19

COMPUERIZATION
OR
SYSTEMATIC WAYS AND MEANS

A PAPER WRITTEN
FOR
THE SEMINAR ON MODERN APPROACHES
TO
MANAGEMENT/ADMINISTRATION
AND THE COMPUTER

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PART I

PART II

"The feature that most distinguishes contemporary world society from previous forms is the increased number and spread of relationships that have occurred under pressure of technological changes, specially in communications. Expectations and values of individuals and communities have altered in consequence: increasing independence, comparisons of ways of life, and the growth of sympathies and envies, create further and altered relationships. Invention, innovation, discovery, philosophic thought, calamity or fear at any point in a social relationships quickly affect other members of it. As different sets of relationships have members in common, others are affected in due course. This is the infectious process of social changes in world society". J. W. Burton – Systems, States, Diplomacy & Rules

"As a correct solution of any problem depends primarily on a true understanding of what the problem really is, and wherein lies its difficulty, we may profitably pause upon the thresh-hold of our subject to consider first, in a more general way, its real nature, the causes which impede sound practice, the conditions on which successor failure depends, the directions in which error is most to be feared. Thus we shall more fully attain that great prerequisite for success in any work - a clear mental perspective saving us from confusing the obvious with the important, and the obscure and remote with the unimportant". A. Mellon Willington – (The Economic Theory of the Location of Railways: 1877).

Computerization or Systematic Ways and Means

PART I

There can be many ways of defining what is a Computer, a good definition appeared in an early 1964 Fortune magazine – that it is an electronic device meant for ingesting, judging or otherwise processing or usefully modifying knowledge. Whether we like it or not what this really amounts to, is that in order to use the computer to ingest, judge, process or modify knowledge we have to define our problems explicitly and this is not as easy as it seems. Since problems are the outgrowth or products or organizations it is advisable to use systematic ways and means to understand what is going on the organization before we can define the problem. After all it is so easy to confuse the symptoms with the disease itself. Since most organizations (whether they realize it or not) are geared to 'continuity' and human beings are their most important links in the chain of continuity it would be as well to pay attention to the man who is part of the part of the problem. In the final analysis it is the man behind the problem, technique or gun who matters. Reorientation of attitudes can do much to eliminate many problems. An ounce of prevention is worth a pound of cure.

Man in organized activity is concerned with two things: handling information and making decisions. A little thought will also bring home that the 'mostest' common denominator of any organized activity under the sun is not money but 'information'. But how are we to utilize this commodity effectively? It is of considerable importance that we look back, if only to ensure that history does not keep repeating itself! It is clear that we are living in an age of compression – of time and of space. We are well aware that both time and distance have lost their meaning in a number of contexts. The development of the motor car took some 40 years before acceptance, the aeroplane 14 years, television 10 years, atomic energy for peaceful purposes 7 years, earth satellites for communication 5 years ,,,,, this must surely lead us to the conclusion that we face a challenge involving increasing our speed of proacting to proliferating technology as well as of creating some mechanism for effective coordination (for control purposes) brought about by the growing complexity of organizations on account of their increasingly large size. There can be no doubt that if our work methods have to match complexity the techniques used

must possess an even measure of sophistication to get us anywhere. The computer provides the tool for precisely such sophistication, be it for planning, control or execution of day to day routine work or of one-time projects. Witness the completion of the Mangla Dam, what must have gone on the way of coordination is only possible to imagine on account of the computer. The productive use of the computer anywhere depends whether one is prepared to be inconvenienced by change, for even change for the better is not without its attendant hardships!

If we are to look back some 13 centuries and attempt to understand the then quick progress made in acquisition and the application of knowledge it will be of considerable assistance to us in dissembling the acute pressures we face today. We will always be faced with new problems, because new situations will always continue to arise (would it not be reasonable, therefore, to assume new remedies will be required?) Effective utilization of previous experience can prevent us from having to learn our lessons again and again the hard way. It is precisely such comprehension that can relate what appears unrelatable. This is not easy, for to move towards objective evaluation. "Verily/We have created man into toil and struggle" (XC-4) but are we not also told "O my Lord! Advance me in knowledge" (XX-114).

There is one Creator of all existence and each sub-system dovetails into its system into the final Supra-System—the Source and Goal of all existence. In this infinity of existence there are no contradictions for it there were this world would be an impossible place to live in. Can we imagine what would happen if the laws of gravity functioned on one day and did not on the next? But we also know that these laws functioned before Newton though quantified human recognition was not there. Recognition by Newton was formulation in a systematic fashion of future anticipation.....

It is usually interesting in attempting to look for a common denominator or thread to harken back to the halcyon days of any culture to find out what made it tick. What was it that made Islam the moving spirit behind the astonishingly quick progress made within a comparatively few years both in the arts and the sciences? One sure barometer of the state of learning and its application in real life are the number of libraries and their size that one finds at a given moment in the history of a nation or culture. The libraries at or with the Dar-ul-Hikma in Baghdad, Umar-Al Wagidis (736-811), Dar-ul-Ilm (991).

Nizamiyya College (1065), Mustansiryyah College (1233), A-Baqainis (1033). Mohammad Ibn-al-Husain of Haditha, Ibn-al-Kami, Nuh-ibn-Mansur (400 camels reputedly, were just enough to transport the books of his library) and then those at Isphahan, Marv, Mosul, Basra, Ghaza, Nishapur as also in North Africa scuh as the Bait al-Hikma (998), bin Faliks library and the 70 odd libraries in Spain including al-Hikmah in Cordova are ample evidence of the progress made in furthering the frontiers of knowledge. One could enlarge the list considerably. How did all this come about? How was such great impetus given to learning by the Arabs who themselves not a few years earlier were wallowing in a sea or prejudice and ignorance? Later, the European Renaissance built upon a small part of the accumulated knowledge which had achieved a zenith in an earlier age on account of the liberating influence of Islam.

The process of transmission of (Islamic) science to Europe began in the 11th century. It was not merely the translations of what the Greeks had had to say. The true test of any systematic or scientific endeavour lies in its being judged from the standpoint of new discoveries and its independent achievements. Witness the systematic correlation of observed phenomena by Abu Ali al-Hasan ibn al-Haytham (965-1038)—Al-hazen—in optics, or Kamal Al-Din al-Farsi on the rainbow halo effect or Al-Khwarizm Mohd ibn Musa on algebra (Hisab al-jabr wal Muqabla) and that the word algorithim derives from his name, or Al-Khwarzm Abu abd Allah Mohd bin Ahmad bin Ahmad bin Yusuf (950-1000) who wrote the Key of the Sciences or Omar Khayyam's cubic equations... The new spirit of inquiry, the quantitative approach and the experimental method brought about new developments in astronomy, algebra, trigonometry, geography, zoology, natural history, chemistry, optics, medicine, physics, ophthalmology, shipbuilding, architecture, manufacturing etc. This spirit of objective or scientific enquiry, in particular the methodology of empirical science—led to the quick advance in the sciences. The eternal search for order in the apparent disorder is the basis of science—that the laws of nature will remain: 'innalla layukhiful meyaad"—God does not go back on His promises and there is no change in God's creation "La tubdeel Khalaq all". This sets the basic framework for the scientific attitude or orientation, fir if the laws kept changing there would be no Universe—it would be Multiverse.

The dichotomy between science and religion that has existed in the West (to the extent of putting people to death) has never existed in the Islamic ethic. No Muslim thinker who was involved in scientific endeavour through empirical research was ever punished. The reason was (and is) that they were faithfully following the Quranic injunction of acquiring knowledge through a study of nature. There is thus no conflict between the 'temporal' and the 'religious'. The spirit of scientific inquiry is based on measurement. It is up to us to ascertain 'what measure' or 'what yardstick'. There can be no doubt that progress comes with increased knowledge, that progress lies in the application of knowledge, that in order to progress there must be a constant infusion of new ideas, that there must be deliberate movement of information from the pure side to the applied, from science to technology (using technology in a very broad sense) and back again in the reverse order to stimulate and sustain progress. As long as the Muslims were cognizant of this they advanced rapidly in all spheres of life. The moment they started to part company with the spirit of the objective enquiry, which is principally that of measurement, their decline began. "If ye turn away .... My Lord will make another People to succeed you" (XI-57) and this is possible because no nation, no community or no individual can claim they are the 'Chosen People'. The message of Islam is timeless—because its message came at a time when the world was prepared to receive basic guidance which would require no further updating. When the Muslims—on account pf petty ego's of self-interest, started tottering the torch of science was taken hold of by the West sparking off the Renaissance. Knowledge accumulated laboriously was translated a little at a time from Arabic into Latin and other languages and this formed the springboard for Western advances, which continue to this very day. There is of course, no critical point when it can be said science 'has been introduced', it is an attitude of mind because it represents a general method of thinking and getting about problem investigation.

In bringing the temporal and religious together Islam automatically brings science and religion together. And if we say that science cannot explain all matters, it is just that we have not acquired sufficient knowledge to create that understanding. That Newton's Laws held say for a long time but could not explain certain phenomena till such time as Einstein's Theory of Relativity was propounded which showed that the gravitation laws were all right but only as a special case of his theory. As mentioned earlier gravitation

has existed all long and what is there to preclude further advances on relativity? The scientific approach certainly makes it easier in bestowing comprehension. Through deduction we accumulate data, recognize relationships then formulate hypotheses, then look for variances from the predicted outcome of such hypotheses. We then attempt to refine our thinking (feedback) and come up with a more plausible hypotheses in which the deviations or variances are negligible enough so as to permit validation of our original thinking and so frame theories and later, laws. Through induction we proceed from assumptions to their logical consequences. But what happens here is that we merely transfer the question of the validity of our conclusion to question the validity of the premises on which they were originally based.

We must now apply ourselves to understanding what is it that we find lacking in many of our systems, therefore, let us make an attempt to understand why so much inefficiency is bound up in our 'borrowed' institutions—be they our joint-stock company system or banking system or system of autonomous bodies.... Is it because in our 'borrowing' we have left the right things out or added the wrong things in" We must admit that such institutions do function at much higher levels of efficiency elsewhere. There is just no question. We must make strenuous attempts to understand why these differences. The Quran beckons us to consider, to ponder in an attempt to acquire understanding. It appeals to our powers of reasoning of discrimination to choose between alternate courses of action.

There are three stages, depending on the degree of involvement of the individual, in getting about attempting a thorough understanding of problems. The first stage is to attempt to acquire some comprehension of the situation or reality, through reading or the experience of others. The second stage is to be associated superficially with the effort—just sighting reality, as it were. The third stage is that of active participation---experiencing reality, as it were.

What McNamara has to say on his reflections in office in 'The essence of Security' is certainly relevant:

> "In many respects the role of a pubic manager is similar to hat of a private manager. In each case he may follow one of two alternative courses. He can either act as a judge or as a leader. As the former he waits until subordinates bring him

problems for solution, or alternatives for choice. In the latter case, he immerses himself in his operation, leads and simulates an examination of the objectives, the problems and the alternatives. In my own case…the responsible choice seemed clear".

Far too often unconsciously or consciously we do not advance beyond the second stage. No matter how well-intended an individual in authority be, unless he decided to move to the third stage it is not possible to expect much to happen. It is easy to accept docilely the continuance of the status quo, which also means the 'conscious' compromise that one makes in the means of attaining higher levels of efficiency, after all it is less inconvenient this way. In Pakistan it means accepting the continuance of our out-moded systems which cannot provide the leading edge so as to help create that incisive organizational leadership which we need so urgently today.

Present day developments have or at least should bring home the necessity of viewing time as a resource as much as the human being or money Our present attitudes are such that the case of the lowest functionary in or civil service—the chaprassi-concerning his leave could very well go up eight or nine levels in the hierarchy for a decision rather than being dealt with very much lower down. It is clear that unless we discard our 'traditional ideas of work flow/time we are going to increase our frustrations. The 'national state of today is far too large a unit for the government to be run on the basis of personal relationships. Personal cooperation—where an organization is not large—is synonymous with formal coordination, but where the organization has grown large and that too very quickly, formal coordination through personal cooperation is just not possible. The top levels do not have the time to decide on all problems—if only they realized it.

The present paradox is, that attempts to rectify the situation through traditional ways cannot succeed. It will only lead to more and more lower level decision-making being pushed higher up. This is the vicious circle which must be broken. No simple evolutionary methods can bring this about. Vested interests are always there to prevent change. If organizational revolutions have to be avoided the evolutionary process must be given a firm but helping hand through enlightened self-interest of those in authority. It is possible to get a measure of the problems we face today in many ways. One way is to consider that in 1947/48 our central revenues on account of Sales Tax, Excise Duty, Sea

Customs and Income Tax were Rs 20 crore and a few individuals, say 10 would through personal cooperation effect formal coordination. Now, with the revenues standing at a shade under Rs 900 crore we have multiplied the turnover by more than forty times. This does not mean to say 10 (individuals) multiplied by 40 ie 400 individuals could act in a like fashion. Try getting them in one room and if you did who would listen to whom! The nature of our problem has altered completely if only on account of size. Change is the real scapegoat—not that science and technology is making it more difficult for us!

But how and why has all this come about? Making emotional statements without reason amounts to hysteria. To a large extent we are suffering from administrative hysteria, we insist on sticking to principles and precepts that have persisted long past their time of usefulness. This is, of course, on account of inertia in our mental make up. Mere insistence on discipline without imagination can only yield results that are sterile, of course imagination without discipline is chaos. Let us attempt to determine the facts and add logic to it and thereby create an administrative science, which we do not have today. All the more reason why we should make strenuous attempts to create the same. If all the developed disciplines that we have today hadn't made a start, no mater how primitive we would never have made any advances. Most of science has, therefore, had mysterious beginnings such as chemistry with its alchemy, or shipbuilding with its coracle, canoe or kayak. Knowledge of transmutation of mercury into 'gold' or the fashioning of watertight joints were zealously guarded secrets. Hoarding of any kind is bound to have bad effects either in the concentration of money, leading to concentration of economic power or concentration of administrative 'inside' information leading to concentration of bureaucratic authority. In either of the above two concentrations there is the greatest likelihood of abuse through formation of cartels--commercial, industrial or administrative.

It is only when this shaman-like attitude is washed away that one finds out that the alchemists transmutation was a hoax. We also find that it is now possible to construct ships of tonnages unheard of a scant fifty years ago, we also find it possible for some private organizations operations to exceed those of several independent states.

Traditionally, we require time—a lot of it—to make orderly observations and then to analyze and develop new lines of thought. Today the difficulty that we are faced with is

that: time has been compressed to such an extent that we no longer have the luxury of moving at our own appointed pace. To revert, how and why has this come abut? This also requires looking back, for an understanding of the genesis of our present day systems lies rooted in what has happened in the past—in other countries ie the quicker developing one's. Knowledge belongs to be who finds it, as is where is. Europe picked up this lost property as mentioned earlier from the accumulated hoard that existed several centuries ago in the many libraries that were dotted all over Spain, North Africa, the Middle East and Iran.

Up till around 1700 the philosopher was the repository of all scientific knowledge. Around then the sum total of such knowledge grew to such an extent that the philosopher perforce handed over the baton of science to the natural philosopher who as his successor-in-interest became the custodian of all scientific knowledge up till around 1850. It was yet possible for a single person to know all there was to know regarding science. History repeated itself, when around 1850 the universities split into the arts and Sciences. The natural scientist was born. Knowledge was parceled up and the various components pigeon-holed as physical, as chemical, as biological.... However, this is also tacit admission of the inadequacy of the human brain to attack nature or knowledge as a whole.... This fact is brought out in bold relief in the difficulties we face in managing large organizational systems where through specialization it becomes difficult to coordinate. In cutting a problem down to a 'manageable' size the human mind was able to resolve problems quickly enough. Thus the superiority of the scientific method was proved to the hilt. Around 1900 the behavioural sciences of psychology, sociology and anthropology...came into their own, and this fragmentation continues apace. A few years ago there were no nuclear or groundwater engineers. Today there are 150 different kinds of engineering, two dozen types of economics or psychology.... The problems raised by brilliant advances in all these fields has created the necessity of meaningful communication from one compartment to another in order to reconcile a host of apparently conflicting viewpoints. If the development of the pure or scientific side of knowledge has created problems for itself it is not an argument against doing anything about it but an argument to harness our abilities to put matters right.

We are aware knowledge by itself is sterile unless applied. The other side of the picture lies in the application of ideas generated in the laboratory or university to the commercial, industrial or technological side. Small organizatins---one-man shows—on expansion ultimately approach the limit within which they can be run effectively. Usually this happens when six or more individuals report to an individual. Authority has to be delegated. True, some otherwise extremely able men find it impossible to delegate, this leads to frustration and failure and the more effort put in by the Number One the worse the total situation gets.

With delegation of authority the Number One has to introduce means for control. Information being the most common denominator of all organized activity under the sun, he makes use of paperwork---for it is information recorded permanently. With continued expansion of the information requirements and the permanent nature of the increasingly voluminous records several difficulties arise, such expansion causes functions to start multiplying: purchasing, storekeeping, maintenance, cost, financial and management accounting, training, personnel, administrative, commercial, legal, medical.... This functional specialization is the analogue of the fragmentation of academic disciplines mentioned earlier. The problems that arise out of the increasing size of organizations involve broadly: the increasing levels in the hierarchy, the increasing number of functions, the increasing number of interrelationships and their interface problems, the increasing length of planning time cycles, the increasing commitment of resources required for viable economic operations...and the increasingly less time the manager or administrator has in which to make decisions. Inefficiencies can only appeal to the inefficient. If we were to accept the spirit of open objective inquiry as brought out in the Quran time and again, we will find that we are pushed towards weighing the merits and demerits of each and every action we contemplate taking.

Nature is not concerned with limitations in the scope or depth of our abilities to come to grips with it. We cannot have our homework done by proxy and expect to know all about it! Let us not limit our appreciation of problems by limiting the method of our approach. Let us also realize that attempts to build up the total picture by putting together the small bits and pieces---which we have created out of our inability to understand nature as a whole---will always give us the wrong picture. Something goes wrong with the

superstructure when it does not keep pace with the times: it misfires. The system misfired in Pakistan in 1958 and again some ten years or so later. As indicated earlier, we must become knowledgeable regarding how the quicker developing countries have adapted to change. As far as the administrative process is concerned it has come through a conscious application of the principle that no single function can be viewed in isolation---as if every soldier developed his own tactics and then expected the strategy to be the sum total of all of them! True, when dealing with large (hence complex) systems the sum of the partials does not give the true total picture.

There are many things in life that we tend to accept as the truth because we do not have the patience or the time to look at it "in a little bit more of detail". This is the result of the human being becoming too big for his shoes by attempting to do more than he was meant to. Unless we do consciously introduce the scientific method into our administrative process we cannot amplify our effectiveness. "A static society can exchange with relatively little effort its small store of knowledge, but a rapidly changing society needs to organize a vast daily flood of communication most of which is not specifically calculated to advance any productive process". Who can doubt that the pace of change is such that unless we continuously plan for change we will always be one step behind merely adjusting to it. It is necessary to recognize that because the personal element in large systems has to be less than in the small, we have to create some formal substitute for the same. More so when we think of Mr. Computer. It is painfully clear to most of us that it is easier to change policy at the higher levels rather than procedures at the ground level! Is this not an admission that something is lacking in the development of organizational process which did not permit declared policy to be converted into effective work-a-day procedures? Where things are so obviously wrong it is not enough to say that we do what we do because this is what we are expected to do.

"……There is nothing more difficult to arrange, more doubtful of success, and more dangerous to carry through than initiating changes….The innovator makes enemies of all those who prospered under the old order, and only lukewarm support is forthcoming from those who prosper under the new. Their support is lukewarm, partly from fear of the adversaries, who have the existing laws on their side, and partly because men are generally incredulous, never really trusting new things unless they have tested them by experience. In consequence, whenever those who oppose the changes can do so, they attack vigorously, and the defence made by the others is uneffective. So both the innovator and his friends are endangered together" – Machiavelli (The Prince).

PART II

The first electronic computer, now about 20 years old gave way in the later fifties to the second generation of computers which made them so very much of a commercial success. We now have with us the fourth (and almost the fifth generation) of computers—a more versatile and a more powerful machine and easier to communicate with than any of the predecessors. It consists of 5 parts:

1. Input.
2. Output.
3. Memory of Storage (Files).
4. Arithmetic Unit.
5. Control Unit

And in addition to carrying our normal arithmetic functions such as add, subtract, multiply, divide, square root, detect equality, less than, greater than etc, it is capable of making logical deductions on the basis of such calculations. In order to make use of its power and speed it is pertinent to examine the implications of using a computer. Since it is basically on 'idiot' it is necessary to very carefully make an arduous study of what one is up to in the first place, this brings in its wake the inflexible requirement of having to think with clarity and precision. Even scientists, "it is true, have found to their astonishment how much their mental activity travels in ruts", such are the demands that the computer makes on ones person. The secret, of course, lies in being able to discipline ones own mind, before the system to be computerized can itself be disciplined to the logic of the computer! The computer is very much like moron servant who must be instructed in very small steps the method of accomplishing a house-hold chore, but once the steps are ingrained in his mind, given a modicum of willingness to work the moron performs effortlessly and efficiently. Beware, of course any changes from the established routine---anything can happen, so it is with the computer, albeit a willing idiot!

A question which raises its head so often, does an organization require a computer or not. The basic thought process being more or less on the same lines as---should I purchase a

motor car. Of course the big difference lies in that while it is easy for us to visualize the se to which a motor car will be put, it is not quite the same in EDP for here we are involved in dealing with concepts and then translating those concepts into something practical and concrete. While the purchase of a motor car makes its presence felt immediately, the decision to computerize involves a tremendous amount of thought in which one has to be prepared to question the entire organizational work-flow because the computer is certainly no cure for any organizational of work-flow ills. If one doesn't have the courage to clean up ones system first, no computer will ever be able to do it. Experience has shown that it is not possible to duplicate other organization's successful applications because there are far too many differences in the work methods to permit such duplication. Each computer application will be unique, this of course is merely another way of saying successes are not in fact repetitive and that what is wanted is an objective approach.

Since computer equipment is expensive it is vital that we adopt a rational approach in developing such facilities. It is pointless to super-impose electronics on top of existing work methods, one ends up with redundant costs, after all the computer is not a fancy clerical or tabulating department. If we cannot get a different result both qualitatively as well as quantitatively the necessity of having a computer is probably not there. So many times organizations plunge into acquisition of a computer without having assessed scientifically what it is they really want. Can you imagine a tailor who stitches a suit without ever bothering to measure the customer? The odds are certainly against the most efficient utilization of the cloth. In acquisition of computer machinery it is not only necessary to know what the immediate applications are but what the organizations requirements are going to be say 5 years hence. I know many of us have difficulty controlling our weight, I have! But I have always given the understanding tailor full marks for looking ahead by providing the odd inch or two for letting out here and there, it certainly keeps ones personal capital investment down by preventing write-offs before their time! Tailoring of organizational systems to the limitations of computer machinery hardware, as it is more commonly known, can be of self-defeating.

Because most office practices have grown like Topsy, they are untidy and are known in all their details to any one member of the organization.. The first task is to find out

exactly what is being done and to set up some means of investigating. Such investigations can consume a tremendous amount of time and since the investigation is to a large extent open-ended it can run into unpredictable delays and costs, nevertheless the dividends are so high that the expenditure of large sums on exploration are justified. There is just no other way. And it is not the saving in the number of clerks that is meaningful, in our fast expanding economy, retraining and placement elsewhere takes care of that, it is the increase in managerial efficiency where the pay-off lies.

There is always a lag in compiling needed statistics, organizations thus operate in the dark for varying periods, if feed-back information is made available quickly reliably and accurately we will find inventories and production in manufacturing and service operations will lose their tendency to pile up disruptively, this must have a beneficial effect on the economy of any country making use of EDP. The computers capacity to perform at fantastically high-seeds with fool proof accuracy offers us a powerful means of conveying meaningful information to those concerned. We speak of 'management by exception'---the best known way of working, since I as a manager am only interested in knowing when things are swinging away from the standards laid down. If matters are moving according to schedule it is not necessary to confirm or reconfirm such a situation. This means we are freed from the drudgery of routine donkey work e.g. as organization with 50,000 items of stock wishes to know how many items are below reorder level on a week to week basis, the computer could very quickly scan the records and report on only those items which are short. If it has been programmed to do so a purchase order could also be printed out also indicating the present average price of what is in stock and the last price paid. This is information which will be of assistance not only to the Buying Department but also to Planning as well as Accounts and to Sales. Since information funnels up to the respective managers so quickly he is in fact in the hot seat. It follows that organizations which have made EDP pay off have put computer decisions in the hands of top management. One finds as one goes along one is being forced to set up models of parts of the organization or business leading up to the building of an experimental model of the overall activity. These models can be made to simulate different real life conditions and it is here that 'decisions can be made which could not be made in any other fashion—truly, trial and error not trial and disaster, the computer at its

best! "Guesstimates" of the past are no longer good enough, the qualitative can be quantified.

A result of this will be that in future jobs at middle management level will become more specialized, specific and highly-programmed i.e. predictable. Senior management will be freed of the need of detail analysis and ill be able to spend more time involving creative thought conducive to innovation. Since all information that is relevant to a manager will be with him "instantly" the use of the computer will lead to greater "centralization" but permit "centralized decentralization" because of the very high speed with activities can be monitored. Machines, even if they were made for the express purpose of displacing man have immemorially increased productivity and that is synonymous with economic development. True, a certain amount of local dislocation may take place, but it is the total beneficial effect that is of interest. It is highly significant to note that the acceptance of the computer, unlike other great innovations, some taking decades to prove themselves successful has taken but a few post-World War II years to be accepted as a universal success. It might appear labouring the point to state space exploration and other equally sophisticated advances were made possible through the intervention of the computer, but what is not so obvious is that such achievement would not have been possible. In our generation at any rate, but for the effective coordination of the tremendous number of diverse activities. Such coordination i.e planning and control has been made possible the conscious creation of disciplined systems and then making use of EDP.

The realization that sheer size creates similar problems in organizations involved in widely varying activities whether in the West, the South Pole, or Pakistan is of paramount importance. The field of communications technology (EDP) is very young and it is possible for an undeveloped country such as ours to make use of the late comers advantage to leapfrog those developments that deserve to be by-passed. All this forces on us a new way of thinking, it concerns:

1. The destruction of conventional organizational concepts. EDP crosses all lines of the organization quite impartially. The computer after all has not heard of or seen an organization chart. In return it supplies those concerned with the proper quality and quantity of information at the right time.

2. Tremendous analysis hs to be made of what the input data should be, this is easier said than done. In practice it makes penetrating inroads into the minds of those concerned, ruthlessly forcing a clear, precise and logical explanation of how and why the work should flow. After all the quality of the output is governed directly by the input.
3. A complete system for coding of all input documents has to be made.
4. The projected EDP system must be flexible enough to permit expansion in all directions. This built in feature makes possible a more effective use of the systems output in course of time.
5. During the planning stages even minor organizational and policy changes must be made to fit the system. This can be a most trying experience.
6. EDP if it is to be effective must operate on an 'open door' policy to all levels of management and staff, there can be no 'restricted' areas. Development and training must be conducted across departmental lines.

Given the proper atmosphere there is not the slightest doubt in EDP providing the key to higher productivity.

When we acquire a computer it is true to say we are in fact forcing ourselves to acquire a new way of thinking, for looking at it a bit more closely the computer system consists of:

1. The hardware : i.e. the machine and its peripherals.
2. The software : i.e. the trained manpower and computer programs.
3. The Organization : Because its operations will be materially affected, more so as we move towards more integrated forms of control.
4. The Management : Who will have more time for planning since most of the repetitive donkey work will be programmed i.e. he will have more time for non-programmed decision making.

Should an organization decide to computerize it can expect to achieve the highest dividends by ensuring:

1. The whole-hearted cooperation of all in the organization, this means a well-

planned effort has to be made to explain what it is all about, analyzing the benefits that will accrue.

2. The proper selection of a data processing manager and his team, on which the success of such a venture might depend, this is extremely important.
3. The maintenance of the team during all the phases of investigation which could cover a considerable period.
4. The selection of the problem area, the 'strategic' to be preferred to the 'tactical'. Some compromise (conscious sub-optimization) might have to be made here in an effort not to delay overly productive results. Nothing is so heartening to a person but to see the results of his labour. It helps keep morale high, an important ingredient which promotes motivation.
5. Last but no least the old manual system and the new must be run in parallel until one is sure "all's well with the new way of doing things". An approach such as this will ensure the best use if made of resources expended on the computer.

In planning the use of computers it is possible to discern three levels in business or commercial application of EDP:

1. *Clerical Work:* It is here that management places most emphasis because management traditionally analyses communications in the form of countable clerks or number of documents.
2. *Decision Making:* because of the speed and accuracy of the computer, departmental barriers must crumble, otherwise the rational use of EDP is made impossible.
3. *Policy Determination:* this is where management has to rethink major strategies, the best policies will arise out of the rethinking that will go into future planning knowing the speed and accuracy of feed-back information that is attainable. Certainly, the leverage made possible through EDP is astounding.

The levels mentioned above arise out of the various approaches that one makes towards computerization:

1. Experimental.

2. Office Machinery.
3. Functional.
4. Integrated.

Experimental Approach:

An organization sees a computer working successfully elsewhere, hence it can work in their organization equally successfully. Nothing can be farther from the truth. This is akin to seeking another person wearing a suit you fancy and you go out and purchase the same without waiting for a fit. Do not assume you can duplicate success. Business and organizations differ far too much in size, present methods, customers, purposes and operating methods. Even within apparently similar, even rigidly regulated industries, such as railways or utility organizations computer usage will be unique. This is merely another way of saying successes are not repetitive.

Office Machinery Approach:

The general philosophy behind this is that is comparatively simple to make a head count of the number clerks involved in doing a job and to work out savings by doing the clerical chores quicker and more accurately. The general feelings is that there will be comparatively little adjustment of procedures hence the least dislocation, this is not strictly true. This attitude is far too limited in outlook. It is as if we consider the time-honoured plough. We first pulled it by hand, then hitched it to a bullock, then on to a tractor even a supercharged tractor. We have to revamp over style of thinking altogether. This thinking does away with functional barriers brought abut by specialization. This is on account of the speed of the computer.