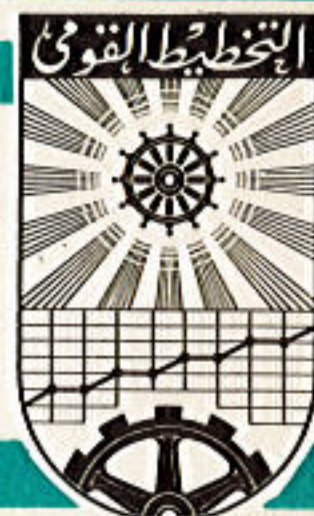


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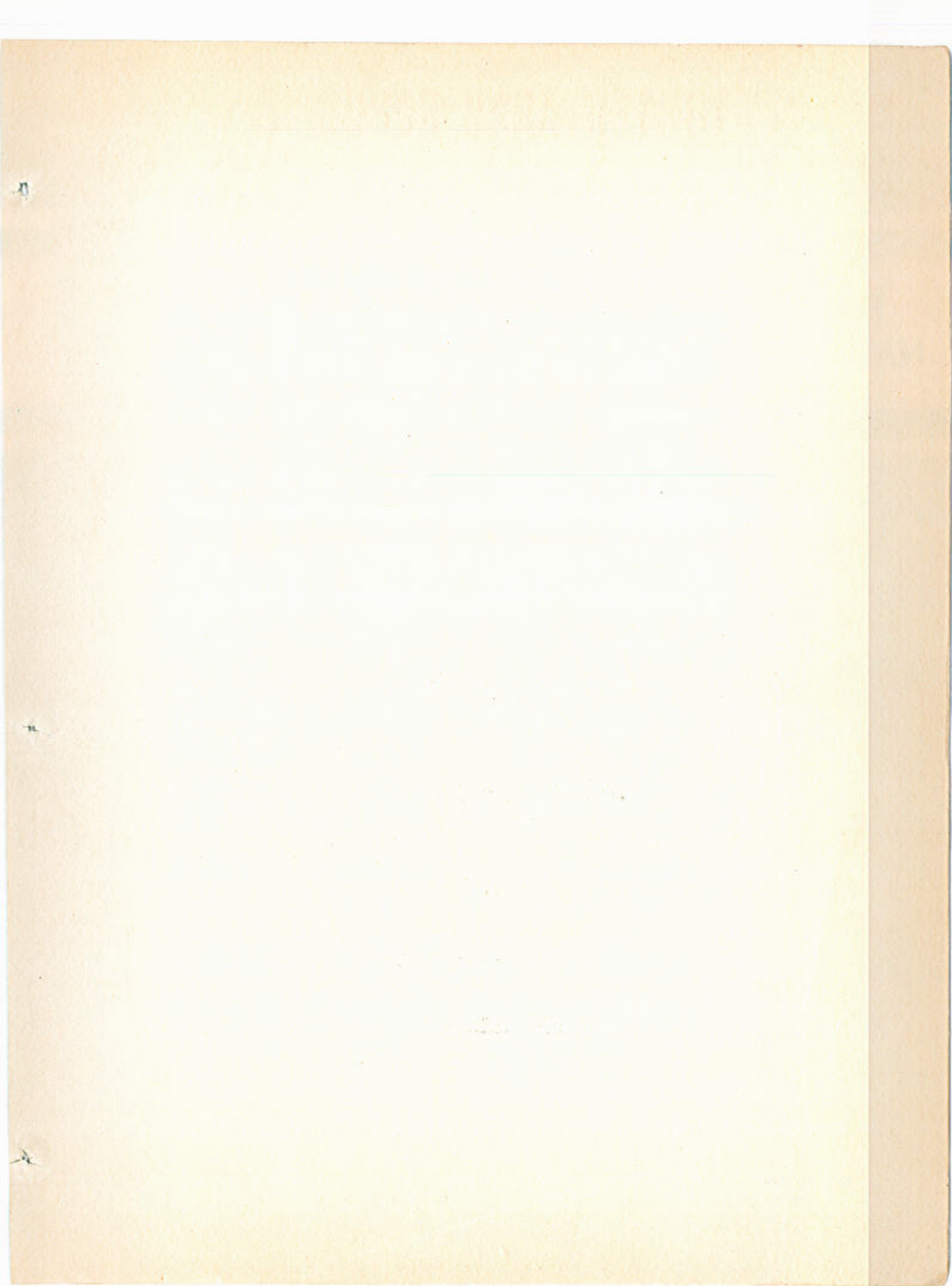
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MANPOWER PLANNING AND
EDUCATION

by

Pitamhar Pant

January 1962.





**PROBLEMS OF ACCELERATED GROWTH & MANPOWER
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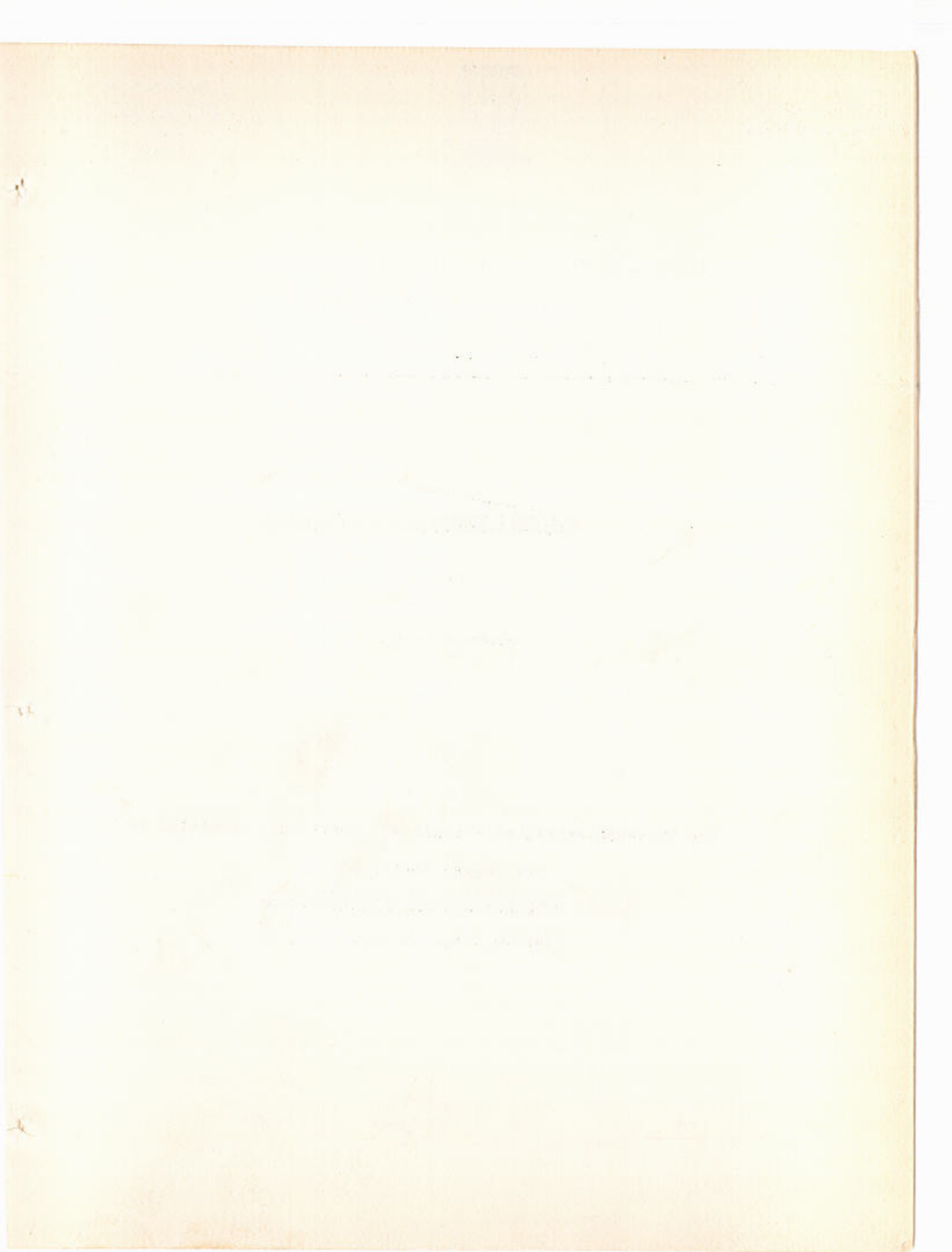
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MANPOWER PLANNING AND EDUCATION

Pitambar Pant

Modern civilization owes its characteristic features to the widespread use of science and technology. The very much higher standard of living of the people in western countries is directly attributable to the great technological advance made in these countries. For the first time in human history, the possibility has been created of banishing poverty, ill-health and ignorance from the life of the masses the world around, fully in keeping with the democratic spirit of the age. Already vast knowledge and tested technology exist to increase production from farms and factories, speed up transport and communication, improved health and well-being; and the method of science ensures constant acquisition of new knowledge and its useful application. It is this which provides the underdeveloped countries with their hope and opportunity to catch up with the industrially advanced countries in standards of material well-being. Analysing the problem of India's poverty, the Third Plan says: "Low levels of consumption, saving, productivity and employment are different aspects of the central problem which India faces in common with other underdeveloped countries. Basically the task is one of developing the natural and human resources of the country through the widest possible use of knowledge and technology and improved organisation within the framework of a well-conceived longterm plan."

Need for Long-Range View

The effective development of the country's resources will require a very large number of engineers and technicians capable of putting to practical use the knowledge which already exists and of scientists capable of making new discoveries. Correct planning and training of these specialists is of decisive importance and requires the most serious attention, so that men with necessary knowledge and skill are available at the right time in requisite numbers to undertake the wide range of tasks the growing economy will require to be performed. In the particular case of higher technical, scientific and medical training the educational process takes 6 to 7 years; if there is shortage of teachers to overcome, action has to be taken ten or more years in advance and even earlier if the base of secondary education is too weak to support a large technical education programme at a later stage. As the training of such personnel takes several years it becomes necessary to base training programmes on calculations of requirements of the various categories of personnel five to ten years ahead in different branches of the economy with a fair degree of accuracy. Because of this time lag in the educational process planning for education and training must be in advance of current planning by a period of several years in a situation of rapidly growing demand, as is characteristic of the Indian economy in its present phase of industrial-

zation. Thus, educational facilities in relation to requirements of the Third Plan should have been taken up as part of the work of preparing the Second Plan and educational programmes in connection with the needs of the Fourth Plan must be implemented during the Third Plan. Such considerations apply in all cases where there is a considerable time lag such as the establishment of large and complicated steel plants, heavy machine building plants, deep mines, hydroelectric stations, etc. and appropriate action during a given period does not become apparent unless a view of the longer period ahead is taken. This is the significance of long-term planning on which considerable stress has been laid in the Third Plan.

The Third Plan not only indicates the minimum rate of growth of 6 percent per annum to be continued for several years ahead and suggests orders of net investment during the Third, Fourth and Fifth plans, but also gives an idea of the specific nature of tasks ahead by indicating the targets of capacity and activity to be achieved by 1970-71, such as: steel ingots (18-19 million tons), coal (170-180 million tons), electricity (21-23 million Kw.), aluminium (230-250 thousand tons), nitrogenous fertilizers (2.0-2.2 million tons of nitrogen); food-grains (125 million tons), railway long distance goods transport (380-420 million tons) etc. Thinking along these lines has to be extended to a much larger range of production and to activities in the field of health, education, etc. so that an integrated, internally consistent and practically achievable programme emerges with fair degree of accuracy. It is on the basis of this that systematic manpower planning can be based and educational and training programmes instituted early in the Third Plan to meet the needs of the future.

This preliminary outline should be as specific and as detailed as practicable and must be worked out fairly early after a round of preliminary discussions with experts concerned. While the levels of production and volume of activity in various branches are being worked out, there should simultaneously be a number of surveys and studies of (a) pattern of employment of engineers, scientists and technicians in different sectors, (b) staffing pattern for enterprises according to scale of operation and type of technology, (c) average work loads for doctors, nurses, teachers, etc. and desired norms of employment, (d) relative proportion of different categories of personnel, (e) standardisation of job designation and required educational and training qualifications, (f) degree of utilization of highly qualified personnel, etc. The results of these studies will provide the material for better planning of manpower.

To some extent this was the method ultimately adopted for the Third Plan. With a better developed outline of the Fourth Plan and more detailed analysis of the situation during the course of the year, certain expansion of training programmes may become necessary; but the principle

has been recognised that the training programmes in the Third Plan have to be related to the requirements of the Fourth Plan. The earlier these requirements are worked out carefully and systematically the better the prospect of not impeding progress in the Fourth Plan due to shortage of trained personnel.

Second Plan Experience

The concern for manpower planning and an appreciation of the issues involved are relatively new developments. The First Plan had scarcely any need for worrying about the matter as the tempo of development was not fast enough to cause shortages of trained men. After the Second Plan was prepared an Engineering Personnel Committee was appointed to evaluate the demand for engineers arising from the development programmes of the Second Plan and to suggest means of meeting the same. The Committee made some estimates based on data furnished by States and Central Ministries in relation to projects included in the Second Plan but admitted that the shortages during the Plan could not be met by the training programme suggested by it, as it was already too late for these programmes to have their impact on the Second Plan requirements. Nor was the Committee in a position to take into account the requirements of the Third Plan, for which period in fact its recommendations would have the greater relevance. The requirements of non-government sectors were conjectures and the distribution of total number by type of engineers was merely a projection of the past and did not reflect the changed requirements of the future. A review was urgently required to work out estimates of requirements of the Third Plan realistically and to expand training capacity in engineering colleges and polytechnics as required well in time to avoid shortages at least during the Third Plan. Such calculations were made in the Perspective Planning Division of the Planning Commission early during the Second Plan in relation to the requirements of the Third Plan on the basis of a fairly detailed, realistic and internally consistent set of targets of production and of activity, conforming to the projection of the growth of the economy outlined in the Second Plan. The estimates were helpful in persuading Government to step up admission to degree and diploma courses of engineering to levels much higher than initially contemplated. The Report of the Working Group on Technical Education and Vocational Training appointed by the Planning Commission in connection with the preparation of the Third Plan recognized the necessity of anticipating Fourth Plan requirements in the training programme of the Third Plan and confirmed broadly the earlier estimates.

The concern for manpower preparedness was reflected also in the terms of reference of the Agricultural Personnel Committee appointed by the Planning Commission in April 1957 which required the Committee "to make a fresh assessment of requirements of trained personnel during the Second and Third Five Year Plan, keeping in view the increased targets of production and the long term proposals of development in different fields;

and to recommend measures for augmenting training facilities and to formulate a planned programme for giving effect to them."

However, as no indication was given to the Committee as regards the size and scope of the Third Plan, and the order of priorities within the agriculture sector itself, the task of assessing the requirements of personnel in the Third Plan was beset with difficulties. The Committee was obliged to make its own assumptions regarding the rate of growth of agricultural production, desirable programmes of development, etc. and, subject to the limitation imposed by the problem, dealt with the subject with care and comprehension. Its report was published in March 1958 and helped the Planning Commission to assess the requirements of technical personnel in a realistic way.

Long-Range Planning for Manpower

The possibility of elaborating a detailed provisional outline of the Fourth Plan for purposes of advance planning fairly soon makes the task of manpower planning for the Fourth Plan, from the point of view of institutional training, less difficult. In what follows, the problem of integration of the system of education with the economic-social developments as seen in the context of future needs has been very tentatively posed.

The projection of the future growth of economy as given in the Third Plan implies an annual growth in investment and in industrial production of the order of 10 to 12 per cent., with agricultural production rising at about half this rate and the rest of the economy growing at a somewhat faster pace than agriculture. The objectives in health and education have not been stated but certain assumptions could be made. A few brief comments are made about the main categories of highly trained professional people, before coming to the main topic of the need for quantitative long-range planning of higher education in particular and the educational system as a whole.

Engineering personnel:

The concept of the Fourth and the Fifth Plans will have to be made much more definite before fairly accurate estimates of requirements of trained personnel can be worked out. It is, however, already clear that in all areas which call for use of engineers-manufacturing, design, construction, teaching, etc.-there will be an expansion of the order of 10 percent or more. With the structure of industry changing more and more in favour of industry utilizing a higher proportion of engineers, such as machine building and chemical industries, and a progressively higher number needed for design and development, there will be a tendency, observed all over the world, for the increase in requirements of engineers outpacing the rate of growth of industrial production.

However, adopting 10 per cent for annual increase and about 2 percent for replacements, with a base of 100,000 degree engineers in 1965 assumed to meet the requirement in full at that time, output should be 12000 in 1966 (as already planned) rising annually by about 1500 to 2000 during the Fourth Plan. This would imply a stepping up of admission by about 2500 a year all through the Third Plan, taking the figure of admissions to about graduate engineering courses in 1965 to about 25000 instead of 19000 as now contemplated. This will barely meet the additional requirement of about 90,000 engineers during the Fourth Plan. Similarly, in the next Plan period also a steady increase of about 3000 per year in admissions will bring admissions to nearly 40,000 by 1970 ensuring during the Fifth Plan and additional supply of 120,000 engineers after allowing for replacements, bringing the total number in position by 1975 to about 300,000 i.e., nearly three times the number active in 1965. This is consistent with a level of investment at least 2½ times higher in 1975 than in 1965 and industrial output three times as much, as implied in the model. It is true this is a very rapid rate of expansion. It means nearly tripling the admission capacity during the ten years 1960-70, but considering the fact that capacity was nearly tripled even during the five years of the Second Plan, the task is not one which should be beyond our capacity. Similar considerations will apply in the case of diploma seats.

This is, of course, a simplified way of presenting a problem which has many complex aspects. The estimates of requirements should be based on much more detailed consideration of the growth of each of the many sectors which call for the use of engineers and evaluation of the main factors which determine the estimates of requirements. This is a task which must be done systematically by individual enterprises, departments and ministries concerned with specific activities and it is easier to do so now because the Third Plan has given a fairly specific indication of the pattern of development envisaged during the Fourth Plan and further ahead. Not only has the overall rate of growth of the economy and the order of investment been indicated but specific targets of production and activities in many key sectors have been suggested. Later the Planning Commission will no doubt develop a fuller outline to serve as a preliminary basis for systematic, unified studies on a wide range of interconnected problems. The natural tendency to consider matters connected with the Fourth Plan as too remote to call for serious attention and effort can prejudice success. Otherwise there is no reason why advance planning will not take timely care of likely problems of the future. The approach is clear, the method is known and whatever uncertainties there exist need not hold up progress.

Medical :

Lack of advance action regarding manpower preparedness renders a solution of the problem very difficult when later a quick solution is desired. Take for example the objective of providing a reasonable standard

of medical care to the masses of our people, specially in the rural areas. It is true there are difficulties in the way of extending medical services on an adequate scale all over the country within a short time. There are not enough doctors, not enough teachers who can train them in larger numbers, and other resources too are meagre. It is on this ground that the Third Plan has been content with the provision of one doctor for 6000 of population even at the end of the Third Plan, as it has remained during the Second Plan and one hospital bed for 2000 as against 8 beds for 1000 persons, envisaged in the Bhore Committee Report several years ago. Considering that in most advanced countries of the world there is one doctor for 500-1000 population, and one bed for 200 population, there is cause for disquiet in our lack of progress in this field.

In Delhi state, there is already one doctor to 1500 of population and there is no reason why for the country as a whole a long-range target of one doctor per 3,000 population, with adequate distribution of service in both the towns and villages should not be achieved within a reasonable period of time. A properly organized health service on this level would still be only one-fifth as intensive as that prevalent in many countries now. As drugs and medical supplies and instruments would be available cheaply and in ample measure for indigenous production very shortly, the problem is concerned mainly with training of requisite staff. Given clarity of objective and a will to find a solution, there can be no serious difficulty in tackling the problem. Consider for example the proposition that the number of persons per doctor should vary inversely with the per capita national income. If per capita income is stepped up at the rate of 3.5% to 4 per cent a year, per capita income will be doubled by 1980 and on the above assumption there should be by then one doctor for 3000 persons. As the estimated population by that time will be around 690 million, the number of doctors active in the country should reach the figure of 230,000. With the current number estimated at 70,000, and allowing for an attrition rate of 2-3 per cent, output should increase at the rate of about 7 per cent a year. This would require training of 28,000 doctors in the Third Plan, 40,000 in the Fourth Plan, 56,000 in the Fifth and 78,000 in the Sixth Plan requiring admission in medical colleges to be stepped up from 6,000 in 1960 to 12,000 in 1965, 18,000 in 1970, 25,000 in 1975, so that by 1980 the output is 20,000 of which about 6,000-7,000 will be needed for replacement and 13,000-14,000 will be available for improving standards of medical attention. The shortage of teachers will be considered as the main obstacle, but this problem which is a general one, can be solved only by following a bold policy of drawing bright people to the teaching profession by offering them better status, emoluments and facilities.

Education :

Objectives in the field of education have not been clearly stated, but reasonable assumptions could be made for the year 1975 (estimated

would be required to conduct the economy in all its branches. Roughly they will be as follows :

Teacher-middle and secondary	16,50,000
University: education and research	4,00,000
Engineers	3,00,000
Medical	1,50,000
Agriculture, veterinary, etc.	1,20,000
Others, (economic, commerce, law, history, politics, etc.)	14,00,000
	<hr/>
	40,20,000
say	40,00,000

This works out to 63 per 10,000 population as against about 14 per 10,000 population in 1955. With roughly similar volume of production in 1950, USSR had 1.5 million persons of higher qualifications showing an average of 75 per 10,000 population. Because of larger population the number of teachers and those under 'Others' are much larger in the above estimates for India.

Carrying the exercise further, it is estimated that 1975 enrolment in classes IX-XI may be kept at 10 million (twice as large as in 1965) with an output of at least 1.5 million. Out of this number, through a selective process of admission, 350,000 may be admitted to universities and technical colleges and about 525,000 to diploma courses as follows :

	<u>Degree</u>	<u>Per cent</u>	<u>Diploma</u>	<u>Per cent</u>
Engineering	60,000	17	1,20,000	23
Medical	25,000	7	75,000	14
Agri., Vet., Forestry, etc.	15,000	4	30,000	6
Education, Research	1,75,000	50	1,50,000	28
Science	1,00,000	28	75,000	14
Others	75,000	22	75,000	14
Arts, Economics Commerce, etc.	75,000	22	1,50,000	28
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	3,50,000	100	5,25,000	100

These estimates are worked out keeping requirements of growth and replacement for each category of personnel as would arise at the time the graduates come out. The phased programme of admissions in earlier years should be consistent also with the total stock envisaged in 1975 on the basis of requirements in that year.

Similarly, admission to degree courses in 1970 may be limited to about 300,000 including engineering 40,000 and medical 15,000. The total enrolment in universities and technical colleges in 1975 may be about 1.6 million showing an increase of only 200,000 in 10 years, as against an increase twice as much in the five years of the Third Plan. The larger proportion of science students is another feature which compels attention. 200,000 out of 350,000 admissions will be science students, showing roughly a proportion of 60 per cent. The same proportion is seen among candidates selected for diploma courses. Thus, out of 1.5 million students passing the higher secondary at least 500,000 should be science students of good standard, which is quite feasible with about 50-60 per cent boys and girls taking science as an elective subject. At the end of the Third Plan facilities for science education will be available for about 40 per cent of the students i.e., for about 1.8 million out of 4.5 million. If ten years later, when the enrolment reaches 10 million, the proportion of science students is to be 55 per cent, the additional facilities for science education will be required for 3.7 million or about 70 per cent of the increase number of students.

This very tentative exercise has been attempted to draw attention to the urgent need of putting perspective planning of higher education on a rational, quantitative basis. There has been substantial expansion of higher education in India in recent years and enrolment has been increasing at the rate of almost 9 to 10 per cent a year. In the absence of adequate avenues for technical and professional training or of employment on the completion of the secondary education, a very large proportion of students who pass the final examination seek admission to universities and colleges. Many of them are ill-equipped for higher education, but persistent demand for unrestricted admission to universities in arts and commerce courses continues. Often the graduates turned out can do nothing better than clerical work and even for this the avenues for employment do not expand in proportion to the number of graduates turned out. There is great deal of waste involved in this attitude of drift. The primary responsibility of the universities is to admit able and talented students, provide for the fullest development of their potentialities and maintain excellence of academic standards. When the need is for more engineers, scientists and doctors, there is really no point in continuing to turn out graduates in arts, commerce, law, etc. in very large number, far too many in fact to have any reasonable chance of fitting in the developing pattern of the economy. Unless the pace of development is much faster, there will be little justification for letting universities increase and expand without adequate facilities and without regard to academic standards. Expansion even then would have to be in scientific and technical fields of education rather than in general arts, law and commerce, etc. The limited resources should be directed to strengthening, scientific technical and medical education, improving laboratory and library facilities and expanding scholarship schemes as much as possible, so that we get able engineers, doctors, scientists, research workers and teachers in adequate numbers and of high quality as these are the people whom we shall so badly need, and on whom the progress of the country will largely depend.

To conclude, planning for education involves careful analysis of a number of issues. Since education can be viewed as social investment with a very long gestation period, its planning should be approached from the point of view of long-term objectives of the society. In other words, the objectives and programmes of education should be related to the requirements of the future plans. Secondly, it is not very meaningful to talk in terms of aggregates, when the equation of supply and demand has to be worked for each separate category of personnel. For only to a limited extent are these variously qualified graduates interchangeable. A comprehensive plan should identify clearly the various categories of trained manpower required, and it is the main function of the educational process to give to properly selected boys and girls the best education and suitable environment to fit them for creative endeavour in future.

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