THE RESEARCH PROCESS

"Probable impossibilities are to be preferred to improbable possibilities"

-Aristotle

Introduction

We are in early days of a revolution. Many commentators agree that the coming of the microchip brings cheap computing to the masses and signals the beginning of the 'information revolution'. In an influential book, Toffler (1980) calls it 'The Third Wave' following the agricultural and industrial revolutions as major forces shaping the way in which we live in the civilised world. The speed with which changes in the post-industrial society are taking place is amazingly fast. A clear picture of the galloping speed of changes in the Information Society is given by McGarry in his book 'The Changing Context of Information'. In order to appreciate the relative rapidity to these changes, he writes, "let us use a clock as a model to given ourselves an idea of the relative time span. We shall take an arbitrary date of 30,000 years ago, when man began the series of carvings and paintings that led to the cave art. Starting with approximately 30,000 years before the present,
let us take a 24 hour period starting from midnight and allowing
1,200 years for each hour of the clock so that five minutes
equal to one hundred years. For thousands of years, progress
is at glacial speed. The high period of Paleolithic art coming
approximately between 10 a.m., in the morning and 2 o'clock
in the afternoon. The following evening we have the beginnings
of cuneiform writing in the Mesopotamian valleys and hieroglyphics
in the Egyptian temples (about 4,000 BC). At 9 p.m. (about
1800 BC) we have the famous Code of Hamurabi carved on
a slate probably the first example of a mass medium for public
information. At 10 p.m., the beginnings of Athenian and Greek
civilization with its contribution to art, philosophy and
mathematics. At 10.30 p.m., we note the beginnings of the
Judaean-Christian culture in Europe and for the next hours
there is relative stagnation, except for the culture of the
monastic libraries. It is 11.33 p.m., before the invention of
printing and the consequent surge of scientific thinking; and
at 11.48 p.m., Britain is in the throes of the industrial
revolution. The communications revolution has taken place
in the last five minutes. The computer has gone through several
generations in the last five minutes. If we speak of the
microcomputer we are dealing with the last few seconds of
our time. What will have happened by midnight? Who can
predict?". This revolution is occurring because microelectronics
offers us a way of storing, processing and communicating vast
amounts of information quickly and cheaply. It also provides
a way of integrating what have previously been separate ways of handling information; data processing on large mainframe computers, text on typewriters, photocopiers and printing machines, and communications via the telephone, radio and television. The integration of these separate technologies provides the opportunity for a single 'information' technology.

Peter Drucker, the well-known authority on Management Science, asserts that the basic economic resource in the post-capitalist society is knowledge. The wealth creating activities will centre around "productivity" and "innovation", both applications of knowledge to work.

But it is only when we start to examine the ramifications of these disparate applications that we begin to see why there is talk of an information revolution. To quote J.A. Senn "The strategic use of information will continue to create new opportunities in virtually all industries. More than money, the ability to use information to gain competitive advantage-through new products and services or through dealing effectively with customers, suppliers, and competitors-will determine which firms will be successful into the year 2000.

Box 1.1 lists some of the predictions, many of them using the terminology of Toffler, that have been made about the broader effects of information technology.

A popular view is that the gradual spread of electronic information handling will replace paper as the medium of
communication so that, in time, newspapers, books and postal communications will disappear. The familiar sight of an office piled high with paper will be replaced by the quietly humming visual display terminal. As the office changes, so the factory will gradually become uninhabited as assembly robots, remote controlled

Some predictions about the impact of information technology

The Paperless Office
The Unmanned Factory
The Electronic Cottage
The Collapse of the City
The Global Village
The Demise of the Expert
The Leisure Society

Box 1.1

Source: Ken Eason Information Technology & Organisational change.

vehicles and computer controlled machines do all that is necessary to produce the goods that we need.

If it is possible to obtain a rich information exchange from home, why bother going to work? By working over computer networks from the 'electronic cottage' people can communicate with colleagues, write programs, act as secretary to someone who is miles away and could, in theory, even control a process in a factory remotely. If the work can be
done in this way, why bother with the tedious and time consuming journey to the city office block every day? Office blocks could empty, city centres could become deserted and rush hours could become a thing of the past. Access to an information-rich environment could also mean that we are no longer limited in our daily contacts to the people and issues in our locality. If we can communicate just as easily with a person on the other side of the world, may be we will choose only to communicate with those with whom we share specialist interests and the world will become a collection of specialist networks. We could then choose where we want to live rather than where we have to live in order to be near our work.

If it is not only information but knowledge that becomes widely available, we could all, with the tutorage of an expert system at the appropriate time, engage successfully in many of the activities which currently require professionals, whether it is mending a car, decorating a home, buying a house or diagnosing an illness. But if they are not needed to do this work what becomes of the experts? This is but one example of a general prediction that the technology will progressively take over greater proportions of the activities that have so far been the responsibility of human workers. The negative view is that the technology will lead to mass unemployment; the positive view that we will live in a leisured society in which the work ethic will no longer be relevant.
The purpose in listing these predictions is not to suggest they will come true. Most of them are probably wrong and they are almost certainly over simple. The main purpose is to make clear that what begins as a change in technical capability has, through the applications it makes possible, the power to change the way in which we live our lives.

Information and knowledge are deemed to be social wealth. The benefits of this social wealth should be available to all the members of the society. The social wealth is available in a variety forms and contents. Information flow in the fields of Science and Technology is well established, although there are constraints on free flow. However information flow is hampered by a number of factors in fields where we have competition and secrecy.

Society has undergone very significant changes at various periods of human history. Three stages are identified in the course of its evolution. These are the Agrarian society, the Industrial society, and the Post Industrial society. Changes in the post industrial society (in its various sectors of development, like, industry, agriculture, and services) are the fastest. Very drastic changes are predicted in the social life of people in this society.

The impact of information and knowledge is also seen in a number of human activities centering around information.
Some of these are Education, R & D, Mass Communication, Government, Business and Industry, and in the ordinary life of a human being. The global dimension of information technology can be rightly understand from its growing scope. A cursory look at figure 1.1 explains how rapidly information industry is expanding.

**The Segments of Information Industry**

![Diagram of Information Industry Segments]

**Figure 1.1**

Source: MLIS-01, Information & Society, IGNOU Study Material

It is already mentioned that the chief agent of change is Information Technology (IT). *The Department of Trade and Industry, U.K.* gives a comprehensive definition of IT “as the
acquisition, processing, storage, dissemination and use of vocal, pictorial, textual and numerical information by a microelectronic based combination of computing and communication. It is, in other words, the convergence of several technologies that provides for interaction and mutual reinforcement, leading to truly qualitative changes in the entire range of new achievements and possibilities. It is also a controlling technology as Beniger puts it. Here the word control means purposive influence on a pre-determined goal. The goal is socio-economic development and the controlling tool is IT.

The larger implications of IT and its impact on all aspects of human life may have far reaching effects. Some of these, as seen by experts, are listed below:

* Information and knowledge become the principle generators of wealth in the form of educational institutions, research and development, establishments, scientific and technological centres and other similar knowledge oriented bodies;

* Information and knowledge will grow in volume and variety. Criticism, dialogue and commentary will add value to them;

* Changes in resource structure will obviously bring about changes in the power structure. The natural corollary of this is the evolution of a
new power elite, leading to a new power structure at the political level;

* An ever increasing gap will grow between “information rich” and “information poor” among nations and within a nation;

* The actual decentralisation of production and decision making may provide the basis for a rich, articulate and participatory social system; or effect purely physical decentralisation, combined with centralised decision making and organisation, giving rise to an increasingly rigid and monolithic society;

* Changes may lead to increasingly rewarding, qualified, creative and formative work, by eliminating repetitive activities (both physical and mental); or develop highly standardised tailored work, offering only the advantage of lessening the burden of various activities, without any corresponding changes in the social structure;

* A better man-machine relationship by exploiting increased capacities for interaction, dialogue, adoption and intelligence on the part of the machines; or further alienation of the instrument of work, in terms of both ownership and ability to dominate them;

* Increasingly centralised capitalism with a subordinate peripheral system; or horizontal
diffusion of a rich and diversified form of capitalism with growing labour participation and, at the outside, direct management by workers;

* Possibility of increasingly intense interaction between individuals and groups; or a dramatic deterioration in interpersonal relations.

_The Siemens Report_ ⁹ (1978) forecast a 40% reduction in office jobs by 1990 and the influential Nora Report (_Nora and Minc, 1980_) ¹⁰ produced a French forecast of a reduction of 30% in office jobs by 1990. In Britain, _Barron and Curnow_ ¹¹ (1979) suggested there would be a 10-20% loss in typing, clerical, secretarial and managerial jobs in 15 years, and several unions, for example _APEX_ ¹² (1979) and _ASTMS (Jenkins and Sherman, 1979)_ ¹³ made forecasts suggesting a similar loss of jobs.

A recent report by the _Institute for Employment Research_ ¹⁴ at Warwick University (1984) concludes that whilst there may be some gains and some losses in the implementation of office automation, there is unlikely to be an overall changes in job numbers. A report by the _Japanese Ministry of Labour_ ¹⁵ (1984) on office automation reaches a similar conclusion. An Office of Technology Assessment report to the _US Congress_ ¹⁶ (1985) concludes that by the year 2000 there may be some slowdown in the growth of office jobs but no actual decline.
System Approach: A conceptual Analysis

What is a System?

The emergence of the principle of wholeness is the starting point of the systems concept. The word system has been defined differently by different individuals. A meaningful beginning of systems concept emerged with the works of Bertalanffy (1951) and Boulding (1956), which also provided the foundation for the general systems-theory. Bertalanffy (1951) made an attempt to apply the principle of wholeness (general viewpoint) to all branches of science. We also find application of the concept of wholeness and system is also found in the works of Koehler, Lotka (1925), Linau (1947), and Trimmer (1950). Cybernetics Wiener (1948) makes use of the systems concept, which was developed as a general theory, intended to embrace communication, engineering, neurophysiology, psychology, and sociology. Trimmer’s (1950) treatment, though closely linked with cybernetics, is restricted to physical systems, which are the simplest for study; but he hints at a wider scope of the application of this concept, accepting that the study of physical systems may pave the way to that of non-physical ones.

In the broadest sense, a system is simply a set of components that interact to accomplish some purpose. Systems are all around us. For example, we experience physical sensations by means of a complex nervous system, a set of
parts, including our brain, spinal cord, nerves and special sensitive cells under our skin, that work together to make us feel hot, cold, itchy and so on. We communicate by means of language, a highly developed system of words and symbols that conveys meanings to us and to others. We live according to an economic system in which goods and services are exchanged for other goods and services of comparable value and by which (at least in theory) the participants in the exchange benefit. To quote Jerry FitzGerald "A system can be defined as a network of interrelated procedures that are joined together to perform an activity or to accomplish a specific objective."

A business is also a system. Its components-marketing, manufacturing, sales, research, shipping, accounting, and personnel—all work together to create a profit that benefits the employees and stockholders of the firm. Each of these components is itself a system. The accounting department, for example, may consist of accounts payable, accounts receivable, billing, auditing, and so on.

Every business system depends on a more or less abstract entity called an information system. This system is the means by which data flow from one person or department to another and can encompass everything from inter-office mail and telephone links to a computer system that generates periodic reports for various users. Information systems serve all the systems of a business, linking the different components
in such a way that they effectively work toward the same purpose, Figure 1.2 illustrates systems concepts applied to a familiar business situation. Notice the interrelations between the elements. These are important to successful systems operation.

**Systems Concept**

![Systems Concept Diagram](image)

Figure 1.2

Source - James A. Senn - Analysis & Design of information Systems.

**Systems Concept**

Webster's New International Dictionary (unabridged, second edition) defines a system as "an aggregation or assemblage of objects united by some form of regular interaction or interdependence. A group of diverse units so combined by nature or art as to form as integrated whole which function, operate, or move in unison and, often, is obedient to some
form of control; an organic or organised whole; as, to view
the universe as a system, the solar system, a new telegraph
system." The word ‘system’ has been defined in general as
cited above and has as many as fourteen different contexts
in this dictionary, viz. Biology, zoology, geology, music
transportation, physical chemistry, etc. Bertalanffy 27 (1951)
defines a system as “any arrangement or combination, as of
parts or elements, in a whole.”

*Boulding* 28 (1956), while discussing routes for an
approach to a general systems theory, presents a taxonomy
of systems in terms of hierarchy as a route for approaching
a general systems theory. He suggests that we may arrange
all the definable systems in terms of hierarchy, consisting
of nine levels, viz. :

(i) Static systems;

(ii) Simple dynamic systems;

(iii) Simple cybernetic systems;

(iv) Open or self-maintaining system;

(v) Plant life;

(vi) Animal kingdom;

(vii) Human being as a system;

(viii) Social organizations; and

(ix) Conceptual constructs.
Such a hierarchy of systems may enable us to locate gaps in knowledge. Johnson, Kast and Rosenzweig (1964) defined a system as "an organized or complex whole; an assemblage or combination of things or parts forming a complex or unitary whole." According to Hickey (1980), the word "system" has different connotations for the stockholder, the stenographer, the electrical engineer, and the race track tout. In conclusion, he says that "a system is an assemblage of objects united by some form of regular interaction or interdependence, which collectively contribute toward an important and complex function."

Andrew (1965) gives a more comprehensive definition, which conforms to that given by Ashby (1952) and Bergman (1957). Andrew says that "a system will be taken to be a conventionally selected set of variables which putatively interact. This set of interacting variables may be (and doubtless will be) a sub-set of a larger set of variables; in words, the system chosen for study may be a part of a larger system." While this is the case, the sub-system can nevertheless be viewed as an organization. Whether the variables conventionally selected do indeed interact and whether their interactions are significant relationships for the organization in question is a matter of empirical test. But some common sense selection must precede analysis. Here, the interactions or interrelationships are the variables' "behaviour" which ties the system together. In brief,
they constitute the processes of the system. Ackoff \(^{34}\) (1971) gives a simple definition of system and says that “a system is a set of interrelated elements.” According to Robb \(^{35}\) (1973), “a system is an orderly arrangement of elements which works in a particular way: it can be a living organism or a cosmic phenomenon.”

According to Hussain and Hussain \(^{36}\) a system is a group of interrelated, often interacting parts that together constitute a whole. The word ‘system’ may be used to describe naturally occurring groups of objects or phenomena. For example, the sun and the celestial bodies that revolve around it belong to the solar system, according to astronomers. The term respiratory system is used by biologists to describe organs involved in the act of breathing. A system may also be a group of interacting mechanical or electrical components (for example, a hydraulic system) or a set of interrelated ideas or principles (for example, the capitalist market system). Jerry FitzGerald \(^{37}\) has explained the concept as follows: “It is, in effect, all the ingredients that make up the whole. A procedure is a precise series of step-by-step instructions that explain.

1. What is to be done.
2. Who will do it.
3. When it will be done.
4. How it will be done.

The procedure tells us how the ingredients are made into the whole.”
When people design systems, they usually arrange the interacting parts so that an objective or set of objectives can be accomplished. Learning is the objective of an educational system, the administration of justice that of a judicial system. Within a business organization, you may find a payroll system to issue salary checks to employees, an inventory system to control stocking of materials, an accounting system to keep financial records of transactions, a production system to manufacture goods, and so on. These business systems are networks of interrelated processes and procedures to perform an activity, outlining what is to be done, by whom, when and how?

With the invention of the computer, computer systems came into being. Their objective? To transform input (data such as raw facts, figures, or lists) into useful output (information) through electronic processing. Since they generate information, computer systems are often called information systems. Figure 1.3 is a simplified illustration as such a system. The figure shows that the output of the system should be evaluated to ensure that processing objectives are met. If this is not so and reprocessing is required, then information for changing the input needed for reprocessing is provided as feedback.

**Illustration of Information System**

![Illustration of Information System](image)

**Figure 1.3**
Elements of the System

The Traditional Data Processing Approach

In general the procedures whereby a data processing application is created for a mainframe computer within an organisation have traditionally followed the phases described in a Figure 1.4 by Ken Eason.

System Analysis and design

![Diagram of system analysis and design phases]

From the results of studies of users under various conditions we can identify a range of problems they might experience:

A) Technical Knowledge

Users asked to review proposals by specialist staff are often at a disadvantage in that they cannot readily understand the technical proposals being put to them because they do not have the background knowledge to appreciate what is being said. A complex flow chart, for example, full of files, terminals, etc., with notes about rates of transmission...
from one point to another, and the amount of storage available in one place rather than another, is not something that the average user, taken from his normal job to advise on this development, can actually pass sensible comments about. It is a long way from this kind of technical specification to the experience of using a system to improve one's work performance.

**B) Communicating with Specialist**

A related problem is that there may be considerable difficulties in communication between users and specialists. Even if the specialists are part of the same organisation, they may speak a quite different technical language to that used by the user departments and neither side may adequately appreciate the difficulty the other side has in understanding the significance of what they are saying. It may also not become apparent to the people concerned that there are these difficulties because users feel inhibited about revealing their ignorance in settings which may contain many important people within the organisation.

**C) Defining Needs**

One of the duties systems specialists may expect to see performed by user representatives is that of detailed definition of user requirements. It is not easy, however, for anybody to step out of the work role and accurately report how that work is undertaken. It is, for example, well known
that managers asked to report how much of their time they spend in meetings, on the telephone, or travelling, etc. are usually inaccurate in their judgements. The designer does not of course merely wish to know how a person undertakes his work which is a stage further removed. In practise users find it very difficult to arrive at judgements of this kind.

**D) Seeing Opportunities**

A related issue to that of defining needs is that ideally the users in the systems design process will not be reporting what they need in order to support the job as they now do it, but will be examining information technology possibilities in order to see what new opportunities they provide. The intention must be to make a significantly different approach to engaging in the work of the enterprise if the full potential of the technology is to be harnessed. Users who find it difficult to report their existing work and who find it difficult to understand technological descriptions, which may be couched in an unfamiliar language, are not in a good position to see these opportunities and to judge opportunities that technologists might offer them.

**E) Class of Users**

A system may have many potential users so which of them will review system progress? Too often it is a user manager when an end user is necessary because detailed
job knowledge is required or it is a junior user when a major, strategic issue requiring managerial decision is on the table.

**F) Resolving Conflicts.**

Introduction of users into the design team adds a new dimension to the conduct of systems design. It means that the technical specialists are, to some degree, under the control of the users, but the nature and degree of this control by the users and which of the users is exerting this control can often be ambiguous and can often cause conflicts within the design process. Furthermore, a large system may well require representation form a number of different user departments. It is most unlikely that all of these users will define the requirements of the system in the same way and there may be fundamental differences in their aspirations. The technical staff require an agreed specification before they can proceed to detailed design and in some way it will be necessary to resolve the differences between users.

**G) Technical not Organisational Design**

It had been hoped that the involvement of users in systems design would mean that the problems and issues of organisational change would be identified early and appropriate changes. Experience has shown that users working within design teams find themselves concentrating, as the technical systems staff do, on the technical issues. The primary concern
is to judge whether the specification for the technical system is appropriate and whether the technical solutions being proposed are going to be adequate for their job. Once again there is a tendency to leave the broader, organisational consequences are more evident.

It is salutary to note that the extensive documentation of these methodologies does not include methods of engaging in job design and organisational change. It is a method of arriving at a technical not a socio-technical solution.

**H) Acting Quickly**

The above list of problems is quite extensive and to be managed effectively will take time and concentrated effort. Unfortunately time is not usually on the users' side during systems development as can be seen from *Figure 1.5* by *Ken Eason* 39 below, displaying the way in which the technical design proceeds from feasibility through design to implementation in a one-shot implementation process. With users involved in the design process, we can hope that the organisational learning process, i.e. the awareness of users about the organisational issues accompanying implementation, can begin very easily as the technical design process begins. However, if the principle design philosophy is to arrive at the specification and then rapidly to design a solution to meet the specification, then users have to make their views known about the specification and about the early principles of the design.
solution very early in the design process. The principles of setting deadlines and freezing the specification before design underpin structured design methods as they do traditional DP design.

**Technical Design with user involvement**

![Diagram showing Design Degrees of Freedom and Window for User Contributions to Design]

**Figure 1.5**

**Aspects related with Systems Development**

**Management Information Systems**

Transaction systems are operations oriented. In contrast, management information systems (MIS) assist managers in decision making and problem solving. They draw on data stored as a result of transaction processing, but they may also use other information.
In any organization, decisions must be made on many issues that recur regularly (weekly, monthly, quarterly etc.) and require a certain set of information to make the decision. Because the decision process is well understood, we can identify the information that will be needed to formulate decisions. In turn, the information system can be developed so that reports are prepared regularly to support these recurring decisions. Each time information is needed, it is prepared in a predefined form presented in a predetermined format.

*Information systems specialists frequently describe the* decisions supported by these systems as structured decisions. See *Table 1.1*. The structured aspect refers to the fact that managers know what factors to consider in making the decisions and which variables most significantly influence whether the decisions will be good or bad. Systems analysts in turn develop well-structured reports containing the information that is needed for the decisions or that tells the state of the important variables.

**Scope of Information Systems**

As we seen that, there is no single information system in any organization. Structurally, an organization’s information systems are a collection of business information systems for marketing, manufacturing, personnel, purchasing, and other business functions. Each of these basic business functions
### Categories of Information Systems

<table>
<thead>
<tr>
<th>Category of Information Systems</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transaction processing systems</td>
<td>Substitutes computer based processing for manual procedures. Deals with well-structured routine processes. Includes record keeping applications.</td>
</tr>
<tr>
<td>Management Information systems</td>
<td>Provides input to be used in the managerial decision process. Deals with supporting well-structured decision situations. Typical information requirements can be anticipated.</td>
</tr>
<tr>
<td>Decision support</td>
<td>Provides information to managers who must make judgements about particular situations. Supports decision makers in situations that are not well-structured.</td>
</tr>
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</table>

**Table 1.1**


comprises transaction level activities, routine decision making and the occurrence of unique decision requirements, and office/departmental support applications.

It makes sense that the various business functions in an organization will need information systems support—hence the notion of functional area information systems. This is how information systems evolve in organizations.

**Systems Development Strategies**

Computer information systems serve many different purposes, ranging from the processing of business transactions...
the lifeblood of many organizations to providing information needed to decide recurring issues, assisting senior officials with difficult strategy formulations, and linking office information and corporate data. In some instances, the factors to be considered in an information systems project, such as the most appropriate aspect of computer or communications technology to be applied, the impact of a new system on the people in a firm, and the specific features the system should have, can be determined in a sequential fashion. In other instances, experience must be gained through experimentation and the staged evolution of a system.

As computers are used more and more by persons who are not computer professionals, the face of systems development is taking on an additional dimension. Users themselves are undertaking development of some of the systems they use, as the executive in the vignette emphasized.

These different situation are represented by three distinct approaches to the development of computer information systems:

1. Systems Development Life Cycle Method
2. Structured Analysis Development Method
3. Systems Prototype Method

Above three methods can briefly understood from the Table 1.2.
## Characteristics of System Development approaches

<table>
<thead>
<tr>
<th>DEVELOPMENT APPROACHES</th>
<th>DESCRIPTION</th>
<th>APPLICATION CHARACTERISTICS</th>
</tr>
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</table>
| System development life cycle method | Includes the activities of preliminary investigation, requirements determination, system design, software development, systems testing, and implementation. | - Predictable information systems requirements.  
- Manageable as a project.  
- Requires entry of data into files and databases.  
- High transaction and processing volume.  
- Requires validation of data input.  
- Spans several departments, Long development time table.  
- Development by project teams. |
| Structured analysis method | Focuses on what the system or application does rather than on how it does it (i.e., emphasis is logical, not physical). Uses graphic symbols to describe movement and processing of data. Important components include data flow diagrams and data dictionary. | - Suitable for all types of applications.  
- Most useful as a supplement to other development methods. |
| System prototype method | Interactive or evolutionary development where the user is directly involved in the process. | - Unique application settings where developers have little information or experience, or where costs or risks of error may be high.  
- Also useful for testing system feasibility, identifying user requirements, evaluating a system design, or examining application usage. |

| Table 1.2 |
Hussain & Hussain described, Development Life cycle as shown in Figure 1.6

**Development of Life Cycle**

![Diagram of Development Life Cycle]

**Figure 1.6**

**Determination of System Requirements**

At the heart of systems analysis is a detailed understanding of all important facets of the business area under investigation. (For this reason, the process of acquiring this information is often termed the detailed investigation). Analysis, working closely with employees and managers, must study the business process to answer these key questions as shown in Box 1.2

To answer these questions, systems analysts talk to a variety of persons to gather details about the business process
Key Questions

What is being done?
How is it being done?
How frequently does it occur?
How great is the volume of transactions or decisions?
How well is the task being performed?
Does a problem exist?
If a problem exists, how serious is it?
If a problem exists, what is the underlying cause?

Box 1.2

Source: James A. Senn "Analysis & Design of information systems"

and their opinions of why things happen as they do and their ideas for changing the process. Questionnaires are used to collect this information from large groups of people who cannot be interviewed individually. Detailed investigations also require the study of manuals and reports, actual observation of work activities, and, sometimes, collection of samples of forms and documents to fully understand the process.

Design of the System

The design of an information system produces the details that state how a system will meet the requirements identified during systems analysis. Systems specialists often refer to this stage as logical design, in contrast to the process of developing program software, which is referred to as physical design.
Systems analysts begin the design process by identifying reports and other outputs the system will produce. Then the specific data on each are pinpointed. Usually, designers sketch the form or display as they expect it to appear when the system is complete. This may be done on paper or on a computer display, using one of the automated system design tools available.

The systems design also describes the data to be input, calculated, or stored. Individual data items and calculation procedures are written in detail. Designers select file structures and storage devices, such as magnetic disk, magnetic tape, or even paper files. The procedures they write tell how to process the data and produce the output.

The documents containing the design specifications portray the design in many different ways—charts, tables, and special symbols. The detailed design information is passed on to the programming staff so that software development can begin.

Designers are responsible for providing programmers with complete and clearly outlined software specifications. As programming starts, designers are available to answer questions, clarify fuzzy areas, and handle problems that confront the programmers when using the design specifications.

**Desirable characteristics of a good system**

The system should provide information that is
Consistent, Accurate, Timely, Economically feasible, and Relevant. These characteristics cater to the needs of the organization in which the system is used. Jerry FitzGerald has identified a variety of essential characteristic of a good system. These characteristics are enlisted below:

1. Establishes standards so you can write procedures on how to do the job.
2. Specifies each area's responsibility so that individual managers will be accountable for the work they manage.
3. Delineates actions and decisions so the logical system can be designed with the proper physical system hardware, software, forms, and/or manual interfaces.
4. Is easily understandable so the people who utilize it on a day-to-day basis can perform their work effectively and efficiently.
5. Provides evaluation criteria with which to judge its performance.
6. Identifies the decision points so the proper decisions can be made in the work flow progress.

**Tools for Systems Development**

Broadly speaking, a tool is any device that, when used properly, improves the performance of a task, such as the development of computer information systems. In general, the tools are grouped into the categories of analysis, design, and development.
Analysis Tools

Analysis tools assist systems specialists in documenting an existing system, whether manual or automated, and determining the requirements for a new application. These tools include:

Data Collection Tools

Capture details describing current systems and procedures. Document processes and decision activities. Used to assist in requirements identification.

Charting Tools

Create graphic representations of systems and activities. Assist in the drawing and revision of data flow diagrams and icons associated with structured analysis. Also include flowcharting programs.

Dictionary Tools

Record and maintain descriptions of system elements, such as data items, processes, and data stores. Often provide the capability to examine system descriptions for inconsistent or incomplete descriptions. May also include the capability to report where items are used.

The most useful tools in each of these categories are becoming automated, both to improve the efficiency of the analyst and to make the results of the analysis effort more accurate and complete.
Design Tools

Design tools assist in formulating the features of a system that will meet the requirements outlined during the analysis activities:

**Specification Tools**

Assist in stating the features that should be included in an application, such as input, output, processing, and control specifications. May also include tools for creating data specifications.

**Layout Tools**

Used to describe the position of data, messages, and headings on display screens, reports, and other input and output media.

Analysts have used tools for the design of systems since the early days of computing. However, the recent infusion of computer assistance and powerful graphics is giving new meaning to systems design.

Development Tools

Development tools aid the analyst in translating designs into functioning applications:

**Software Engineering Tools**

Assist in formulating software designs, including procedures and controls, as well as documentation for the design.
**Code Generators**

Produce source code and working applications from functional specifications that are well articulated.

**Testing Tools**

Aid in evaluating a system or portion of a system against specifications. Include examination for correct operation, as well as for completeness in comparison with expectations.

**Utility & Problems of Systems Development**

Information technology may represent a fundamental way of transforming society but each application will be undertaken in order to achieve specific benefits. The technology can be employed to achieve a wide variety of benefits and here an attempt is made to examine the main types of benefits and their organisational ramifications.

Because any kind of technical innovation represents a risk, an attempt will be made to examine the problems of implementing information technology. To begin by looking at some of the evidence about the success or failure rates of information technology projects. These data are difficult to attain but frequently there are disasters; even more often there is disappointment and frustration. The commonly voiced complaint is that the technology is being oversold; the type is such that it cannot achieve what it purports to achieve. It is difficult to put figures to the shortfall. Suppliers are
not likely to advertise application difficulties and user organisations are not overkeen on their problems being made public. Nevertheless, there are some studies that give an indication of the scale of the problem and the nature of the outcomes.

Types of benefit

An organisation can be viewed as a collection of resources deployed to handle a specified workload. In these terms we can employ information technology to increase the work undertaken (or impose its quality) or we can use it to replace or reduce the resources we need to deploy. The Figure 1.7 shows a classification of information technology benefits based upon a continuum from resource reduction to work enhancement. It groups the benefits into four types. The first is cost savings. The major cost in offices is staff costs and the reduction of the number of people employed (or their more effective deployment) is often a major target. Other costs may be reduced; if everything is stored electronically, we may save the costs of paper and the space needed to store bulky paper.

Rather than reduce the cost of resources we may choose to seek higher productivity from existing resources. Thus, a group of secretaries may be expected to process many more words or a telephonist may be expected to control the transmission of many more messages.
Information Technology benefits in the office

<table>
<thead>
<tr>
<th>Tangible Benefits</th>
<th>Intangible Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cost Reduction</strong></td>
<td>- Staff savings after Direct cost savings eg. space</td>
</tr>
<tr>
<td><strong>Improved productivity</strong></td>
<td>- More words Processed More Messages Transmitted</td>
</tr>
<tr>
<td><strong>Improved Support</strong></td>
<td>- Improved information Decision Support Expert Assistance Computer Aided Support</td>
</tr>
<tr>
<td><strong>Organisational Enhancement</strong></td>
<td>- New Forms of integration New Business</td>
</tr>
</tbody>
</table>

**Figure 1.7**

*Source - Ken Eason - Information Technology and organisational change*

The third major group of benefits arises as a result of an expansion of the quantity or the quality of the work done directly in pursuit of the organisation's objectives. The technology may be used to improve the information available to executives or to improve the support for their decision making. Expert systems may be used to provide specialist knowledge that might otherwise not be available and computer aided design (CAD) systems might be used to improve the quality of design.

Finally, and most importantly if any dramatic revolution in user organisations is to occur, there is the use of information technology to seek new and valued objectives that could not
otherwise be contemplated. This may involve internal objectives such as new forms of integration and communication or it may involve external objectives in new areas of business.

Organisations using information technology systems may be seeking any or all of these benefits. But it would be unrealistic to assume that all organisations are clear about the benefits they seek. There are many applications which are stimulated by concern for the way other companies, especially competitors, are applying the technology. There may be a fear that competitors may be successful, that the advertisements for information technology products may be right, and that they may be left behind. They may also want to give the impression of being an up-to-date, efficient, high technology organisation.

Almost any organisational objective can be supported directly by information technology; marketing, sales, production, research, monitoring the outside world, maintaining security, storage and distribution, etc. Applications can be identified in each of these areas. In many there is a gradual shift from existing objectives to new ones; from existing services or products to new ones. Most service organisations are offering a wider range of services, confusing the traditional boundaries between organisations. Banks, building societies and other financial institutions are now in direct competition and information technology is an underlying reason why this is happening.
Many of the changes may be organisational in character making it possible to achieve other objectives. *Promfrett and Damodaran* (1989) give an example of an organisation taking out a tier of its regional marketing structure by using information technology to enable salesmen to communicate with the regional headquarters from their homes. The concept of Telework, i.e. using information technology to allow staff to work from home is now becoming a practical reality; see, for example, the Rank Xerox Experiment *Judkins* et al., (1985). An alternative is the Locak Work Centre *Hedberg and Mehlmann*, (1984) in which a number of organisations share offices wired for all forms of information technology local to the homes of their staff.

This list of possible organisational enhancement objectives could be much longer, as long as the myriad goals of organisations. Many applications, however, lead to failure. Problems in establishing a Systems Network.

1. **Defining the Organisational Need**

These applications should start from the identification of objectives the organisation can beneficially pursue. They should not start from a new technical opportunity because this may not mirror a real organisational need. Frequently this is how they do start and the result can be a system that does little for the fundamental problems and opportunities of the organisation.
2. Developing Specialist Systems

Whilst the systems implemented may belong to the families of applications described above, each will have to be uniquely developed to meet the organisational need and to match the organisational structure. Attempts to provide standardised solutions at this level have often led to disasters. An excellent example is the development of Management Information Systems (MISs) in the 1970s. In many organisations grandiose plans were drawn up to provide rather rigid information services to all managers. The result was what Ackoff* (1967) called 'Management Mis-formation Systems'; services that provided piles of irrelevant, out-of-date data but little usable information because the services were inadequately matched to the needs of managers. Many systems fell into disuse. The need is to specify the technical service required to meet the unique organisational need and this requires a combination of technical knowledge, business requirements and inside knowledge of the organisation in question.

3. Organisational Change

Above all other considerations, the pursuit of organisational enhancement using information technology demands organisational change. Computer integrated manufacture needs dramatic changes in the work roles of people in production units. Inviting a substantial proportion of employees to work from home needs completely new ways of running the business. It has often been failure to think through and
implement these changes that has led to lack of success. The result can be a new form of technical systems harnessed to an old form of social system, the incompatibility of the two preventing the achievement of the original objective.

4. The Problems of Achieving Benefits

Here it will be appropriate to summaries the issues which confront the organisation seeking benefits from information technology. This review suggests that the claims for information technology are real especially in its ability to enhance the work of staff individually and collectively. The overselling seems to have occurred not in the statement of potential benefits but in the problems of achieving the benefits. The worst offenders are those who claim that it is easy; 'you buy it, switch it on and the fruits of the new age are yours.' Nothing could be further from the truth.

Environment of the system

A system operates in an environment, i.e. the environment of the system of what lies outside the system. When we say that something lies “out-side” the system, we mean that the system can do relatively little about its characteristics or its behaviours. Moreover, not only is the environment something that is outside the system's control, but it is also something that determines in part how the system performs. Secondly, the environment of the system greatly influences the “requirement schedule” of the system.
Parsons (1960), while discussing an organization as an open socio-technical system suggests that there are three managerial levels in the hierarchical structure of a complex organization: the technical or production level; the organizational (managerial) level; and the institutional or complexity level. This analysis provides a useful framework for discussing the concept of the environment. Petit (1967) introduces the concept of boundary and further describes the analysis given by Parsons. He says that the technical level has a boundary that does not seal it off entirely from the system’s environment but does have a high degree of closure, and consequently is more susceptible to the intrusion of internal elements. The institutional level has a highly permeable boundary, and is therefore strongly affected by uncontrollable and unpredictable elements in the environment; inputs enter the system, are transposed into outputs in the technical sub-system, and then disposed of in the environment. Petit (1967) presents the whole analysis diagrammatically shown in Figure 1.8.

Eurich (1960) observes, “In education, we seem to dread the word efficiency. It is a word from business, and educational instruction must not be business.” But, in fact, education is big business. Secondly the resources at the disposal of any society are, by definition, scarce or limited; they are not free, like air or ocean water. Hence, the allocation of educational budget has to be made in such a way as to
get the most highly valued returns on the resources expended. Hence the need for effective and efficient organisation, planning, execution and evaluation. Education is now facing the prospect of demands and expenditures which are rising beyond income. Hence the need for systematic thinking to get more from our educational resources— that is, to increase efficiency, may be by comparing alternative methods of reaching the different goals.

A management information system has been defined as “a formal system in the organisation which provides management with the necessary report to be utilised in the decision making process” (Schoderbek, Kefalas and Schoderbek, 1975). Such reports should contain information rather than data, the distinction being that data are merely a collection
of symbols, numerical, alphabetical or both, whereas information is the meaning derived by the user from the data - information is evaluated data. The need for information arises in the decision making process from the need "to reduce uncertainty so that the correct choice can be made. If there is no uncertainty, there would not be a need for information to influence the choice" (Davis, 1974).

**Changing Concepts in Educational Administration**

A change in the concepts of educational administration has possibly been influenced by the change in the concept of man and the development of new theories of organization. Cubberley (1916) has described the school, superintendent as a heroic, almost superhuman, figure. In his system of administration, the administrator of an educational institution has been described as a manager, proficient in the techniques of management and school operation. According to NSSE (1946), educational administration is a social statesmanship which guides educational activities, plans programmes and facilities, and provides leadership in a long term, but broad, social perspective. Sears (1950) makes administration roughly synonymous with management and observes that, in its proper use in education, it contains much that we mean by the word government, and is closely related in content to such words as superintendent, supervision, planning and regulation. Miller and Spalding (1958) treat administration as the making and
carrying out of decisions about how to attain what is agreed upon by the people themselves or by their representatives. Knezevich 59 (1952) describes administration as a process concerned with creating, maintaining, stimulating and unifying the energies within an educational institution towards the realization of predetermined objectives. According to Getzels and Guba 60 (1957), the administration may be conceived structurally as a hierarchy of subordinate-superordinate relationships within a social system. Functionally, this hierarchy of relationships is the locus for allocating and integrating roles and facilities in order to achieve the goals of the social system. It is in these relationships that the assignment of positions, the provision of facilities, the organization of procedures, the regulation of activity and the evaluation of performance take place.

Research in Educational Administration in India Desai and Rao 61 (1974), in their chapter, "Educational Administrations: A Report", contributed to A Survey of Research in Education by M.B.Buch 62, have presented a detailed account of researches conducted in the area of educational administration in India till 1974. In all, they have reported 53 studies which, they claim, may be broadly classified in seven areas, viz.,

(i) Educational authority or agencies;
(ii) Inspection and supervision;
(iii) Different branches of education;
(iv) Educational problems, such as compulsory education, wastage and stagnation;
(v) Organization and planning;
(vi) Organizational behaviour; and
(vii) Miscellaneous.

Almost all these studies are of a survey nature. Practically no attempt has been made to conduct any experimental study in area. Since it is a new and developing area of research, one finds that, in most of the cases, broad sub-areas of educational administration have been for research. It would easily be noticed that a knowledge of the theories of organisation and changes in the concept of man as well as educational administration have not been fully utilized by researchers so far in specifying the research areas. The new methodology, i.e., the systems approach, has rarely been used and a systems view has rarely been taken while planning researches in this field. The result is that very few research attempts, particularly in the area of education, have been really been concerned with a modification of administrative systems as such. It is also obvious from the classification reported by Desai and Rao (1974) that researchers of an applied nature have attracted the attention of Indian researchers and that the result has been that the findings of the researches done so far in this area cannot be synthesised and used for remodelling or redesigning the administrative structures.
It has rightly been pointed out by Desai and Rao (1974) that all approaches to organization study and to studies in the area of educational administration should aim at the maximization of efficiency in the accomplishment of the task for which the organization, i.e., the educational system, has been set up. They further suggest that, in analytical terms, as a result of research studies, the educational system should achieve:

(i) Efficient performance of the primary mission for which the organization is set up;
(ii) Reduction in interpersonal, intergroup or interdepartmental conflicts, a balance of power and performance among the sub-systems of the system;

and

(iii) Opportunity for individual members to realize their individual capabilities of growth to the optimal level and enjoy both the social need and job satisfaction.

In the final analysis, our research programmes should be based on the new concept of man and the new theory of organization so that both effectiveness and efficiency may be achieved and optimal systems may be developed.

**The Research Problem**

The growing demand for mechanization and automation has resulted in more. Sophisticated machines, computers
and computerization, it has changed the way of our thinking's the way in which we work. The growth of automation in administration has helped in simplifying the office procedures and to enhance the work efficiency. The concept of office automation has influenced even the field of educational administration. The computerization of university system, university administration has geared up slowly in INDIA. Today the use for computerization for administrative, examination purpose has helped in solving many problems of educational institutions. However, the process is still not implemented to its fullest extent. The present study is an attempt to know, how and to what extent the computerization can be implemented in the University? Hence the title of study is “Application of Management Information Systems in Developing a Total System Approach for Institutions of Higher Learning - A Case study of Amravati University”.

Objectives of the present study

The main objectives with which the present study was undertaken are enlisted below :

a) To find out the extent to which a total systems approach can be implemented in the university context.

b) To work out plan to install a total computerization plan in the context of the University structure.

c) To find out the problems and issues involved in implementing the computerization plan in the university system.
d) To identify the areas where computerization can save the funds, efforts and resources.

e) To identify the training needs and to develop a suitable human resources system effective for computerization.

**Rational of the present study**

The concept 'Information Technology' is now well established all over the world in every sphere of life. Hardly there is any activity where the system approach is not applicable and is not applied. The concept of totality and its impact on understanding of a problem has given a new dimension to desire and development of every system.

Business organisations have accepted the concept of system approach because of its manifold advantages. It has improved the efficiency, effectivity and profitability of business houses as different activities are now rightly linked, reducing wastage, losses and many kinds of duplication of activities. Even in non-business activities, administration undertaken by adopting principles that are applicable in the field of business management. Hence, the system approach was accepted and applied even by Government and other administrative agencies basically working for welfare and development. This has led to apply the system approach even in the agencies like Universities, Trusts etc. The application of systems approach to University Administration can effectively reduced the problem
of wastage, duplication of activities and help improving its efficiency as well as image. The enormous size of funds that are poured-in for development of effective higher education can be rightly put to use if there is an appropriate planning, control and management of education system. The planners at the apex level have understood this view in the right context and have emphasized on applying different principles of business administration to the administration of educational institutions like Universities.

The application of computer based Information System and Management Information System to Universities administration is the recent phenomena. In the last two decades; experts, administrators and educational planners have started thinking of applying the system approach to educational administration. Further, developing a suitable MIS has proved the great boon to the Universities and even in the University administrations, timely decisions, regular control and minimization of research ways have a vital importance.

Building up of an effective Management System requires a suitable Database. No decision making system can be efficient without appropriate data Packages and Information Systems. The diversified nature of work of Universities and multiple levels of administration makes difficult to establish a comprehensive Management Information System. Installation of a manually developed Information System hence becomes
complicated activity. Developing suitable Packages, information inputs and their inter-linkage is often tough task when it is done manually. There are many complications, loopholes and limitations which prohibits development of suitable Information System without aid of computers. Hence, in the early phases, though educational planners have realised, the importance of MIS though they could not establish an efficient Management Information System.

The advent of computers and availability of different softwares have now made it possible to develop suitable Database Packages for developing appropriate system for inter-linked information inputs and creating an efficient electronics Management Information System. Now it will be an easy for every University to establish an efficient MIS by taking assistance of different computer aided softwares. Rational of the present study can be put-forward in the following manner -

(A) Institutions of Higher Learning like Universities utilise a great chunk of resources allotted for the educational activities. Hence, efficient management of this resources is essential which invites effective system of administration. Such a system can be established, if an organisation has a sound Management Information System, supported by the appropriate decision unit.
(B) Establishment of effective Information System can reduce duplication of many activities which can avoid wastage and help in timely decision making as well as removal of bottle-necks in the administrative process.

(C) A sound MIS works to protect from damages to the system, avoids any delay and can help in appropriate image building.

(D) Universities are basically user-oriented organisations. Efficient service is only criteria to judge whether an organisation is user-oriented. The goal of effective user-oriented organisation cannot be achieved without a proper Management Information System. Here again, installation of an appropriate MIS can help Universities in many ways.

(E) The success of many organisation depends on Control, Co-ordination and Co-operation. A rightly designed Management Information System tries to achieve all these three objectives and hence, it is essential that University should install computer based Management Information System, which means requirements of administrators, the expectations of the students and fulfills the societal commitments.

From the above justification, it is very clear that there is a need for computer based Management Information System for the right kind of administrative set up; for efficient work culture and for effective decision making in University set up.
Limitations of the study

The Study has following limitations-

1) The present study is restricted to the activities of Amravati University, Amravati i.e. the entire system is designed and development is made after considering basic status and methods of operation prevailing in this University. Hence, the conclusions drawn in this study cannot be applied to all such similar organisations without appropriate modifications and alterations.

2) The study is restricted to the extent of suggestion and development of a suitable Information System by applying the computer process. However, no attempt is made to develop softwares and programmes which can help in installing an actual computerised Database Management System.

3) In this study only, selected activities are studied and a course of development of suitable Information System has been suggested. All the activities of all the sections are not studied and analysed; certain activities have been left due to constraints of time, availability of data and other technical problems.

In the light of above limitations, conclusions and suggestions are drawn in this study. All these aspects have to be considered so that relevance and the rationale of the study can be rightly adjudged.
Relevance of the present study

Considering recent trends in educational administration the present study is the need for an hour. The apex institutions of

Stages of System Development Activity

Stage 1
Analysis of Present System

Formal User Review 1

Stage 2
Specification of New System

Formal User Review 2

Stage 3
Selection of User Options

User Selection of Options

Stage 4/5
Data Design/Process Design

User Evaluation

Stage 6
Detailed Physical Design

Flow Chart 1.1
higher learning i.e. U.G.C. and A.I.U. also have heavily stressed upon the implementation of computerization for educational administration. The growing cost of administration and the increasing number of students is continuously burdening the system. The financial and administrative accountability has also undergone a sea change. The process of computerization also helps in quick updating the data so as to improve its accuracy. Furthermore, when most of the organisation are computerizing their work system, no institution of the status of university can keep itself away from the process of computerization. For the purpose of present study the system development activity is divided in six stages. These six stages explained with the help of Flow-Chart 1.1

**Major Aspects of Research**

In this study the researcher has tried to evaluate the existing systems of Information and Data submission to the Management from various levels. In order to develop a more comprehensive and updated M.I.S. The researcher has proposed to establish following setup of the system.

**Establishing a Total System**

This system is developed to include a comprehensive system that covers all subsystem. The total system is an integration of all subsystems, that will integrate various section and activities. Each section Viz. Finance, Administration, Academic, Development, Examination and Library etc. Thus
the entire work system is a complete integration of the working pattern of the University.

The subsystem is designed to cover every small activity of each section or division so that it can rightly integrate and co-ordinate various functions. Each subsystem is covering its basic activities and at the same time integrate itself with other sections.

A intra-linkage subsystem is also designed for linking of the inter-departmental activities.

**Designing the sub-system**

In this study, the sub-system means all the systems that are restricted to a particular department / section or specific activity. Such sub-systems actually form one complete activity and they are responsible for completion of one particular desired activity, such as, declaration of results is one such activity which is the part of sub-system of Examination Department. Similarly, preparation and finalisation of the course curriculum can be inter activity which is a part of a sub-system called “Academic Section.”

**Inter-linking of sub-system**

According to concept of the systems, no sub-system can work independently. It has been rightly linked with other sub-system so that, the entire system or a total system can
work in its effective manner. From this point of view, the major thirst area of this research is to develop a plan which will inter-linked all the sub-systems and help to form a cohesive Total System.

**Computerisation of the University activities**

The entire University as an Academic System can be computerised in order to reduce the problems of delay in work efficiency, reluctance and apathy. In this research, a special emphasis is given as to find out how the system approach can be effectively utilised for computerisation of the University system.

**Methodology of the System**

The present study has been undertaken to find out how an efficient M.I.S. and computer based data system can be established in universities. From this point of view, the researcher has adopted a three tire methods of analysis.

a) At first level the primary and fact base data is collected from the main and primary sources by interviewing the officials and by observing the existing system.

b) At the second stage a system designer is formulated to find out the manner in which it can be implemented.
c) At the final level the actual system design is constructed so as to implement an effective M.I.S. and M.C.S. through computer aided systems.

Hypothesis

The present study is based on following basic assumptions.

a) The application of systems approach can enhance efficiency of the organizational functioning of universities.

b) A well designed M.I.S. can improvise the work procedure and is useful in proper coordination of various activities.

c) Computer-based systems are useful to save time, money and other resources.

Research design & Sampling

The total research process consists of various activities. The activities are divided into main activities and subactivities.

Keeping in mind the nature of study the total functioning and procedures of the University are studied. From this point of view, this study is a case analysis of the Amravati University. The study covers analysis of all procedures and subprocedures of the Amravati University.
The Flow Chart 1.2 explaining the research design and total coverage of the study is as follows:

**The Research Design and total coverage of the study**

![Flow Chart 1.2](image-url)
Conclusions of the Study

The main conclusion and findings of the study

The existing system that are working in the university are evaluated by using certain criteria. The criteria applied for evaluation are given in the Box 1.3.

Evaluation Criteria of System

| Specialist technical skills where needed |
| Specialist social skills where needed |
| Users able to contribute task knowledge |
| Users able to assess organisational effects |
| Practical use of resources |
| Acceptable to the organisation |

Box 1.3

The researcher has faced certain problems in projecting and establishing an information system in organization like University. The problem that have been experienced are given in Box 1.4.

Obstacles for effective system establishment

| Users reviewing rather than doing |
| Users predicting future needs |
| Understanding technical language |
| Managing status and occupational differences |
| Getting time to consult |

Box 1.4
The learning needs and modes of promoting learning are shown in *Box 1.5*.

**Learning needs and modes of promoting learning**

<table>
<thead>
<tr>
<th>Delivery Mode</th>
<th>System Centered</th>
<th>Application Centered</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I.T. Basics</td>
<td>System Model</td>
</tr>
<tr>
<td></td>
<td>Command Learning</td>
<td>Skills Match</td>
</tr>
<tr>
<td></td>
<td>Task-System</td>
<td>Application Build</td>
</tr>
<tr>
<td>General Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Familiarisation</td>
<td>✓✓</td>
<td>✓</td>
</tr>
<tr>
<td>Main Interfaces</td>
<td>✓✓</td>
<td>✓✓</td>
</tr>
<tr>
<td>On-line Help</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Manuals and Prompts</td>
<td></td>
<td>✓✓</td>
</tr>
<tr>
<td>Expert Support</td>
<td></td>
<td>✓✓</td>
</tr>
<tr>
<td>Local Experts</td>
<td>✓</td>
<td>✓✓</td>
</tr>
</tbody>
</table>

**Box 1.5**

It is noticed from *Box 1.5* that in order to establish suitable MIS, the organization (University) will have to consider the learning needs and new modes of learning of the employees. Then only the employees will understand how to use information system, otherwise the system may not work effectively.

**Training for effective implementation of a system**

In this study it is noticed people often belive that, computer based data system cannot work effectively in university...
setup, because profit is not the motive and efficiency is not the watch-word. Hence to remove this barrier there is strong need for training for occasional users. This training can be of following five types.

1) Training for full-time users where heavy emphasis will be given on how to analyse, install, implement and evaluate a system.

2) Limited training for those users who are frequently associated with the system & databases.

3) Development of manuals for those who are less frequently come in contact with the system.

4) On-line help for those users who use the system as and when it is needed.

5) Hotline support training for instant and irregular users.

**Chapterisation**

The entire study is divided into following chapters -

**I) The Research Process**

This chapter has covered the process of research methodology and other aspects of research process.

**II) The Concept of System Approach**

This chapter has dealt with idea of system approach and its application in educational administration.
III) M.I.S. and Computerization of The University System

This chapter has encompassed various aspects of computerization.

IV) The Analysis of Work Procedure

In this chapter the researcher has covered issues like; how computer based systems can be installed in the University setup? and what are the elements of work system?

V) Challenges & responses of Higher Education in India

The chapter deals with status of higher education in India and its role in national development. Similarly, it throws light on various constraints and challenges faced by institutions of higher learning in India.

VI) Development and Design of Computer Based M.I.S.

In this chapter the researcher has tried to formulate the model of systems useful for application of computer based data systems of M.I.S.

VII) Conclusions

Suitable and appropriate conclusions are drawn by using the data, models applied and observations of the research.
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