

Technological Change & Human Processes

The man-machine relationships in newer technologies are, on the whole, significantly different from the automation and mass producing innovations that were introduced earlier in business and industry. The automated technology was primarily based on developments in engineering, and broadly replaced skills of the operatives. They mechanised the human operations, thus replacing the operative who, in effect, became, in most cases, an attendant. The automatic looms, for example, replaced the weaver. The numerical machine technologies improved the quality of the product, and increased the output (Rice, 1958; Walker, 1958). Operations became more uniform, faster and cost-saving. Technology guided the process, not man.

The new technologies are primarily science driven and result from combined efforts of scientists, engineers and technologists (Dayal, 1987). They vary in complexity. They range from simple takeover of the routine, repetitive operations such as the application of computers in a bank or insurance or robot on a production line, to applications of bio-technology, advanced electronics where operatives have to have considerable scientific and technical knowledge. New technologies do not, on the whole, replace but require different kinds of human skills. The man and the machine of the process are complementary, not substitutional.

Two other characteristics of new technologies are worthy of note. One, any one invention in science leads to varied applications. Laser is a classic example. The application of laser in medical instrumentation, consumer durables and a large number of other areas is widely known. In the same way applications of research findings in genetic bio-technology, bioengineering and many other areas are also widely spread in agriculture, food processing, health and other unrelated areas. Industries need people

who understand the significance of varied applications to their particular situation in order to exploit fully the scientific discoveries. And persons with several disciplines are needed to effectively convert these discoveries into products and processes. Hence, organisations have to rely on expertise in many independent areas, yet needing close cooperation among them to develop new applications for the company. An example would be IPCL in Vadodara. The processing plant has chemical engineers and chemists working side by side with the people who operate the plant. These persons are responsible for keeping in touch with research findings in many fields such as chemistry, processing, chemical engineering, etc. and apply that knowledge to improve the performance of the plant. The researchers and the operatives work together closely, each relying on the expertise of the other. Together they provide synergy to the plant operations.

Two, being science-driven, changes are rapid and many directional. The industry has to bring about changes much faster and more frequently than ever before (Subha Rao, 1994). One chief executive in a large consumer durable business mentioned that they had been working on a device for some time which would give them advantage over the competitor for about six months or so because within that time the competition will bring out something comparable. He said that the company has to keep thinking about new developments to hold their market share in the range of products made by them.

Another related development, which is triggered mainly by technology, has to do with growing competition in the market place. The newer technologies being primarily 'knowledge-based', smaller and medium size organisations are able to exploit them as well, or, in some cases, better than larger organisations. They are able to bring about changes faster than larger organisations, and, by so doing, gain competitive edge in the market place over larger organisations. Such organisations are able to gain cost advantages as well. In response to the changing and the emerging situation, larger organisations have to re-organise their operations and make them more responsive to market changes. Organisations in the west which have faced severe competition in the market place had to undertake extensive reorganisation. General Motors, Ford, General Electric and many others for example, have carried out financial restructuring, created independent business units, rationalised products, collapsed levels of supervision and have initiated many such changes to make the organisation responsive to the market. Similar exercises are being carried out in the UK and Europe. In India also many large corporations such as the Tatas, the Birlas, the Thapars,

the JK Corp, the RPG Group and others have taken steps to make their business units responsible for performance and responsive to external demands. And these are not one time exercises. Organisations have to constantly review their capabilities and make changes appropriate for the changing situation in their particular business.

The impact of technology and competition on organisations is wide ranging. The impact is direct in respect to three aspects of enterprise activity, as identified below:

Overall Business Strategy

There is need for specialisation in respect to product development, keeping in constant touch with customers and systematically using the market data to achieve deeper market penetration. These requirements have led organisations to identify the areas of their strength, core competences, and use their financial, manpower and organisational resources to exploit identified market segments. Tatas have decided to get out of those businesses in which they cannot remain the leader or in second position. Birlas are said to have rationalised their products into nine groups; they will get out of the products which do not fall in their line of business. The organisations follow focused growth. This approach is necessary to maintain market position, and utilisation of increasingly expensive resources. Business houses are engaged in rationalising their products by selling, acquiring and developing business enterprises in their group. The management has to work on a long-term business strategy and handle problems that the re-arrangement would inevitably cause in their organisations (*The Strategist, 1997*).

Re-organisation of the Management System

The combined effect of technology upgradation and competition is that organisations have to become more efficient and capable of responding to the market conditions. The management must be able to respond quickly to the changes in the market and be one step ahead of the competitors. In most cases, the levels of managerial hierarchy are collapsed, decision making is decentralised with clear responsibility at each level for results, and work processes are re-engineered to achieve greater efficiency and cost effectiveness. Cross-functional teams and multi-skilling have become common in a number of companies (*Dayal & Aggarwal, 1995*). All these changes are aimed at providing better service to the customer and give the organisation a competitive edge in the market place. The new roles become more demanding, specific and need team work.

The Employee Development

New technologies need new skills. Most employees are not used to changes in the nature of their jobs. At best, changes were incremental, i.e. using similar skills on better machines, not qualitatively different, ten year old automobile is still perceived by many as new. The understanding of technology is narrow, not dynamic. In some European companies, machinery and equipment is changed within three years. People are used to anticipating or expecting changes. In India the situation has been different. The entire perspective on technology has been governed by the controlled economy and emphasis on self reliance. These considerations also governed industrial and economic policies of the country. New technologies require knowledge, re-training and new attitudes towards work. In many cases multiple skills are encouraged to improve work efficiency. The processes require interdependence and flexibility in operations. The operatives have to assume responsibility for quality and cost, needing new perspectives and work attitudes. The organisations have to develop strategies that encourage change in work habits in managerial and operating positions.

Differing Demands of Technologies

The impact on management systems varies from one technology to another. Technologies used to facilitate the process as in banking, insurance or robot on the production line, need system re-design and new skills at the operator level. The electronic technology employed for centralised control and monitoring as in steel and power generation, etc. need changes in managerial practices. Technologies based on genetic, bio-engineering, instrumentation, etc. need a high degree of decentralisation and cooperation at operating levels. The redesigning of the work organisation has to inevitably take into consideration the particular demands that the technology makes.

At the organisational level, the cooperation of employees is essential. The cost and quality of the product can only be controlled at the production floor, and by conscious efforts of the operatives. Many companies like Steel Authority of India, ITC, ABB, Eicher and others have had to take up programmes to involve employees both at the collective and individual levels. The programmes aim at developing (i) a level of trust in management, and (ii) conviction among employees that the management is making genuine efforts to improve the position of the company (*Dayal et.al, 1996*).

Change Strategy

Globalisation of business is inevitable. The trend is irreversible. For their own survival, organisations have to shift from an inward looking stance and arbitrary or bureaucratic practices to those that encourage innovation and market responsiveness. The question of considerable significance is how this transition is best achieved with least trauma for those who are most affected by this change.

Experience all over the world shows that successful change strategies must include all aspects of working, i.e. systemic changes, and must include top levels of management as also employees down the line. The strategies and the changes have to be planned carefully (Hammer & Champy, 1993). Planners have to anticipate human problems involved in the transition, and evolve appropriate measures to deal with them.

The intervention strategy of the management would have to bring about a change in the work attitudes of the top management, the managers and the other employees. The strategy would have to shift the perception of the employees from 'we' (the employees) and 'they' (the management) to 'us' (the company). This shift will depend upon the success of the intervention strategy that could achieve the following:

- the employees clearly seeing the need for the new systems;
- support of the employee's representatives for the change programme;
- the employee's trust in what the management say, i.e., credibility of the management notwithstanding the past experience and the relationships;
- the confidence that the rank and file of workers have in handling the new responsibility, through training and counselling services;
- the role model that higher levels of management provide to people down the line.

In response to technology upgradation and competition, employees have to adjust to the many changes in the organisation. Some organisations such as SAIL, ABB, Eicher and others have handled problems of human adjustment, and others have handled them as the problems arise. Among the many human problems, the following need special consideration:

- The old and established work relationships are disrupted. For some employees break-up of such relationships are more difficult than it is for others. Many employees derive emotional sustenance from co-workers and, in many cases, the new arrangement disrupts such

relationships. Many people find adjustment in the new situation extremely difficult.

- Invariably the organisations have to downsize their manpower. Many employees have to leave their jobs and this causes the immense problem of rehabilitation (Guha, 1996). Psychologically, forced separation damages self-image and self-worth. These features add to the problems of rehabilitation.
- The down sizing induces a sense of instability and fear of losing livelihood if the organisation is unable to compete well. In our interviews we found that employees are also worried about finding jobs for their sons because they believe that recruitment would be seriously curtailed by companies. Unskilled workers are affected more than others because new technologies require fewer unskilled categories of workers. Re-training and learning of new skills is generally liked by workers. But dislocation of work groups often caused by new technologies produce anxiety and some persons lose their social orientation.
- At the middle levels of management, the job changes are extensive. Downsizing exercise invariably affects these categories of managers adversely, and a sufficiently large number have to seek fresh employment. The new technologies are unfamiliar for many and they have to go through extensive re-orientation and training. In a number of cases, the supervisory role changes, especially when operatives are made responsible for results. In one organisation the management stipulated that middle level managers must spend more time on the shop floor than in their offices, and solve technical and personal problems of employees. They should not transfer the problems as they did earlier, to either their superior officers or the personnel department (Dayal and Aggarwal, 1995). In our interviews with many middle level managers we found that most of them enjoyed the experience of working with upgraded technologies but found the job more stressful. They needed re-orientation in their job and reassurance by their superior officers.
- The decentralisation of decision making and compulsions of business place responsibility down the line. Traditionally, responsibility for results was placed at higher supervisory levels. Employees at lower levels were required to complete routine, and repetitive tasks. In most cases the work had to be approved by the supervisor and authority rested with supervisory levels. Even if an employee needed stationary from stores, the supervisor had to sign the requisition. A sharp

distinction was between the managerial and the other employees. The organisations nurtured a strong sense of personal loyalty and followership and it is doubtful that we can acquire without effort independent innovation and result orientation. An officer said that they follow instructions without ever questioning 'why' of the work. It is rare that someone will look for a better alternative to what is suggested. They carry out work as a routine. He said that they look for enjoyment away from work, or cultivate relationships that relieve them of the boredom.

In the light of changes in the market the management had decentralised decision making where managers had to accept responsibility to analysis, diagnose and take proactive and corrective action where needed. The managers had to acquire new capabilities and learn new ways of doing their job. In earlier business environment the system-drift did not adversely affect operations. In the emerging environment the management recognise that intervention is needed to bring about a transition from a culture of dependence to one of autonomy and self reliance.

- The system of voluntary collaboration and resolving differences at the peer level is rarely practised in most organisations in India. Differences among people are referred to the superior who might take up the problems to higher authorities for resolving them. In most cases the differences are suppressed. As differences are not articulated and resolved, the people concerned develop negative, if not hostile, feelings for other groups or people. Team working among departments or voluntary cooperation in such an environment is difficult. New technology also needs intensive cooperation. The organisation has to consciously develop relationships and create supportive systems to promote greater peer level work related interventions.

The anxieties of employees have to be resolved more through face to face contact and less by written communications. Organisations that rely on written material alone to handle changeover find that many hidden fears and anxieties of employees remain unresolved. These feelings show up in constant disruptions of work and expressions of resentment.

Recognising these problems, one organisation took several steps to deal with the problem. They (a) designed a number of tailor made courses to explain the need for the programme, and develop skills that new jobs will require, (b) conducted a programme for representatives of the employees, (c) created a task force, kind of a floating group, who could be approached by employees with any query that they may have, (d) the top management

met different groups of people to answer every query that employees had, and (e) encouraged employees and their unions to conduct courses on new system (Dayal, 1995).

Literature includes cases of successful and unsuccessful experiences of technology upgradation. In a number of cases, the new technology has hardly improved product quality or reduced costs. In a few cases organisations had to revert to the old technology because they found poor results from the change. The introduction of new technology, by itself, does not improve performance. In a number of banks, computerisation has worsened customer services. In the coal industry, the Long Wall Method has been successful in the UK but it has been unhelpful in India. One generalisable experience is that organisations which have attempted to harmonise the social system or the human processes and new technology, have derived the benefit of technology and those which have failed to develop the two together, have at best met with partial success.

REFERENCES

1. Dayal, I (ed.) (1987), "Managing High Tech Industry", Monograph Series 3 - 87, Indian Institute of Management, Lucknow.
2. Dayal, I & Aggarwal, V (1995) "Modernising Organisations", New Concepts, New Delhi.
3. Dayal, I, Sahgal, P, Jain, R, Gupta, P & Sen, A K (1996) "Successful Applications of HRD: Case Studies of Indian Organisations:", New Concepts, New Delhi.
4. Dayal, I (1995) "HRD in LIC", in Designing HRD Systems, Concept, New Delhi.
5. Guha, B P (1996) "Voluntary Retirement", Shri Ram Centre for Industrial Relations and Human resources, New Delhi.
6. Hammer, M & Champy, J (1993) "Reengineering the Corporation", Nicholas Brealey Publishing, London.
7. Reddin, W J (1987) "Effective Management", Tata McGraw-Hill, New Delhi.
8. Rice A K (1958) "Productivity and Social Organisation", Tavistock, London.
9. Subha Rao, A (1994) "Management of Technology Change", Global Business Press, New Delhi.
10. The Strategist, April - June (1997); & August (1997), Business Standard, New Delhi.
11. Walker, C (1958) "Modern Civilization and Technology", McGraw-Hill, New York.