UNIT 3 THE ORGANISATIONAL IMPACT OF MIS

Structure

3.0 INTRODUCTION

Unit 1 underlines the importance of understanding organisation for a successful implementation of MIS. In this Unit we reaffirm some of the ideas and provide a frame work that calls for viewing information as a corporate resource just as other resources like Finance, Personnel or Machines. With h e changing role of MIS his unit also outlines that competitive advantage that can accrue due to effective use of MIS.

3.1 OBJECTIVES

After going through this unit you should be able to :

- view information as a resource
- understand the role of MIS in future
- appreciate the importance of MIS profession.

3.2 INFORMATION AS A' RESOURCE

Traditional economists of the pre-industrial era considered only land and labour and capital as the resources. With the emergence of industrial revolution and the availability of powered engines the importance of the resources changes relatively. The technology of mass manufacture placed a premium on the "technology" which emerged as the major resource. In fact this resource particularly in the context of changing job mix, as outlined in Unit 1, completely overshadowed the traditional resources. A shining example to illustrate this point is the emergence of Japan as the major international power.

With the recent information revolution, the prized resource is actually information. This point can be better appreciated when one considers the success or failure of products that appeared in the market at the right time or wrong time. While the technology of two products would be comparable, the vendor who brings in the product a few months, ahead of the competitor wins substantially more market than the later. Late introduction a new technology product in the market may even translate to a virtual collapse of an organisation.

The information being such a vital resource need to be managed just as other resource like money. Formal methods to control, monitor and evaluate this resource are needed to manage the organisation successfully. We have discussed this issue in section 2.4.1. There is also a need for corporate strategy to manage such a vital resource.

3.3 INFORMATION FOR COMPETITIVE ADVANTAGE

Recently organisations have not only found out the immense utility of infonnation systems to better manage their organisations but are also feeling the potential of the competitive advantage provided by information as a resource. The classic example of the use of information for competitive advantage is SABRE Airline Reservation System [ ] of American Airlines and the Frequent Filer Option introduced by Airlines the world over. These are examples that illustrate the use of information not just Io run business effectively but to open up new business vistas.

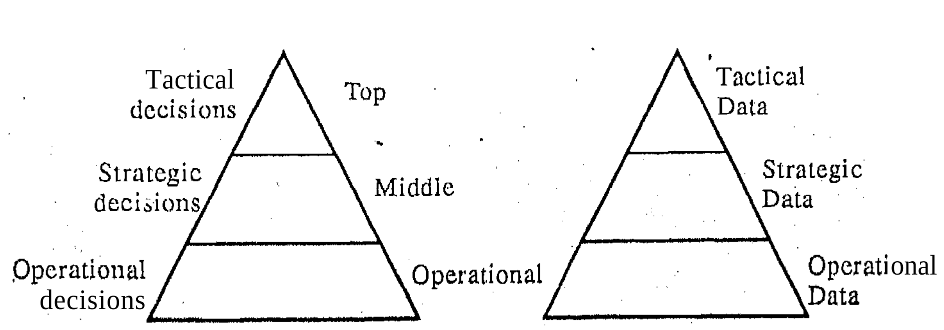
Even in the Indian context, the Citi Bank's expansion into a larger market share compare lo Grindlays Dank is an example. Due Io Government restrictions Citi Bank had to contend with their existing 6 branches compared Io 26 branches of Grindlays. Using telecommunication, Citi Bank could still manage to capture large percentage of the business.

Information as a resource can provide new value added business prospects as well. The reduction in Telephone Tariff at off peak hours by the Dept. of Telecommunications last year is an example Io illustrate this point. Based on the data collection capabilities of the new generation trunk exchanges it was much easier Io detect the poor utilisation of trunk lines. 'Similar exercises would not have been easily possible but for the information capture capabilities of the electronic exchanges.

'3.4 ORCANISATION, INFORMATION AND DECISION

Successful development of infonnation systems call for a deep understanding of the organisational structure and dynamics of the enterprise. Some organisation are goal oriented, the analyst must be clear as Io what information exactly need to be collected, stored and analysed, Since every information must have a context, only operational information that ultimately has some decision making contribution must be collected. Second the information collected and processed must be consistent with the level of the organisation to which it is to be presented. In this context, a classification of organisation by Anthony [] is very useful.

According to Anthony's classification, there are basically three levels of management, independent of the size of the enterprise: operational level, middle level and top level management. Operational decisions that call for large volumes of internal data (local to the enterprise). The middle management is concerned with medium range (tactical) decisions that call for much less information. The top management being concerned with long term (strategic) decisions calling for just a few vital internal information but a lot of external information as well. Any successful infonnation system should take into account such a pattern of information needs by the management. This is generally pictorially displayed in the form of Management vs Information Pyramid.



The importance of information to management is further emphasized by the fact that much of management is primarily decision making. While there are several views of what constitute management, the generally accepted planning, organising, coordinating, directing and control are all concerned with decision making. In this text we take such a view of management and we perceive management information systems lo support such managerial decision making. We also would like lo emphasize that information systems should address clearly the situations of programmed decisions and **non-programmed**[] decisions by properly structuring the appropriate information. Failure to recognize intrinsic difference may lead to a failure of the information system.

Several functional areas of management viz. personnel, marketing, production, finance and services will be significantly influenced by the information systems that are to be implemented in the organisation. Care must also be taken to recognize the fact that in cvery functional area the mapping of the informational pyramid must be carefully worked out. Typical example of the three levels of information among the functional areas of management are as follows (reproduced from Section 1.7).

Example **of** Typical MIS System

	Production	Finance	Personnel	Marketing
Strategic	New Plant Location	Alternative Financing	Welfare Policy	Competitor Survey
Tactical	Production Bottleneck	Variance Analysis	Performance Appraisal	Advertising
Operational	Daily Scheduling	Payroll	Leave Records	Sales Analysis

Operational Information :

Daily schedules refers to the detailed assignment of jobs to machines or machines to operators in a production environment. In a service organisation like hospital it may be a duty roster for nurses, doctors or other paramedical staff. Such schedules must be detailed, unambiguous reports produced in large number at relatively low cost. Most of the information contained in such reports is internal - to the special shop or hospital.

The payroll represents a typical operational system for the financial management. Since such systems must execute accurately data pertaining lo a large number of staff in a timely manner, month after month, cost based efficiency and speed would be a major consideration in the design of such a system.

Leave records constitute a major statutory record that must be maintained for cvery employee, through the many years the employee serves the organisation. The MIS system built for such an application has a primary aim of minimizing the chore involved in such large scale mundane record keeping. Once again the speed and accuracy are the major performance measures of such systems.

Detailed Sales Analysis is a must for any sales and marketing function. This might involve a very detailed data collection and processing pertaining to every salesman, every product over a long time span of an entire year or a quarter with even details of the region, market segment etc. Naturally it is an involved data collection and processing function. Accuracy and timeliness of this effort would decide the quality of tactical and strategic decisions that may be based on summary information generated out of this data. Accuracy and disaggregation would be the watch word for such detailed data collection effort.

Tactical Information :

At the tactical one could visualize a production bottleneck analysis in a manufacturing environment. Such analysis would call lor senior management involvement by people with years of experience. Results arising out of such analysis are likely to have medium range impact. Naturally information systems to provide such information must have summary inlormation, with provision for detailed inlormation when called for. Comparative analysis shift wise, plant-wise, machine-wise, operator-wise etc. may be necessary. The watch word would be insight and analysis and not mere reporting of data.

Variance Analysis for the finance function would call for systems that point out deficiencies, cost over runs, budget excess by carefully matching goal or target information with summary information generated by operational **data,** Once again the accuracy is important; but what is more important is the clear recognition and highlighting of patterns that can help the decision maker to initiate action and bring systems under control. Timeliness is a must as the systems must be re-set before they are too late,

A tactical systems under personnel function is the Performance Appraisal which would take into account among several other things, the individual employee leave records. The details may not be that important but patterns are, Whenever they are clearly visible. Certain policy conformance may also be checked through such analysis, Since decisions based on such systems are likely to have medium to long term impact accuracy should not be underestimated, while keeping the priority of analysis.

Advertising Information System is another examples of tactical information system for the marketing function of management. Needless lo say planning for advertisement would use much of the information generated by detailed sales analysis (an operational MIS system). But to be able lo decide on the levels of advertisement, mix of advertiscmcnt, budget for advertisement etc. calls for certain policy parameters as well as environmental (outside organisation) information. This point must bc clearly borne in mind in designing MIS for tactical decision situations. .

Strategic Information:

A strategic decision by the production function of the management is a New Plant Location. This would use much of the internal information generated by the tactical system designed to analyze the production bottleneck that is internal to the organisation. But a long term decision like location of a new plant is likely to bc influenced far more by environmental information like changing market, changing technology, changing fiscal and governmental policy like deregulation, tax incentive for backward area etc. Obviously strategic information systems should have a mechanism of scanning and assimilating environmental information that are likely to influence and stralegic decisions in a systematic way.

For the finance discipline Alternative Financing is a strategic decision. It will use a summary status information about the internal finances of the company including payroll, budget, overruns, variance analysis etc. but will be primarily governcd by long term policy, business environment etc. that are strategically imporlant to the survival and growth of the organisation. Information support for such strategic decision would call for substantial external information supplemented with internal financial health indicators.

Decision concerning Welfare Policy of an organisalion is a strategic decision that must be faced by personnel (also known as human resource developmcnl) management. It will be tempered by internal information about staff size, their quality, the compensation package etc. but the strategic decision will be governed by the future vision for the Organisation as seen by the Lop management as well as the labour market conditions of the environment. Being a long term decision with major impact on the corporate health of the organisalion this strategic decision need lo be supported by a balance blend of external and internal information.

A stralegic decision for the marketing function is a survey of competition and the resulting strategy of gaining market share. While a detailed analysis of in-company sales and advertising is a ncccssary pre-requisite, much will depend on the present and future strategies of the competitors who arc external to the environment. Once again this brings to the focus the imporlance of external for stralegic decision.

While we take primarily the dccision making role of the management in the design of the information systems, care must bc taken to take into account the stark realities of managerial work-style. The diversity of managcrinl work, the inter personal dynamics, politics of people, resistance to change, etc. must also be taken into account. These arc issues beyond the scope of this texl but must be taken into account in the actual implementation.

3.4.1 Data arid Information

Early generation of textbooks in MIS used to elaborate in detail the definition of data and information and the imporlant differences between them. With so many information systems in daily use and access cvcn by the common man (like the Banking Informalion Syslcms, Library Information Systems, Train, Air, Bus-Tickcling and Reservation systems even in India), most people understand and appreciate that data is relatively raw and information is relined form of dam that is more useful for human understanding and dccision processes. The exact form of refinement may vary according to the needs and the nature of the applications. In some cases it is merely packaging in the form of a neatly formatted report, an aye-catching graphics on the TV or print media or a slide show presentation with brilliant effects. In some other applications it may be a form of summarizing data often using statistical tools and techniques viz, mean, median, standard deviation, probability estimates, approximation of distribution etc. In yet another situations, it may be a detailed simulation study using sophisticated modelling techniques. In all these cases the basic difference is clear - information provides insight. into situations using data culled out of the processes that characterize the situations. Normally information systems should concentrate on information and not merely data.

From an information processing point of view there are some basic characteristics of data that must be kept in mind. Minimally the data must be accurate, timely and relevant. Several other attributes like reliability, source of data, consislcncy over time, value aspects including threat to individuals, society and to the world at large, privacy, protection of intellectual property etc. are imporlant but are needs specific to some applications. For brevity we will elaborate only the former three attributes viz. accuracy, relevance and timeliness of data.

Data **accuracy** is obviously an important characteristic that any information system should guarantee to maintain. Inaccurate data-processed using analysis techniques however sophisticated in terms of tools is unlikely to be of use for any real world decision making. In computer jargon this is referred to as garbage in and garbage out (GIGO) rule. It is true that data collection costs money and more accuralc data collection costs more money. To generate data up to an accuracy of tenth decimal digit may be prohibitively expensive. Yet large inaccuracies must be clearly avoided and a golden mean between cost of processing and value of accuracy must be found. There can be no general prescription about the absolute accuracy if data in general. Many monetary transactions get rounded to just two decimal digits (like Rupees and Paise in the Indian context and dollars and cents in the context of the U.S.). Such delinitions of accuracy are based on the definition of currency. There may be no such equivalents in many other fonns of data. Even a financial data like interest may havc no fixed delinition of accuracy. In a competitive business environment some bankers may compute interest rate to far more numbers of digits. In millions of transactions across the globe ovcr electronic networks like SWIFIT, evcn a fourth digit after the decimal point might translate to millions of dollars! This aspect of the application specific accuracy should bc borne in mind in the design of information systems. As another illustration of the needs of accuracy one can consider the time table information of the Indian Railways. The arrival and departure data of long distance express trains need bc stored to an accuracy of five or Len minutes on evcn up to a quarter of an hour. However the time table concerned with commuter trains that operate ovcr short distances within lrequcnt intervals accuracics of arrival departure information may go down to a minulc. During peak hours when the time gap between trains approach two minutes or so the arrival/departure information may even have to reach sub-minute accuracies! A related attribute of completeness is equally important. Extending the example of the train timc table, information about the timc and the timc zone may havc lo be provided in a train system operating ovcr multiple time zones like EST, CST, MST, and PST in US or the time zoncs of different countries for trains that operate across the conlincnt crossing scvcral countries.

The second aspect of the data is the **timeliness.** Data howcvcr accurate if not available at the right time is of little use, Large scale use of computers in the early census calculations was primarily due lo the power of conipulcrs to deliver dala in a timely manner. Manual data collection of large census data, taken once in ten years. in many countries including India,. does take more than a year if not many years. If the data of the decade spanning a ten year interval taken ten years to process, it would hardly be useful. Thanks to the computers and the National Informatics Centre, for the first time in India, the census data of 1991 was available to planners in early 1993. In the early EDP era, thcrc were several examples of data processing centers where enthusiastic data entry personnel used to process large, even accurate data often out of trne and time. With large improvements in processing times of computers over the past several years this is no longer a problem. Yet this aspect should not be lost sight of. In the Indian context, clearing tax dues, duty collciions etc. take so long that by the time the tax evasion or duty avoidance is noticed the concerned entities may not even be there. In such cases either the speed of processing must dramatically improve or the data collected must be drastically pruned, and may be both the strategies must be attempted simultaneously. Otherwise the information systems will lack any practical utility. After all insight is more important than numbers.

The **third aspect relevance** is indeed the watch word for data. The emerging Decision Support Systems and Executive Support System that arc characterized by end user computing underscores the importance of relevance in information systems, There is a growing feeling among a number of senior managers and end users that information systems professionals are able lo provide accurate and timely information which are often not relevant; there is a whole bunch of information that the end users feel to be relevant but such information is not captured by many information systems. This mismatch once again underscores the importance of understanding organisations and the information needs of the organisation, which often may be outside the organisation, before designing information systems. Many library information systems provide selective dissemination service of the books and journals received recently in the library; often it takes months to prepare. What the users want often is the current contents of the journals, that are subscribed to by the Library as well as those not subscribed by the Library. They want information about all new books in their area, not necessarily those the Library has. This explains the role of relevance information systems.

The unprecedented developments in data capture technologies over the past few years had re-defined the role of dala and information. The low cost auto identification technology of Bar Codes has totally done away wilh large scale data entry that was necessary to process a large number of transactions - sales data in super markets, issue and return of materials into and out of stores, libraries, drug-houses, hospitals etc. The smart cards will eventually replace Bar Codes and may lead to even further reduced data processing. Such developments also change fundamentally the design of information systems. A large number of examples of such automatic data capture and on-like access for verification in banking, insurance and government services (passport, driver license, crime records, voter identity card, Permanent Account Number for Income Tax etc.) will change information systems radically. Coupled with the Re-cngincering exercise, one may witness such radical developments likc Ticket- less Travel in aircraft recently introduced by South West Airlines.

3.4.2 Information arid Management

Much of the management is decision making, according to one of many approaches to management. While there arc several views of what constitutes management, according to the decision oriented view, management mainly comprises the following :

Planning
Organising
Coordinating
Directing and
Control.

Each one of these functions may be at the strategic, tactical or operational lcvcl. To illustrate this paint we will use a series of examples of strategic, tactical and operational decisions and the information needs, in each of these functional areas.

Planning: Strategic level planning would call for a lot of environmental information like shifting markets, changing technology as well as internal information like core-competitive, strength of the organisation. Tactical planning activities like vendor development, make-or-buy dccisions would call for cost and availability information pertaining to materials, production capacities both internal to the organisation as well as outside. Operational planning likc staff scheduling would need large amounts of inlernal information likc schcdulcs, attendance, up- times of equipment.

Organising: Strategic Organising would need extcmal and inlernal data to decide on re-structuring as well as forge strategic partnerships. Tactical organising would need changing wage level data of both the organisation as well as that of competitors. Operational organising would need data relating to skills and training requirements of the operational staff.

Co-ordinating: Strategic co-ordination would call for industry wide data corresponding to technology availability. Tactical co-ordination would call for plant wide and supplier wise bottleneck data which reflects the deficiencies both inside the organisation and outsidc. Operational co-ordination would require itemized break up of plant and machinery perfonnance, failures etc.

Directing: Stratcgic directing functions like introduction of office automation would call for detailed cost, benefit analysis of new techniques. Tactical directing like innovating marketing strategy would call for detailed market and production data. Operational directing function would need data pertaining to the individual managers detailed skills.

Control: Stratcgic control decisions like total quality management would need detailed performance data and bench marking data from outside the organisation. Tactical control decisions like maintaining steady market share in the medium run would necessitate continuous monitoring of plant data. Operational control may call far techniques of statistical process control that involves the collection of substantial sampling information that must be collected and processed continuously during the entire production period.

In essence each and every area of managerial decision making would be it planning, organising, co-ordinating, directing or control, it calls for substantial amounts of information processing. While these functions of management need information support for decision making, there are subtle differences between the decisions thal can significantly benefit from information; equally there are decisions that are unlikely lo be benefited substantially by the availability of information. This subtle difference between the decisions, in a managerial context was very ably pointed out by the pioneering decision- theorist and Nobel Laureate Siman in his New Science of Management Decisions. According to Simon, all decisions cutting across the disciplines and levels of management can be classified into two types of decisions.

Programmed decisions are those that can easily be automated, like the determination of optimal product mix, minimum cost production schedule, optimal sequencing of machines to minimize mean flow time etc. Generally such decisions are characterized by large data and a few decision rules or algorithms that use the data in an automated fashion to arrive at an optimal plan. Techniques of Operations Research like Linear Programming represents a typical example of this category of decisions that use formal data and algorithms. Naturally such decisions are easily programmed. In other words they can be represented as an algorithmic procedure into unambiguous instructions whose step- by-step execution will lead the optimal result. Since these algorithms are likely to be codified in the form of a computer program and run on a digital computer, they care programmable or programmed decisions. The key to such programmability is the underlying structure of these decision situations that permit an algorithmic translation. By no means it is intended that such programmed decisions are unimportant, trivial or simple. There arc no value judgements to such programmed decisions either. What is intended simply is an appreciation of the nature of cognitive or mental burden associated wilh such decisions. Many of the programmed decisions may need the most challenging algorithms involving the best brains available at that moment for their solution. Nevertheless they arc translatable into algorithmic procedures. Simon's predictions of the fifties have practically come true in the nineties. This is borne out by the large number of decision support systems that use data and models to automate such decisions - re-order levels in materials and production control, control limits for process re-setting etc. Information support for such programmed decisions can be designed rather easily.

Non-programmed decisions on the other hand do not lend themselves to easy automation. The model support for such programmed decisions would need more of heuristics rather than optimal algorithms. Optimization Algorithms as menlioned earlier also arc formalized procedures readily implementable as a finitely terminating, computer programs with guaranteed outcome of optimal solutions, whenever they exist. Heuristics, on the contrary, generally yield near optimal if not the optimal solution but cannot guarantee optimality. The heuristics themselves mav be implemented in the form of an algorithmic procedure and solved on a computer; howevor the decision situation may not have admit any optimal algorithm. The interesting developments in complexity theory of the theoretical computer science also led to an inleresling observation thal for many interesting optimization problems, heuristics are necessary as no optimisations algorithms wilh reasonable estimates of computational performance are known to exist. This idea led to the heuristic problem solving approach where one gels good solutions and even optimal solutions but optimality cannot be guaranteed. Such heuristic procedures for the solution of many real-world problems in the area of scheduling and resource allocation have been found to be extremely successful. Such heuristic problem solving vindicate a related theory, also proposed by Simon in the form of satisficing principle. Under this principle most decisions makers use a model where they fix initially a set of aspiration level; a level on the optimization criteria like profit for which they aspire. They identify strategies that take them to the pre-specified aspiration level. This re-evaluation process of the aspiration level stops after a while and the decision maker declares the best solution obtained in the process as the satisficing solution. Simon established that in many decision situations the decision maker uses the satisficing principle in place of optimizing principle. Most of these decisions being to the non-programmed variety. Often times but not always, the tactical and strategic decisions belong Io this category.

Information support for non-programmed decisions, naturally would be very different. The programmed decisions often use the algorithmic approach using high quality (accurate and precise), predominantly internal and low volume data. Non-programmed decisions, on the other hand, would ofen use unstructured and uncertain data. The programmed decisions like statistical process control would need one type of data support; the non- programmed decisions like the Just-in-time manufacturing process, Total Quality Management process would need entirely different type of decisions and naturally a very different information support. Over the years the programmed and non-programmed decisions have also come to be known as structured and unstructured decisions. Inlormation systems designed should keep this vital difference between the two types of decisions in mind. Flexible access to data, user friendliness, graphical user interfaces, natural language support, what-if analysis, capability, etc. characterise inlormation support for non- programmed decisions.

3.4.3 Information Support and Nature of Management

Office Automation Systems are characterised by repetitive, short-term, input-output oriented syslcms used directly by a large number of end users like clerks, typists, accountants etc. A large number of accounling syslems like payroll, invoicing, billing, inquiry etc. belong to this category. These syslcms are more tuned lo generation of information rather than the use of inlormation. Office Automation Syslems generally form the bed rock of all other information systcms and Lhc information generated by them become the corporate database. Information supporl for such systcms must be simple, flexible and user- friendly. User friendliness in the Indian conlext would include provisions such as Multi-lingual support i.e. applications presented through Indian scripts like Tamil, Devanagari etc. The contribution of GIST (Gcncralized Indian Script Technology) and its widespread use in large systcms likc Railway Reservation System are prime examples of user friendliness in the office automation conlext. Many organisalions world widc are moving away from IBM Mainframes and VAX minicomputers (that were mainly used upto the eighties for office automation) to PC based software tools like Word-Processing,Spreadsheet, Database, Business Graphics and Communication software. Standardization, Application Portability, Data and Formal Compatibility clc. arc Lhc issues that must be rcsolvcd among various office automation system Components, particularly in large organisation. Use of standardized software for such purposes like Accounting is the current rlcvelopmcnt in this area with an all time high emphasis on cost reduction. The emergence of integrated software and the bundled software bundles likc Microsoft Office, WordPerfect Office, Borland Office suites along with electronic mail software like cc: Mail represent this trend of changing profile of applications in this area. The emergencies of work flow automation through software like Lotus Notes represent a still further integration of software over corporate network with many applications becoming mail-enabled. Inlegration with other office aids like copying, phone, fax, dictation, equipment, TV and other projection represent yet another development that will lead to exciting applications, changing the very concept of office in the organisations. Desk Top publishing and the emerging Desk Top Video including Desk Top Video Confcrencing represent another office automation trend.

Transaction Processing refers Io the traditional applications of computers likc invoicing, billing, order entry, despatch, delivery, stores accounling etc. In all these application any single transaction like raising an invoice, accepting an ordcr, shipping an item, receipt of an item, payment of a bill etc. would need an updating of multiple data stores (databases like accounts receivable, ordcr status, pending list etc. A transaction can be said Io be complete if and only if all the associated databases that arc affected by this transaction are updated and all die updates are completed. It is important to emphasize the necessity of completing the updation of all databases before the transaction is complete. Any deviation from this would lead to major disasters as incomplete information may have serious consequences. Imagine the case of updating the line status of a telephone as disconnected but not updating the customer database to reflect the discontinuation of billing. The particular connection would be provided Io some other customer arid the old customer would keep getting the bill. More embarrassing example would be the updating of the guest status as booked. The next guest checking in may get the same room allotted to him by the hotel information system and Lhc poor guesl may slip into the room occupied already by the former guests! Naturally major corporalc-wide information systcms likc Airline Reservations, Hotel Reservations, Library Automation Syslems etc. have to reckon with this problem of transaction processing, and account for bulk of the applications. Many transaction processing syslems also use very large databases running on large mainframes and minicomputers. They also call for very large processing of data by hundreds of users using equipment distributed over dozens of location spread over a vast geographical area. By their very nature, issues like performance, speed, accuracy, response time, backup, recovery, security etc., are extremely important in these applications. Naturally such systems receive substantial attention from the researchers and application specialists. Each one of the issues mentioned here is important enough lo warrant several texts to discuss them in detail. For the sake of brevity, we shall discuss just a couple of issucs,

Measurement of transaction processing speed and not merely the processing power of the processor is an important activity that must be continuously undcrlaken in any large scale transaction processing environment. The time taken Io complete a uansaction depends on the size of the databases, their distribution across the machines and/or across the network, the relative speeds of the processor, network, input/output device speeds like data transfer rate etc. as well as the nature of applications like simple query using one or more table, selective searching, searching and sorting, special processes like compulation of statistical measures and the subsequent processing etc. An Organisation Transaction Processing Council has been developing a set of benchmarks in the form of TPC-A, TPC-B and TPC-C ratings for various combinations of databases, servers and networks. Constantly running these test suites, calibrating these test suites and actual benchmarking of the database applications constitute a major activity. Backup and recovery issues including disaster management (when data pertaining to thousands of users, transactions, bills etc. are lost, damaged or corrupted) is itself a major development activity. Security issues including encryption schemes that crypt the data and the converse schemes to decipher the encrypted data form another interesting research and development activity. Consequently information systems analysis should be able to deal with large scale, complex, organisation wide, mission critical applications in this transaction processing area that demands substantial hardware, software and manpower investments. Because of the dominance of transaction processing systems in many organisations, MIS professionals in these organisations associate information support only with this area, often at the cost of other areas. While this may be a default it should not be made out by design. Well planned information systems for office automation, decision support and executive support are needed with the same priority, though often as a small scale as well. In fact without the low level office automalion systems in place, organisation wide transaction processing systems may not take off. Without some decision support systems in place many managers may not see much value for the transaction processing systems, The handful of executive support systems may be a positive factor to get top management involvement, commitment and investment approvals needed to continue the running of organisation wide information systems. In passing it may be pointed out that office automation and transaction processing systems capture much of the information needed for programmed decisions, described in the earlier section. Decision support and executive support systems to be discussed in the next set of paragraphs caters to the non-programmed decisions.

Decision support **systems** are intended lo help individual managers in their decision making capability, involving generally the decisions belonging lo the non-programmed category. Such system would need access to the large information generated by office automation and transaction processing systems However, what they need is mainly the summary information, exception information or some patterns and trends. To generate such summarised information like wends, patterns, exceptions etc. they may need access to analytical models. Since the decisions are non-programmed the exact report, formats and the contents of decision support systems cannot be decided 'a priori'. The end users would, therefore, need tools that enable them to generate on the fly reports with ease in a flexible manner. Since the end users are likely to be conversant with but not skilled in programming, the interaction will have to be at the higher level of abstraction. Fourth Generation Languages, Menu Driven Packages, use of point and clock or pull down menu based access, form based database access (with a flexibility to paint screens easily with different data, format etc.) are likely to be more easily acceptable. The user must be convinced that he/she is using his/her time productively to get insights into the decision processes without spending too much time in learning the commands of the computer packages. Related features that are generally demanded by decision support applications are the provisions for graphics (generation of different type of charts), integration with other modules (presentation software, slides preparation etc.). In short information for decision support calls for summary information processed in innovative ways in a flexible manner by end users directly, Decision support generators like IFPS (Interactive Financial Planning Systems), to be discussed in the next chapter, were designed primarily with these features in mind.

Executive Support **Systems** provide yet another challenge to the information systems professional. These systems are meant to be used by senior managers directly to provide support to non-programmed decisions in the strategic management category. The information needed will be largely external, unstructured and even uncertain. The exact scope and context of the information needs is not likely to be known a priori, to the analyst. The requirement is for intelligent information market intelligence, investment intelligence and technology intelligence. This must oflen be collected and presented to the decision makes in a pro-active manner. Often the information is likely to be spread throughout the organisation as well as in the outside environment. Access to external databases, technology information like patent records, technical reports by consultants and consultancy organisations, market report by market intelligence agencies, confidential information regarding competitors, speculative information about markets, sources of financial information, like government policies etc. being to the calegory of information that must support executive decisions. One can easily appreciate the extent of the lack of any structure among this diverse information needs. Since executives often work in groups, group communication, brainstorming etc. are often ncedcd. Executive support systems, therefore, provide the highest levels of challenge lor the information systcms design. Tools of Artificial Intelligence (AI) and Export Systems (ES) are often used to cope with some of the complexity of executive decision making. Natural Languages Support to provide a natural, intuitive and less demanding interface to databases and other sources of information is yet another but difficult requirement of some of the executive support systems.

In the past few paragraphs, we have argued about the need of the analyst to appreciate the differences among office automation, transaction processing, decision support and executive support systems. This is absolutely necessary as the requirements of quality of information, quantity of information, access strategies, presentation of information all vary substantially across the different systems. The strategies, skills and resources necessary to succeed in one area may not necessarily lead to success in other areas. The careful analyst should arm oneself with all the necessary tools and apply the most appropriate tools for the situation. It may be noted that every organisation will have some elements of all the four information processing systems; only the cxlcnt and relative proportions vary. For reasons of brevity, this will not address all the techniques of each of these systcms. Being a basic text, own intention is lo clarity the basics. The interested reader may refer to advance texts in each one of this areas.

3.5 MIS. AS A PROFESSION

What constitute a MIS professional? After going through the spectacular growth in the Inforination Technology (Unit 2) one might tend to feel that a good computer scientist can make a good MIS professional. Quite often such an assumption is not true. Dcvcloping information systcms call Lor pcoplc interaction, organisational understanding and inter personal skills that arc gcncrally not the thrust areas of the computer science professional. Keeping this view in mind ACM Curriculum Recommendation [] clearly outlines a separate profession with a mastery of organisation, viz. the Information System Executive. This text is clearly addressed to such professionals with a strong back ground in lcchnical computing.

3.6 SUMMARY

This unit provides the organisational contcxl of MIS. After reviewing the resource view of information, the emerging role of MIS as a possible competitive weapon is outlined. This is followed by a possible profile of an MIS professional.

3.7 SELF-ASSESSMENT EXERCISES

1) What is meant by "Information Revolution"?
2) How can information provide "Competitive Advantage"?
3) Explain in your own words the terms "Organisation Pyramid" and "Information Pyramid".
4) What are the major attributes of an MIS professional?