AUTOMATION IN INDIA

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"People must come to accept private enterprise not as a necessary **evil,** but **as** an affirmative good."

—Eugene **Black**

INTRODUCTION

Automation is revolutionising business and industry in economically developed areas of the world. In recent years, it has been introduced in developing countries like India where it has become a controversial subject. It is feared that automation would aggravate the unemployment problem.

The subject is such that it can no longer be ignored. It is essential that a dispassionate study be made of automation in the Indian context, keeping in view the need for rapid development of the economy to raise standard of living of the people, the possible consequences on unemployment situation, and other relevant considerations.

It is the main effort of the Forum of Free Enterprise to place authentic information on such current economic problems before the public. Accordingly, this booklet brings together three papers: one by an industrialist (Mr. Murarji Vaidya), another by a trade union leader (Mr. Bagaram Tulpule), and the third by a professor (Prof. N. S. Ramaswamy).

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AUTOMATION IN INDIA

I

AUTOMATION IN A DEVELOPING COUNTRY

By

MURARJI J. VAIDYA*

The problems of mechanisation and automation have been exercising the minds of those who are connected with industries either as trade unionists, economists, employers or employees. The Government has also been very much concerned about these matters.

It will be useful to recall here that when mechanisation was first introduced in the countries of the West, there was a great deal of opposition from many quarters on the ground that mechanisation of any production operation will render hundreds and thousands of people unemployed and deprive them of their means of livelihood. What has actually happened over the last two centuries is that with the mechanisation of various processes of production in every conceivable industry all over the world, employment today is at a much higher figure in all countries than it was 200 years ago when England first introduced mechanisation and the use of power.

If we look at the position as it was even in our own country, say, 100 years ago and now, it will be found that a far greater number of people are employed in different industries in manufacturing processes today than they were employed before.

This naturally leads us to the question whether the fear or apprehension entertained by those who oppose mechanisation were really justified. History has proved that these fears were not only not justified but it has now been acknowledged that the introduction of power and the mechanisation of various manufacturing processes has enabled every country in the world to produce more at cheaper prices, to help to raise the standard of living so that products which were considered luxurious when they were made by hand have become necessities now and are within the reach of the common man. The **per capita** income of all countries has risen and there is not only no fear being entertained now about the use of power, but on the other hand, it has become an accepted fact that more and more power and mechanised equipment should be made available even to the villages for use in agriculture such as drawing water by pumps from wells and canals, in farms by the use of mechanised tractors and in transport of agricultural products by motorised vehicles. No one, for example, would now suggest that bullock carts should be used for transporting wheat from the Punjab even to a comparatively near place like New Delhi. Therefore, mechanisation and the use of power have become a part and parcel of the modern way of life.

Continuing this line of thinking one cannot escape the inevitable conclusion that the rapid developments that are taking place in the world in the use of automatic machines and of computers in almost every field of human activity have to be viewed as a continuing process of modernisation. Therefore, no country which wishes to be considered a modern country and which wishes to keep its industries and its means of production, transport etc. up-to-date can afford to neglect, much less to oppose, the introduction of these modern ideas to greater production and to raise the standard of living. Those who oppose this inevitable process of modernisation and development are perhaps ignoring the lessons of history because those who have opposed this process of mechanisation in the past have been proved wrong as indicated earlier in this article. The history of the modern developments that are taking place in Japan which is an Asian country and which is also faced with the problem of rapid and dense population proved that the adoption of latest methods of

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production through automation has enabled Japan to stand in the fore-front even of developed countries and has enabled her to raise her standard of living and the rate of growth which would be equal to that of any modern prosperous nation.

In this context, it must be remembered that computerisation must be considered in its proper perspective as developed which is not quite similar to automation. The functions that a computer performs and can perform cannot be performed by human hands or even human brains. The rapidity with which computers can, for example, perform certain complicated mathematical calculations could never be performed by any or even by a few thousand human brains. Let us take for example, the work which the computers in U.S.A. and Russia perform in connection with the space travel, space rockets and satellites and of translating into intelligent interpretation of complicated data that is covered by space vehicles which contain numerous and complicated instruments. Can any human brain or even a collection of several hundred human brains perform that task within the time which this type of operations requires?

The answer would be a definite "no". It is only because of that space travel today has become an accomplished fact of the modern world of sciences. Let us take another example, the interpretation and presentation and even to the extent of putting data on a visible screen of air travel and hotel reservations which are used by all the modern lines and large groups of international hotels would have been impossible without the use of numerous computers and closed circuit television for a passenger wanting to travel by any international airlines to a country ten thousand miles away from his home who gets within a few minutes specific information about the availability of seats on all the incoming air services in his long journey and make sure about the reservations of his rooms in half a dozen hotels in different countries on his way. Now this has been made possible by the use of computers alone. Then again, the calculations which large international financial corporations, insurance companies, banks and those who operate on a large scale throughout the world make within a few minutes with the use of computers would never have been dreamt of before the computers came into the field.

Considering the question of employment as it would be affected by the use of computers it has to be emphasised that the use of computers and all the ancillary equipment that is required for a complete computer set-up has created thousands of sophisticated new occupations and jobs which did not exist before the computers came into the field. All those who have been able to get these jobs are paid much more than persons who work even on electronic calculators or tabulators which are now considered to be obsolete because of the use of computers.

In this way, automation and computerisation have helped to create a better world for man to live in. They have increased employment by increased production. They have helped to raise the standard of living and the **per capita** income in all developed countries of the world.

There are, of course, always new human problems created whenever science begins to employ new techniques. Such problems have been tackled in the past successfully and to the ultimate benefit of man. This process of tackling new problems created by the automation will have to be continued. There may be temporary upsets, statistical, physical or even material. There may be transitory problems created by the need to adjust the types of employment and the types of persons to be employed as a result of automation. But these have proved in the past to be short-term technical problems, and human ingenuity and modern science have helped us to overcome them. If we adjust our minds to the changing times which make this process of automation a continuous process with the progress of science, we will, I am sure, be able to solve these problems as they continue to arise just as we solved them in the past to the ultimate benefit of mankind.

II

HUMAN PROBLEMS OF TECHNOLOGICAL CHANGE

By

BAGARAM TULPULE*

Productivity is recognised as the key to economic progress. Advancing technology opens up possibilities of almost unlimited improvement in labour productivity. It is, therefore, a valuable aid to economic progress.

It would be a mistake to conclude, however, that advanced technology will always contribute to higher productivity. This is because the ability of a society to fully exploit advanced technology itself depends upon the stage of development which that society has already reached. The possibilities of increasing total output are not always present in underdeveloped economies due to various factors such as scarcity of capital, raw materials or purchasing power in the community. Where the possibilities of raising output rapidly do not exist, advanced technology offers dubious benefits.

No doubt, even where substantial and rapid increase of output is not possible, adoption of advanced technology by a particular industrial unit would increase the labour productivity in that unit. However, it would cause displacement of some labour and unless the displaced labour can be employed elsewhere at a comparable level of productivity, the productivity of labour in the community as a whole will not rise much. Indeed, if the displaced workers remain unemployed, their productivity is reduced to zero. Hence, the community as a whole will derive little benefit from such use of advanced technology even

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though the particular unit might be able to increase its productivity and profits in the short run.

Though displacement of labour may not appear to be a serious problem to the unit which adopts the higher technology, the society has to bear the cost of feeding the displaced workers and their dependents. Where means are not available for doing so, the persons concerned will fend for themselves by resort to unsocial behaviour if necessary. The cost of such displaced labour to the society cannot, therefore, be ignored.

Use of advanced technology almost invariably requires greater investment of capital, much of it in foreign exchange, and demands a higher level of technical know-how. Where these are scarce, they must be carefully deployed so as to yield the highest return per unit. Only that way can the optimum productivity of all the means of production be achieved. Where labour is plentiful and wage levels are low, the yield per unit of these scarce resources is often maximised by using a larger volume of labour at a relatively lower level of technology.

It is, of course, true that advancing technology, especially the science of electronics, makes possible today what was not possible at all yesterday. Where social betterment demands performance of jobs and operations which could not be performed otherwise, the use of most advanced technologies must certainly be accepted.

Industrial management in our country, indeed, in most countries, is still authoritarian in its philosophy. The workers have very little say in the initiation of any change, technological or otherwise, nor do they have sufficient information about the likely consequences to them of such change. Hence, all change generally gives rise to suspicion and resistance from the workers except where the change is to the obvious benefit of the workers themselves. The introduction of technological change involves the problem of overcoming this initial suspicion and resistance among the

workers. This is not something which can be achieved merely by some piecemeal assurances or offers of benefits. It demands a change in the total climate of relationship between management and employees and a greater readiness by management to take the employees along with it in planning and introducing the change.

Ever since the earliest stages, the use of machines in industry has been viewed by labour as a threat to their jobs. To this day, this constitutes the most serious human problem arising from technological advance.

It is sometimes said that higher technology makes it possible to reduce costs of production and also to increase the volume of production. New products can also be placed on the market. Thereby, the rate of growth of industry as a whole is speeded up. A larger number of jobs are thus created by advancing technology than those that are eliminated.

This argument, though perhaps true in the long run, does not help to minimise the human problem of fear of unemployment, because the workers whose jobs are threatened immediately cannot find any consolation in the possibility that after 5 or 10 years many more jobs will be created. They and their families have to make a living in the present and not in the future.

When the rate of displacement of jobs is particularly high as in the case of introduction of automation, the threat of redundancy is also correspondingly greater. The critical factor here is the rate of growth of an industry or of the economy as a whole in relation to the rate of the growth of labour productivity due to new technology. Where these two are in reasonable balance, the threat of redundancy can be kept to manageable proportions. But where the latter far outstrips the former, greater unemployment is the inevitable result of advancing technology.

An assurance to the employees concerned that there will be no retrenchment of the present employees is, of course, essential before the employees can be

expected to give any positive consideration to the introduction of automation. However, recent experience shows that such assurance does not always overcome the resistance from the employees. One of the grounds for such resistance is the fear that even though the assurance may protect the present employees, it will reduce the employment prospects of new entrants in the labour market. In a country like ours with vast unemployment, it is argued, any measure which reduced the future prospects of employment must be considered undesirable.

This question of the impact of automation on future employment needs to be viewed in proper perspective. The total employment in the entire organised sector of the economy in our country at present is estimated to be less than 20 million. As against this, the number of wholly unemployed persons is estimated at about 15 million. Even without automation, the additional employment in the organised sector during the past two decades has been negligible compared to the total volume of unemployment. Only a very small part of the organised sector is likely to be affected by automation at least for the next decade or two. The impact of automation upon future employment in the organised sector is, therefore, likely to be only marginal. In fact, it has now been recognised that the answer to the unemployment problem in our economy does not lie in the field of organised industry at all.

Hence, the fears that automation will aggravate future unemployment seem to be exaggerated. The reduction in future jobs may be only of the order, of a few thousands every year while the addition to the volume of unemployment is of the order of several lakh. every year. On the other hand, automation discreetly applied may stimulate the growth rate to an extent that may neutralise the possible adverse effect upon future employment.

This macroscopic and statistical appreciation of the problem of the impact of automation on future

employment should not, however, blind us to the human hardships that may be caused to people who are in employment at present. Protection of their jobs alone is not enough. They can be adversely affected due to transfers to distant places, prospects of promotion, loss of status and so on.

In the developed countries, the threat of unemployment has been largely mitigated by two factors :

a) Conditions of full employment in which a displaced worker can look forward to finding new employment within a fairly short time or where displacement may merely mean re-deployment;

b) Extensive social security benefits including unemployment pay, which keep the worker from starvation while he is finding new employment.

In the developing countries neither of the two factors mentioned above are present and hence the threat of unemployment is all the more grave.

Even where there is no direct threat of unemployment there is always the fear that technological change might render certain long-standing skills obsolete. Similarly, the relative status and/or wage rates of different jobs and occupations might change. New skills may have to be acquired by large groups of workers. All this implies a disturbance of the existing order of things at the work-place from the worker's point of view, and a feeling of insecurity arises unless special efforts are made in good time to allay his misgivings.

It has also been suggested that when due to technological advance the worker is reduced merely to the status of tender of highly automatic machines instead of being a producer of goods himself, the worker's self-esteem and the meaningfulness of his work to him are undermined. Unless the institutional and social

relationship inside the factory as well as outside can change sufficiently to absorb the impact, the psychological effect of the changes upon the worker is likely to be serious. In our country, very little field research has been conducted in this because of the change in the relationship of the worker to the work.

The workers are constantly told that their wages and living conditions cannot improve unless productivity of Indian industry rises. At the same time, when any new machinery or equipment is introduced as a result of which labour productivity rises the employers often contend that the workers are not being called upon to put in greater effort or skill, and therefore, should not ask for higher wages. If they are thus denied the benefits of productivity increases resulting from technological change there is no real reason why they should accept such change at all. Nor will their wage and living standards rise much if these are to be related to their own efforts or skills alone.

In the developed countries some guidelines have now emerged for dealing with the human problems arising from the introduction of new technology. In India also an effort was made in the 15th Indian Labour Conference to evolve such guidelines : Some of the steps which are now deemed necessary are :

i) adequate advance planning of the change;

ii) consultations with the workers' organisations from the earliest stage of the planning of the change;

iii) Anticipating the likely adverse consequences of the change to the workers;

iv) devising ways and means of protecting the workers from these adverse consequences even if it means phasing out or slowing down the introduction of the change.

The protection of the workers' interests in situations of changing technology has been primarily

achieved in the developed countries by the trade unions themselves both through their bipartite relations with the employers and through exerting influence upon Government policy. The vigilance and strength of the trade unions have been the greatest guarantee of the security of the workers' interests. This guarantee has, in turn, induced a positive attitude of confidence among the workers themselves and minimised suspicion of change. Here again, conditions in our country are vastly different. Neither the trade unions nor the Government have been sufficiently effective in protecting the workers' interests. In fact, no institutional framework exists at present to process the human problems arising from technological change.

III

ECONOMIC AND SOCIAL CONSIDERATIONS

By

PROF. N. S. RAMASWAMY*

"When looms weave by themselves, man's slavery will end," so said Aristotle more than 2,200 years ago. What Aristotle meant figuratively is a practical possibility today. In some of the technologically advanced countries, looms are almost weaving by themselves. Almost fully automated plants are springing up all over the world. The phenomenal development of science and technology in the last two decades has ushered in an era where the end of Man's struggle for mere physical survival is in sight. It is today technically possible to eliminate manual labour from most of the mass production operations. As regards other operations, Sir George Thomson said that it may be possible to train monkeys to do the simple jobs that it is not economic to make automatic.

Today, scientists agree that, theoretically speaking, automation has the potential to bring about economic abundance without any significant amount of labour input, thus freeing man from the need for drudgery. This would give him a lot of leisure which he can creatively use for the unfolding of his personality. Several thinkers consider that with the advent of automation an age of plenty would logically emerge. Mr. Adlai Stevenson thought that "this is a time of transition.... from the ancient problem of sharing scarcity to the modern problem of distributing abundance." The American labour leader, Mr. Walter Reuther, considered that "Economic abundance is now within our grasp if we but have the good sense to use our resources and technology, fully and effectively, within a framework of economic policies that are morally right and socially responsible." Socialist thinkers are banking on automation for bringing about economic abundance which will form the material base for the creation of socialism and communism.

It is readily agreed that automation increases productivity many times and saves a large amount of drudgery and boredom of repetitive jobs. The possibilities of automation seem to be infinite, unfolding new horizons. Automation can do what man can never hope to do. Also, what man can do, automation can do more efficiently. Even war, which used to be the domain of the physically strong and the mentally courageous has not escaped the invasion of the computer and its programmer. Push button warfare is no longer a novelist's fantasy, System Analysts threaten to replace veteran generals. In brief, man has today the opportunity to make automation an efficient servant.

There is considerable confusion, even among the generally well informed men, about the extent of automation possible and the economic and social problems it will create. The President of the Rockefeller Foundation once said, "we have been undone by a

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technology which came too soon and which found us utterly unprepared in point of religion, ethics, law, philosophy or politics to meet the exigencies which it created."

In the United States where giant strides are being made to replace labour by machines, automation has created many problems. This great scientific development, which should have been a boon to man, threatens to become a curse, and is generating social and national tensions. Prof. Buckingham has said that "unless there is full understanding of automation, its benefits could be dissipated by inefficiency, unemployment, and human degradation." It seems, therefore, necessary to inquire into the causes which are responsible for such unfortunate consequences.

Technological developments throughout history have always necessitated readjustment in social relations. Man has always sought to improve the technique of production, and along with it, to create social relationships wherein these techniques could be used to the maximum advantage. Therefore, it is only natural that the introduction of automation as a further development of mechanisation and mass production creates new problems in the economic and social plane. No wonder the social scientist is again the centre of discussions. Prof. Buckingham feels that "on investigation into the zone between the complicated technology and the equally bewildering social sciences would soon lead to nightmarish labyrinth and inter-connected causes and effects."

At this stage it might be useful to get some understanding of automation. Mr. D. S. Harper proposed the term in 1946 in the production planning sense: "The automated handling of parts between progressive production processes." Since then, literally hundreds of definitions have been given, a sample of which shows the range in thinking:

"Use of machines to run machines."

"...is a concept of the organisation of work."

"...a mechanisation of sensory control and thought process."

"...a combination of certain advanced forms of technology and forms of management."

"...is this generation's term for its newest technology."

Another approach to automation given in "Labour and Automation" is:

"(a) Integration of production planning to fuse purchase, production and distribution, and transfer of work from one station to the other.

"(b) Application of instrumentation techniques that stimulate human skills.

"(c) Integration of information technology by computers."

As a continuation of mechanisation and mass production, automation necessarily implies fantastic production volumes. This means that automation necessitates gigantic scale of operations. In order to realise its full advantages, production has to be planned at levels never dreamt of earlier. For reducing cost, volume has to be increased, which means use of automated equipments. This involves huge outlays on research and equipments. If a unit cannot keep pace with the technology due to want of funds or otherwise, it will have to wind up or get gobbled up by larger units. This has resulted in the emergence of monopolies and oligopolies. The age of small entrepreneurs seems to be disappearing giving way to giants. It is not unusual for one or two such industrial giants to dominate the national market and sometimes even part of the international market. The automobile industry in the United States is an illustration of two corporations, between them controlling nearly 70% of the market and slowly taking control of a sizeable portion of European market and production. The situation is the same in industries like computers, chemicals, artificial fibres, etc. The European States are today apprehensive of their economies being dominated by foreign capital.

Considerable amount of discussions and research are being carried out on the impact of automation on

culture and values and other social aspects of the people. For instance, there is an apprehension that cultural standards are deteriorating, leisure is being wasted on frivolous pursuits, etc. Though it is true that these developments followed automation, it appears that automation is not their direct cause.

Another aspect of automation is the imperative need for planning. Many will be surprised to learn that there is a greater amount of planning in the American corporate sector at the unit level than in socialist countries. However, as there is no planning at national level, this leads to contradictions. The resultant problem is the inability to take full advantage of the merits of automation. Labour is not able to go whole-heartedly for automation because of the threat of present and future unemployment. In the absence of adequate measures at national level to counteract the evil effects of automation, labour is hostile to automation. Many economists believe that it will be difficult for the United States to economically employ all its productive labour if automation is extended fully to all sectors. The enormous productive capacity of automated plants has lead to over-production necessitating cutting back production, or alternatively seeking overseas markets. It also seems to be true that problems of excessive productive capacity and unemployment have been absorbed by military spending. American experts agree that in their market-oriented economy, the transition to peace time proportions has to be necessarily slow in order not to dislocate the economic balance. Some of these problems can be solved by planning. Labour hostility to automation can be eliminated because there will be no unemployment. The absence of uncertainty in demand makes it possible to fully utilise all the productive capacity of plant and equipment.

These can be seen from the experience of the U.S.S.R., where automation is being introduced vigorously and extensively. In 1959-60, one of the policy directives to the 6th Five-Year Plan was to speed up

automation so as to create completely automated plants. According to Lenin, replacement of manual work by machines is the essence of progressive development of human techniques. They believe that automation, by providing the means for increasing productivity and turning out products in plenty, creates the material conditions for economic abundance. Attempts to automate are limited only by the availability of resources and know-how at any one time. Instances of saving in manpower and material, increased utilisation of equipment and space, increased production rate, etc. are advertised widely to motivate others to follow. Targets for release of manpower are fixed for each sector of industry, and provisions are made in advance to allocate the released manpower to new sectors. Mr. K. Klmin-ko of the Soviet Academy of Sciences estimates ("Automation and Society" — Pg. 425) that "the annual economic yield deriving from the automated equipment is equivalent to about double its initial cost" — clear proof of the advantages of automated equipment~.Education and training are undertaken to prepare the workers for the change, thus minimising the severity of the effects of technological displacement.

The question of automation has an entirely different meaning in developing countries. Conditions with regard to capital availability, unemployment, population pressure, technological know-how, social and cultural values are so different that it will be unfortunate if the models adopted by advanced nations are imitated by the developing nations. Strangely enough, temptation to imitate, irrespective of the validity, seems to be irresistable. By and large, the advanced nations have surplus capital and their labour cost is high. Typically, in a developing country, there is scarcity of capital and abundant manpower. For the purpose of analysis, we can take our own country for examining the feasibility and economics of automation.

We have a mixed economy where partial planning co-exists with free enterprise. Towards the achievement of welfare state objectives, the Government participates in the economic activities in order to bring

about rapid economic growth and regional balance. By a process of central allocation of basic resources and by regulatory measures, Government hopes to gear the economy to a balanced economic development. We might examine those characteristics of the economy particularly relevant to automation.

First of all, mechanisation and automation do need enormous amount of capital, which is extremely scarce in our country. We are able to save very little of our national product for further investment. The demand for capital from the various sectors of the economy is many times the available investible funds. Many important sectors — basic items and infra-structure facilities — are not just taken up for production just because of lack of funds. This, in itself, is distorting the growth of the economy. Experience of other developing countries, who are ahead of us in terms of **per capita** income, shows that scarcity of capital will continue to be the problem, for a long time to come. (Incidently, some of us have not realised that we are almost at the bottom among the 77 developing nations, and at the existing rate of growth, we will take a century to attain the present levels attained by some of the better off among them). In these circumstances, it is obvious that whatever capital is available should be rationed and allotted to the important sectors on a national priority basis.

There is a notion that cost of capital is the rate of interest (this varies according to "for whom and from whom"). In view of the acute scarcity of capital it will be advisable that a higher value (shadow price) for interest be taken notionally for purposes of calculating the economics of investment.

Secondly, automation displaces labour. Labour rendered surplus is either given alternative employment in the same company or retrenched. In most cases, they are absorbed in alternate jobs; but it should be noted that, in such cases, future job opportunities are being lost. More often, the problem is that of one who does not get a job, rather than that of one rendered surplus.

In India, we have 15 million unemployed today, and the absolute figure seems to be increasing every year, since the number of jobs generated by the economy every year are less than the new entrants to the labour force. Further, a still larger number are employed only part of the year. Again, in the agriculture and household sectors, there is disguised unemployment, where a larger number than necessary are engaged in production. Thus, we have an acute unemployment problem. The unemployed with their potential for productive work are today a burden on the community.

Developing countries have scarce resources. Increasing utilisation of these resources, i.e. increased productivity, helps to accelerate the rate of progress. Looking at it from the national point of view, our immense manpower resource is not being utilised fully. Under the existing framework, wherein a certain amount of capital is required to create employment, the magnitude of capital required will be colossal — far beyond the capacity of any developing country. Also, we do not have an organisation to put them to work on projects involving provision of infra-structure facilities, as is being done in some other countries.

The economic significance of automation can be measured by its consequences on the form and amounts of capital and labour required for production. The dimensions of this factor are: savings in the use of capital and labour per unit of output, ratio of labour and capital, time dimension, degree of substitutability of labour and capital.

Several leading economists have advocated that developing countries should resort to labour intensive techniques wherever feasible. Though this has been accepted, in principle, it is not being implemented in practice due to numerous reasons. Managements at unit level generally prefer to avoid labour intensive methods because of problems connected with labour and trade unions. Capital has an inherent tendency to move to avenues of maximum profitability. The free

enterprise system is based on the concept of unit level profitability. Under this system automation devices, wherever accepted by labour, are employed when the profitability of the unit is increased by this measure. The 'consequence of the labour rendered surplus is not considered while working out the economics of automation. If the labour rendered surplus is not productively employed, it becomes a social cost on the community, irrespective of whether unemployment doles are given. Thus the gain to the unit is partly offset by the social cost to the nation when the situation is looked at from the overall point of view. Being wedded to the establishment of a welfare state, it seems that the overall national gain rather than unit level profitability could be the criteria for an investment decision. Whatever be the policy, private sector units, working on profits as the yardstick for efficiency, cannot be expected to take the two national problems (capital scarcity and labour unemployed) in their day-to-day decision making process.

Besides the above, there are other factors which go against automation. Automatic equipments are not yet manufactured in India. Imports add to the burden of foreign exchange. Secondly, the volume of demand is not adequate to justify automated equipments. Thirdly, there is scarcity of trained personnel. Fourthly, lack of adequate spares renders equipment idle, thus reducing its utilisation index. Lastly, and most importantly, our managerial know-how and efficiency is below the requirements demanded by automation, except in the case of a few units.

Under the existing set-up, labour's attitude to automation is an important factor to be considered. Even in a country like the United States, there is considerable apprehension about the impact of automation on the economic and social aspects. In spite of the enormous increases in employment in the production and services sectors (more than 50%), as well as defence, there is still fear of job security, strain connected with change in job, location, timing, etc. Therefore, the Indian worker, who is living under mere subsistence

levels, is genuinely concerned. Shakespeare has said that "you take my life when you take the means whereby I live." But unlike in the United States, there has been no retrenchment in India due to automation as they are absorbed in expansion schemes. The problem is not of those displaced, today, but of the millions who are unemployed waiting to be employed.

An illustration is the cotton textile industry which is the largest employer in the organised sector. If automation is to be introduced here, a colossal amount of capital will be needed and bulk of the labour will be displaced. While there is no doubt that this sector has to be automated, some day, the questions are whether we have the funds, and what to do with the surplus labour. The difficulties of the situation are so enormous that no optimum solution can be attempted in the foreseable future.

Thus we can see that with respect to the factors connected with automation, we have the problems of the free enterprise system, with marginal advantage of the planned system. Therefore, the case for automation in toto appears to be unrealistic. Whatever be the ideal approach, only a selective approach seems feasible.

The overall strategy of one approach would be :

(a) adopt automation, where manual methods are not feasible, or are absurdly uneconomic to meet the requirements of quantity, quality, speed and safety;
(b) adopt automation in export-oriented industries, where automation is a more suitable alternative to subsidies;
(c) adopt automation to learn the know-how in sophisticated sectors;
(d) avoid automation where manual methods can do an equally (or near equally) good job with regard to requirements, but at a higher cost.

Obviously, some of the process industries like refineries have to be necessarily automated, since process control by automatic devices is the only way to

achieve optimum results. There are numerous other situations such as signalling in railways, power generation, handling in ports, steel making, etc., where automation should be adopted. But in an engineering industry, even with mass production methods, it may still be possible to use semi-automatic and manual methods to transfer work from one station to the other.

The advent of electronic computers for handling of information, is another phase of automation. The growth in this area during the last 10 years is almost staggering. Hundreds of computers are being installed every month completely revolutionising the methods of processing of information. For considering the economic aspects, computer applications can be classified into three categories :

(a) Scientific and engineering design;

(b) Analysis and decision making;

(c) Labour saving.

There is no question that computers should be used for scientific and engineering design work. In most cases, manual methods just cannot do the calculations, while in others, it will take days to solve a problem. Design of structurals, equipments, etc. result in economies in materials and production cost. Automatic control of aircraft, process industries, etc. can also be included in this category. One of the objections against central planning was that the volume of work and centralisation of decision-making would need a bureaucracy of monstrous size. But, computers have almost solved the computation problems of national and regional planning.

Innumerable national level problems, such as : (a) input-output analysis for resource allocation, (b) plant location and economies of scale, (c) rationalisation of transport, and (d) national income and trade statistics, can be solved by the computers, which cannot be done manually satisfactorily. There are similar problems at unit level such as Production Programming, Inventory Control, PERT, Operations Research

Analysis, Traffic Control, etc., where again use of computers should be encouraged.

In all such cases, the attempt is to process information so as to make it adequate, meaningful and timely, with the result decisions become more rational. Productivity of the situations is increased as a result of such scientific decisions. Also, the objective is not to bring about any labour saving in the direct sense.

Only in the third category can there be debate on the desirability of using computers, since the main objective is to substitute labour with machine. Even here, it can be argued that the volume of work is so large that manual methods will be absurdly uneconomic and inefficient. However, in the majority of cases, automation is to be discouraged. Applications in this category are billing, accounting, pay roll, etc.

We are losing ground in our exports, mainly because of high cost. A typical situation is the cashew and coir industry. Both have labour intensive methods today. While coir exports have already been severely affected, cashew industry is being threatened. If the quantities of export earnings are crucial, here is an area to be considered for mechanisation, which will reduce cost.

In a developing economy, we have the so-called dualistic development where primitive methods and advanced technology co-exist. For instance, investment in bullock carts is not far behind railways, and when we are proud of our atomic energy establishments, let us not forget that cowdung is one of the main source of fuel in our villages. This is inevitable. But we have to learn quickly the know-how of automation technology in all the major sectors. We cannot sit back and wait till we have enough capital and tolerable levels of unemployment in order to acquire this. Therefore, we should automate representative sectors of activities, necessary know-how and skill, irrespective of capital and labour considerations. For instance, we should go in for a few units

of computers, adopt instrumentation in process industries and automate manufacture of specific key industries.

The economic and social problems of our country are enormous. Automation has not made any sizeable inroads yet. Even if the desire is for automation, there are numerous obstacles. Wherever it is achieved, there is some gain. The magnitude of the unemployment problems is so terrible that the introduction of automation here and there will not make any appreciable impact either way. We have to go through the stage of mechanisation first before we are really asked to confront the problems of automation. Serious studies will help to clear up some of the misunderstandings and help to clarify issues.

Time and again it has been .proved that automation is not a mere technical problem. In fact social scientists feel that the problems of leisure and social adjustment will be much more difficult to solve than technical ones. If man has the courage to go into the root causes of the evil effects connected with automation, he could command nature and te'chnology to achieve his well-being.

The views expressed in this booklet are not necessarily the views of the Forum of Free Enterprise.

"Free Enterprise was born with man **end** shall survive as long as man survives"

—A D. Shroff
(1899–1965)
Founder-President,
Forum of Free Enterprise.

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