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THE OBJECTIVES, MACHINERY AND METHODOLOGY OF MANPOWER PLANNING

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This paper deals with three aspects of manpower or human resource development planning: I. Objectives, II. Machinery, and III. Methodology. It stresses in particular the problems of newly developing countries with partially planned economies. In many respects, it reflects the basic approach and philosophy of manpower development which appear to be emerging in Nigeria and some of the other new nations of Africa. This particular paper is part of a more comprehensive treatment of the subject which may be found in the book entitled, Education, Manpower and Economic Growth, by frederick Harbison and Charles A. Myers (McGraw-Hill Book Co., New York, 1964).

The Objectives, Machinery and Methodology of Manpower Planning.

By

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1. OBJECTIVES OF MANPOWER PLANNING

The central objective of manpower planning is to construct a strategy of human resource development which is consistent with a country's broader aims of social, political and economic development. At the outset, let us be clear about the scope of manpower planning. At the very minimum, manpower planning includes planning of the formal education system, planning of in-service training and adult education, analysis of the structure of incentives and the utilization of manpower, as well as surveys of manpower requirements. It should also include the analysis of unemployment and underemployment and appropriate measures for alleviating them. All of these things, I am happy to note, come within the broad jurisdiction of the National Manpower Board in Nigeria.

In more specific terms, I would suggest that the objective of a manpower or human resource development strategy is to arrive at an effective balance in choices of policy objectives. Some of the critical areas of choice for the partially planned economy are the following:

1. In all areas of formal education, the relative emphasis on quality vs. quantity.

2. In secondary and higher education, the stressing of science and technical subjects vs. law, arts and humanities.

3. In skill development, the relative reliance on preemployment formal training vs. in-service or on-the-job training.

4. In building incentives, the conscious manipulation of wage and salary structures vs. dependence on market forces.

5. In the general rational of human resource development, consideration of the desires of individuals vs. the needs of the country.

A newly developing country cannot have everything it wants all at once. It is compelled to make difficult choices, and it should make these choices on the basis of rationally determined priorties.

The choice between quantity and quality in educational development may take many forms. In some countries, it is necessary to choose between primary education for all or high-quality secondary and university education for a smaller number of potential leaders. There is always a choice between educating fewer students with better-qualified teachers and larger numbers with unqualified teachers; and there is also the choice between a good but costly curriculum and a poor but cheaper one. In general, political and social pressures make for emphasis on quantity, whereas the achievement of rapid economic growth makes it imperative to emphasize the quality of high-level manpower required for development.

The choice between science and technology vs. the law, arts and humanities in secondary and higher education is a difficult one for all nations. In a country such as Nigeria, there are critical shortages of technical manpower. There are also pervasive shortages of good teachers, managers, administrators and social scientists. But there are also needs for artists, writers, musicians, jurists, historians and students of African culture. In part, the choice is one between expensive education and cheap

education, as we have noted above. But, in important respects it is also related to the values and ideals of the nation. Social and political pressures tend to stress the importance of the more liberal, non-scientific type of education, whereas economic considerations demand greater concentration on science and technology.

In building technical skills, particularly at the craft level, countries may choose to place primary responsibility for training on the formal educational system or they may attempt to shift most of the burden to the employing institutions. In practice, training and re-training is a continuous life-time process of human development, and thus the employing institutions cannot escape responsibility for some training. Ideally, the role of the schools, particularly at the secondary level, is to produce broadly-educated persons who are readily trainable. But some training probably must be provided prior to employment by the schools and more can be offered through various kinds of "sandwich," extension and part-time courses for those already employed. A strong case can be made, of course, for pre-employment sub-professional and professional training in higher education, but an euqally strong argument can be made for continuation training and retraining conducted by joint efforts of employers, labor unions and educational institutions. In this area, the national choices are essentially technical in nature, but they are also influenced significantly by social and political pressures. For example, in some countries labour organizations have not only developed leadership training and worker education programs, but have also pressed for broader access to formal education.

No country today can rely completely upon market forces to provide the incentives for its people to engage in the kinds of activities most critically needed for development. In some cases, the status and compensation of engineers, scientists or agricultural specialists are too low.

In nearly all contries, the pay of teachers is inadequate, and the rewards of sub-professional personnel and technicians are far from sufficient to attract the numbers needed. The preferences for urban living, the forces of tradition, and historical differentials all tend to distort the market for critical skills. Thus, all countries must take some deliberate measure to influence the allocation of manpower, and these measures may range from outright compulsion to various kinds of financial and non-financial inducements. In general the more rapid the pace of planned development, the more deliberate these measures must become .

Finally, there is the crucial choice between the interests of the individual and the interests of the state in virtually all phases of manpower development. Does the state exist for the individual, or the individual for the state? The answer is never simple. A manpower strategy may have as its central goal the enchancement of the freedom, dignity and worth of man, but man has some obligations to help build the kind of economy which can provide decent living standards and protection of basic freedom. In all societies, therefore , there must be some compromise, or perhaps blending of the interests of the state and the individual. The actual blend will vary with the political and ideological character of the society.

As already noted, the objective of a manpower strategy is to strike the right balance in these critical areas of choice. The nature of this balance depends upon the goals of a society, its level of development, and its leadership. A country which fails to achieve a proper balance will produce the wrong kind of high-level manpower; it will invest in the wrong kind of education; it will allow the perpetuation of the

wrong kind of incentives; and it will emphasize the wrong kind of training. In reality, no society achieves a perfect balance, but some do much better than others. And, as economies progress, the forces which make for an effective balance are constantly changing, so there must be a continuous process of successive adjustment.

11. THE MACHINERY OF MANPOWER PLANNING

There is now emerging some experience in the establishment of governmental machinery for manpower palnning. Among the non-communist countries, India has probably done more in this field than any other country. Ghana, Nigeria, and Tanganyika and one or two other countries are in various stages of establishing human resource planning boards. The time has come for more intensive study of this process as well as exchange of significant experience.

There are many potential participants in both the formation and the implementation of a strategy of human resource development. Within the central government the ministries of education and labor obviously have major roles to play. Many other ministries, however, are vitally concerned with education, training, and development of particular categories of manpower. The government establishment office is concerned with personnel in the public sector; the public health ministry more particularly with doctors, dentists, nurses, and medical technicians; the agriculture ministry with agronomists, veterinarians, foresters, and their various assistants; the ministry of industry and commerce with manpower for private and public enterprises; the armed forces with military personnel; and so forth. In addition, employer organizations and labor unions are intimately concerned with manpower problems.

This diffusion of interest and responsibility for human resource development highlights the need for organizational machinery which will (1) coordinate the activities of these various bodies, (2) encourage forward planning on the part of each within its particular area of intrest , (3) assume responsibility for human resource assessments on a continuing basis, (4) relate human resource programs to palnning in all other areas, (5) construct and periodically revise a master strategy, and (6) promote and review the implementation of the strategy which has been agreed upon. In the newly-developing countries, there are perhaps three major components of this machinery.

1. The first is the establishment of a human resource or manpower development board. It should have representation from the appropriate government ministries and also from private employer and labor organizations. The functions of the board should be to allocate responsibility for various aspects of human resource planning to the appropriate ministries or groups, to review their plans and programs, and to provide for coordination.

2. The second is the establishment of appropriate planning staffs within the main participating bodies to shoulder the responsibilities agreed upon by the human resource development board. The ministry of education needs its own planning unit, as does the ministry of labor and perhaps others as well. And employer organizations should certainly be encouraged to set up staffs to work on programs for training and manpower development.

3. The third is the creation of a general human resource planning secretariat. In most cases, this secretariat can serve the human resource development board, It can also constitute the human resource

staff of the national planning organization, if one exists. In any case, the key to success is the competence of this staff, because deliberations of busy and powerful political leaders on human resource or general planning boards can be only as sophisticated as the quality of their secretariat services.

The chairmanship, or location, of the human resource development board and the secretariat serving it are matters which are likely to be determined in different ways by particular governments. In some cases, the leadership of the board is viewed as a logical extension of the responsibility of the ministry of education, and in others it has been loged in the ministry of labor. Where strong general planning organizations exist, there is a compelling reason to put the human resource planning machinery under its jurisdiction. In a few countries, human resource planning may be undertaken before the creation of general planning organizations, and here a case can be made to put it directly in the office of the prime minister. And in some countries, the staff-work on planning of all kinds is conducted by semi-independent organizations which are removed in part from the formal government machinery. The decision as to where to locate the planning function in a particular country may be made quite rightly in accordance with political criteria rather than with administratively-logical organization charts.

In the end, the crucial question is whether the machinery works. The precise location of a planning unit in an organization chart is not a matter of major consequence; it is far more importnant to link the planning function to clearly identified centers of power wherever they may be. Particularly in the human resource area, the palnning process needs to involve local and regional as well as national government bodies

and influential private groups. This is important to create "systems of consent-building" which are essential if plans and strategies are to be implemented effectively.

The major tasks to be performed by the human resource planning staff, therefore, are not narrowly technical. To be sure, statisticians, theoretical economists, engineers, or pedagogical experts may be needed to work on pieces of the problem, but the most critical skills required in the secretariat are organizational and political. The leading figures in the staff perhaps should be experts in their own right in particular fields of knowledge, but their principal functions are to act as "transmission belts" for concepts, ideas, and programs in all fields of human resource development. They need social perspective, political insight, and broad knowledge of their country's economic and social institutions. They must be promoters as well as judges. And above all they must be integrators and generalists. A human resource program which consists of unrelated pieces is hardly better than no program at all. The top staff men in the organizational machinery for human resource development should be strategy-builders rather than purely technical specialists.

III. THE METHODOLOGY FOR SETTING MANPOWER DEVELOPMENT TARGETS

In order to formulate a strategy of manpower development for a particular country, it is essential to make a systematic assessment of its human resource problems and requirements. Such an assessment is much more comprehensive than a manpower survey or a study of formal education. It should include, at minimum, an analysis of the following:

(1) manpower requirements;
(2) the system of formal education;
(3) institutions for in-service training and adult education; and

(4) the structure of incentives and the utilization of high-level manpower. It might also include some appraisal of problems of health improvement and nutrition. And, of course, it must be based upon an analysis of demographic trends and be related realistically to the social, political, and economic environment of the country.

In assessing the problems of human resource development, the most difficult task is estimating the future requirements for manpower. If these can be specified, it is then possible to plan programs for the building of educational and training institutions, and to estimate the costs involved. Also, if net requirements for manpower are estimated, it is possible to calculate the annual rate of withdrawal from the labor force because of death, retirement, or other causes during a planning period, thus arriving at figures for gross requirements. In the discussion to follow, therefore, let us assume that the policy planner is in position to handle such tasks, and that his major problem is the estimation of future manpower requirements as a basis for the other decisions which he will have to make. Stripped to its essentials, the estimation of manpower requirements involved a reasonably comprehensive analysis of the present situation, and using this as a base line, a forward estimate of long-run requirements for a period of perhaps 10 to 20 years. We shall discuss both in some detail.

A. The Analysis of the Present Situation

The assessment of present and short-term manpower requirements, while fundamental as a basis for longer-range estimates, presents few serious methodological problems. Short range is considered here as a period of one to three years. The essential elements are the following:

(1) an inventory of employment and short-term requirements for manpower;
(2) a general appraisal of the educational system;
(3) a survey of existing programs for on - the - job training; and
(4) a brief analysis of the structure of incentives and the utilization of high-level manpower.

1. The Inventory of Employment and Short-Term Requirements

An analysis of the present situation starts with a review of the available facts about the population and an inventory of the existing labor force. Where possible the probable or actual labor force participation rates for males and females should be obtained. Then an inventory of employment and short-term requirements should be made for each major sector of the economy. These should include as a minimum: agriculture, construction, mining, manufacturing, public utilities, transportation and communication, trade and commerce, education, and government services (exclusive of education). Where appropriate, a more detailed choice of sectors can follow the classification used for the national accounting system or the economic development plan.

Within each sector, an estimate should be made of total employment as well as the extant of unemployment or underemployment.[2] In addition, employment should be broken down by major occupational categories in order to indentify various classes of high-level manpower. Here the following categories made by Parnes for the "Mediterranean Regional Project" of OECD are useful:[3]

Class A: incudes all ocupations for which a university education or an advanced teachers college degree or its equivalent would normally be required.

Class B: includes occupations for which two or three years of education beyond the secondary level (12 years) or its equivalent may be required.

Class C: includes occupation for which a secondary school education (either technical or academic) or its equivalent would normally be required.

A fourth category, Class D, encompasses all occupations not included in the above three classes. Parnes has grouped all of the 1,345 occupations defined in the International Standard Classification of Occupations into these four classes.

There are, of course, obvious difficulties involved in the use of this or any other system of occupational classification which attempts to relate occupations to formal education requirements. For example, the educational requirements for a graduate engineer, a physical scientist, an agronomist, or a doctor are reasonably clear. But those for teachers are not. In an advanced country, most primary school teachers would fall in Classes A or B since they would have a minimum of 14 to 16 years of formal education. But in many underdeveloped countries, the majority of elementary school teachers may have no more than primary school education. In this case, they would fall in Class D and would not appear in the high-level manpower categories. The requirements for managers, technicians, and foremen likewise are difficult to define in educational terms. Indeed, the educational level of persons in a wide variety of high-level occupations depends in part on the available supplies of educated manpower. In a relatively advanced country, employers can and do insist on higher

standards of formal education than in less developed countries. In making the employment inventory, therefore, it is desirable to ascertain the actual educational attainment of the major categories of the labour force. Where this is impossible, one must rely on experienced judgment.

Within the three classes of high-level occupations described above, it is necessary to distinguish those requiring pre-employment technical training and those requiring largely general education. And in Classes A and B it is necessary to further subdivide the occupational categories so as at least to be able to distinguish managerial and administrative jobs from professional, scientific, and technical occupations. An even more detailed breakdown, of course, is desirable if the information can be obtained.

The methods for making manpower inventories are now well-known.[4] They may be based on special or general census data, if available, or upon establishment surveys. They sample establishment survey, using interviews to supplement questionnaires, is perhaps the most reliable method, and it has one additional advantage of great importance. The establishments surveyed may be asked to report existing shortages as well as anticipated short-term needs for one to three years. They can also be asked to report on existing or desired qualifications of the labor force. Many of the recent manpower studies conducted in newly developing countries have in fact been based on some sort of establishment survey, and the inherent advantages of this method would warrant its use even where general census data is available.

The inventory of employment and short-term requirements, if conducted properly, serves three major purposes; It indentifies immediate, short-range needs; it provides a base line for comparison with other countries and for making forward estimates; and it establishes a framework for making subsequent periodic inventories of manpower requirements. The manpower inventory necessitates collection of considerable statistical data, and it requires the use of experienced judgment (particularly in relating occupations to education). The conceptual and methodological problems, however, are relatively simple.

2. General Appraisal of the Educational System

The task of appraising the existing educational system is reasonably clear-cut. Data area needed on enrollments by age groups for the various grades in each educational level, the numbers of teachers by level and by qualification, the teacher-student ratios, wastage or drop-out rates, and school completion rates for each level. The curricula at each level should be evaluated in terms of immediately needed changes or improvements. Capital and recurring costs should be estimated for each level of education, and within each level for various types of education such as academic, technical, teacher training, and others.

In many countries, specialized quantitative and qualitative studies are made for each level and type of education. Thus there may be surveys of primary schools, secondary schools, or post-secondary and higher education. Often technical education is singled out for special attention. Unfortunately, however, analysis of training on the job or the structure of incentives. Educational assessments should be made as part of a broader analysis of human resource problems, and the

failure to do so makes it difficult subsequently to construct realistic long-range targets for development.

3. The Survey of Programs for On-the-Job Training.

Human capital formation may start with formal education, but it does not end there. Most managerial, technical, and craft skills, for example, are developed on the job much more effectively than in vocational schools. Indeed, in many countries vocational or trade schools are quite inefficient and wasteful instruments of human capital formation. Better craft training would result from shifting more responsibility for skill development to the employing institutions. But in any case, it is just as important to make an analysis of the processes of skill development of employment manpower as it is to make a survey of formal educational institutions.

In particular, attention should be given to programs of administration and management development, supervisory training, craft training, and apprenticeship. It should cover experience of large and small establishments of both government agencies and private enterprise. And, indeed, the discovery of the lack of concerted on-the-job training efforts is in itself important. An attempt should be made also to ascertain the degree of cooperation between the employing institutions and the vocational schools, the judgments of employers with respect to the usefulness of such preemployment training, as well as the costs of in-service training programs.

Closely related to on-the-job training are programs of general adult education, fundamental education as part of community development projects, and agricultural extension projects. A general study of the

existing and possible roles of such activities is, of course, an essential part of any comprehensive human resource assessment.

4. Analysis of the Structure of Incentives and the Utilization of High-Level Manpower.

Another significant but commonly neglected facet of the assessment of the current situation is the structure of incentives. Ideally, it would be desirable to have in every country a nation-wide survey of wages and salaries coupled with analysis in depth of non-financial incentives which motivate persons in the various occupational categories of the labor force. Few countries can afford to make such a comprehensive survey. Nevertheless, it is possible to make an examination of a small number of critical occupations. If there are critical shortages of engineering technicians, for example, the differentials in compensation between sub-professional and fully qualified professional personnel might be explored. The differentials between certain administrative and technical jobs can be examined in cases where there is evidence to indicate a shortage in one and a surplus in another. The relative preference of persons for jobs in the city as compared with the rural areas should be noted, as well as the existence of unfilled places in agricultural and junior technical training centers. In many countries, furthermore, there is widespread under-utilization of certain kinds of highly skilled manpower, and the reasons for this should be determined.

In most countries, the problems of incentives and proper utilization of manpower are well known to informed people in government and private enterprise. Admittedly, it may be difficult to quantify such problems. But to overlook them completely in a human resource assessment is a serious conceptual error.

The time available for surveys of the present situation may be short or long, and the staff may range from a single person to a large team of experts. As a practical matter, the human resource planner must do the best he can with the information he is able to get within prescribed limits of time and budget. Nevertheless, a preliminary survey, even if it is superficial, is better than no survey. The availability of statistical data is a great asset, but at the same time it is often necessary to make assessments even when statistics are poor or non-existent.

The manpower assessment, no matter how superficial or tentative should cover the four areas described above. A survey of formal education by itself, or an assessment of present and short-term manpower requirements, without adequate consideration of on-the-job training and the sturcture of incentives, can be quite misleading. It may be necessary, of course, for several experts to collaborate in making an assessment of broad scope, but the net result should be an integrated rather than a one-sided analysis. It is far more important to aim for comprehensiveness the thoroghness in initial surveys of human resource development problems. For if the scope of the assessment of the present situation is too narrow, responsible programming for future development becomes quite unrealistic.

B. Procedures for Estimating Future Requirements

The most difficult aspect of manpower analysis is the determination of long-term future requirements. Because of the long lead time required for human resource development, requirements must be estimated for a minimum of ten years and preferably for two decades in advance. This is obvious when one considers the time required to build schools, to train teachers, and to fill the education pipe lines in primary and secondary schools

in order to expand the number of university graduates. For example, most of the potential university graduates, for ten years in advance are already in secondary schools. Children now entering primary school will not emerge as secondary school leavers for approximately 12 years, nor as university graduates for at least 15 years a longer time perspective than the encompassed in most economic development plans.

There is no generally accepted methodology for estimating future requirements. Nor is there a clear concept of the meaning of the term "future requirements." Some people talk about "predicting" or "forecasting" manpower requirements; others contend that they are making "projections." And still others emphasize the process of forward "target-setting." Let us briefly examine some of the more common approaches which are in current use.

A rather simple method of estimating future requirements is to ask existing establishments to specify them. This will provide an informed judgment of short-term requirements, but it is quite unreliable for long-run estimates. The establishments which may be in existence 10 or 20 years hence may not be at all the same as the present ones. Furthermore, most employers are unwilling or unable to estimate what employment will be in the long run. As one exasperated owner of a business in Jordan is reported as saying, "Such guessing is an impious act, for only Allah knows that the future may hold." For these reasons, I consider that forecasts made by individual establishments are essentially part of an assessment of the present situation rather than a practical means of making long-run estimates.

Another method is to use past trends as a means of projecting future requirements[5]. This method has been used in some advanced countries to estimate needs for high-level scientific and engineering manpower as well as for teachers. The procedure is to extrapolate past trends in the growth of the number of persons in the particular occupation, and then correlate this with total employment, production, population, Gross National Product, or some combination of such variables. The regression table thus obtained is then used to project future requirements for each occupation.

This projection method has the advantage of simplicity, but its usefulness is limited. In many countries it is impossible to get past data for an adequate time series. And even where the data may be available, the assumption that future relationships can be derived from past trends is open to question. Actually, the concept of forward planning usually implies that the future will be different from the past. In some cases, however, the projection of trends may be useful as a check, along with other exercises performed in the process of constructing forward targets.

A more complicated method is what Beckerman and Parnes describe as the "manpower requirements approach to educational planning."[6] Here the estimation of changes in productivity is the critical factor. The steps in this approach are the following:

1. The analysis of the existing manpower structure is made along the lines which were described earlier.

2. The patterns of output for the various sectors of the economy are projected for the forecast year, usually as set forth in an economic development plan. Then total employment for the economy as well as for each sector is estimated on the basis of some assumptions about productivity.

3. For each sector, the total employment for the forecast year is allocated among the various occupations according to the occupational classification system which has been chosen. Then the requirements for each occupational category are aggregated from the various sectors to give the total stocks required in the forecast year. Here, however, allowance must be made for the effects of increases in productivity on the occupational structure. As productivity increases, of course, the proportion of persons in high-level occupations increases relatively to those in the lesser skilled jobs. In practice, however, one must make assumptions regarding the influence of productivity increases on occupational structure, since there are very little reliable data on which to base objective calculations.

4. The supply of personnel with each major type of educational qualification is estimated for the forecast year on the basis of present stocks, anticipated outflows from the existing educational system as presently planned, and allowances for losses due to death, retirement, and other reasons for withdrawal from the labor force.

5. The estimated outputs from the educational system are compared with the required outputs as determined in step 4.

6. The orders of magnitude for expansion of the educational system are ten established to close the gap between anticipated requirements and presently expected supply.

This method, perhaps, has the greatest appeal to economic development planners, and with modifications has been used by most of the countries in the Mediterranean Regional Project.[7] It links manpower

requirements to productivity; it is designed to indentify high-level manpower bottlenecks which could hamper production; and thus it appears logically to relate human resource needs to economic requirements.

This approach, however, has some shortcomings. First, although the productivity criterion may be appropriate for the manufacturing, construction, mining, and transportation sectors, it is not so useful for estimating high-level manpower requirements in public health, general activities of governments, and many kinds of services. It is questionable, also, whether in agriculture it is possible to estimate future employment by predicting what productivity will be, particularly in countries where there may be extensive disguised unemployment and under-utilization of labor on the land. Some countries, of course, merely assume that the labor which cannot be employed in other activities will have to be retained on the land. But, in any case, a simple estimate of future productivity is unlikely to provide many clues about the quantity and quality of high-level manpower needed in agriculture.

Perhaps the most troublesome problem is the lack of empirical data on which to base estimates of expected increases in productivity and the bearing of these on changes in occupational requirements. In practice, one can do little more here than to make general assumptions. For example, one may assume that in the forecast year the average productivity of all factories in a particular sector will equal the present productivity of the most modern ones. Or, one can assume that average productivity of the manufacturing sector in country A in the forecast year will approximate present productivity of a comparable sector in Country B which is somewhat more advanced.[8]

Another problem inherent in this approach, as well as in most others, is the determination of required educational qualifications of high-level occupations for the forecast year. To a large extent, these may depend upon the supply structure of educated persons at that time. Here again, one is forced to make assumptions, and these are often made on the basis of comparisons with other countries.

Another possible criticism of the manpower requirements approach is that it gives an impression of making forecasts or predictions about a future situation. Because of the complexity of economic, social, and political events, predictions are dangerous. However, the manpower requirements approach need not be linked to forecasts and could be used as a method for target-setting, a concept which we shall discuss shortly.

In the end, the validity of the "manpower requirements" approach rests upon the reasonableness of the assumptions made about productivity, and these assumptions, in most cases, must be based upon international comparisons. Some countries, which have adequate time-series data, may make projections on the basis of past trends, and for some manufacturing sectors it may be possible to estimate both productivity and occupational requirements where the precise future technology of production has already been determined. Nevertheless, it is quite misleading to think that future manpower requirements based on productivity analysis are less subject arbitrary judgment than other approaches.

Beckerman and Parnes also have described an alternative approach which they call "the social objectives method."[9] Unlike the manpower requirements approach which attempt to define education needs in terms of

productivity and a given pattern of economic growth, the "social objective" approach recognizes that education serves more than economic ends. It assumes that a more educated labor force will itself tend to promote economic growth, and that it is neither necessary nor desirable to attempt to measure specific manpower requirements for economic objectives. This method concentrates, therefore, on identifying deficiencies in the present educational system in the light of social and educational objectives, and it projects future needs in terms of estimated population increases and the desire of persons for education at various levels. Certain goals are taken for granted such as elimination of illiteracy, increasing enrollment ratios in secondary education, decreasing the student-teacher ratios to desirable levels, lowering wastage rates, and improvement of standards. These goals, in effect, are suggested by making comparisons with other countries. Then the targets for future development are based upon a statistical calculation of the logisties and cost of satisfying these goals in varying periods of time.

This approach has been favored traditionally by educators. It by-passes completely the difficult determination of occupational requirements. But at the same time, it overlooks essential economic problems. If this approach is used, there is likely to be little integration of the work of the educational planners and the economic planners, and in the end the latter are likely to recommend that expenditures for education, along with other social activities, be given a lower priority than investments in projects which are clearly productive and appear to contribute more directly to economic growth .

Other methods of estimating future manpower and education needs have been suggested, including the very imaginative Tinbergen-Correa model.[10]

Using what they call a simple model of the input-output type, the authors attempt to relate directly needed secondary and higher education outputs to given rates of economic growth, without using the intermediate step of calculating occupational requirements. Essentially, the number of persons required from each educational level is calculated from a series of linear difference equations which relate the stock of persons completing a given level of education and the number of students in each level to the aggregated volume of production. Its purpose is to suggest what structure of the education system is needed in order to "let the economy grow at a certain rate," and how that structure should change with changes in the growth rate.

Certainly, the mathematical formulation of this model offers no grounds for criticism, but the assumptions implicit in the use of certain technical coefficients are open to question. For example, it is assumed that the number of persons with secondary education and also with higher education is proportional to the volume of production in the same time period. Such an assumption is based upon judgment pure and simple. Likewise, the coefficients expressing teacher-student ratios are based upon rather questionable assumptions, those actually used being derived from United States experience. Depending upon one's judgment, of course, coefficients derived from other countries could be used, or perhaps they might even be artificially constructed.

Another implied assumption in the Tinbergen-Correa model is that in the present situation the number of persons with secondary and higher education is the current number for the existing level of aggregated production. In practice, however, there are usually acute shortages or even sizeable surpluses. Moreover, implicitly this model assumes that technology and productivity in the time period remain constant, and it thus

completely overlooks what effect such factors might have on required occupations and hence required educational qualifications. Finally, the model as presently developed draws no distinction between types of education (technical or academic); makes no allowance for qualitative imbalances in school curricula, and fails to distinguish between the major economic sector of the economy.

In conclusion, the practical use of the Tinbergen-Correa model, as well as other approaches, depends upon the validity of the assumptions made with respect to empirical facts. To the extent that empirical evidence is unavailable, one must make judgments. Thus this model, although giving the appearance of methodological precision, is actually no less dependent upon guess-work than any other approach. To be sure, when empirical evidence becomes available, the assumptions regarding the technical coefficients may be changed accordingly. Likewise, the model can and should be expanded to include other variables such as increases in productivity, and with refinements it could be used to make estimates for educated manpower by occupation and by sector. But at present, it provides no substitute for the use of experienced judgment, and is no more objective than any other approach.

Before proceeding to outline some of my own suggestions on methodology, it may be useful to summarize my views on the existing methodology.

First, there is confusion about the concept of estimating future needs. Is the aim to make forecasts to construct projections, or to establish targets? The distinction is important. In the modern world, it is really impossible to predict what is going to happen in particular countries or regions, regardless of the techniques which may be employed. Here I find myself in agreement with Beckerman who has said:

People who believe that economists should be capable -- provided they are smart enough and provided they equip themselves with the necessary gadgets, such as input-output tables, demand functions, intra-firm comparisons, field surveys, etc. -- really to foretell the future are, to my mind, in the same category as members of ancient tribes who attributed similar powers to their witch doctors .

Projections, of course, are different from forecasts. They express the logical consequences of assumed courses of action. They are helpful in determining what needs to be done if certain objectives are to be attained, or perhaps what will happen anyway if certain objectives are in fact achieved. Targets, on the other hand, are operational direction indicators based upon projections and reasonable judgments. The methodology of manpower analysis would be greatly improved if both the concept and the term "forecast" were discarded, and if analysis would indicate clearly when they are making projections or setting targets.

Second, the purposes of manpower estimates are too narrowly conceived. Most projection or target-setting exercises aim only at estimates of requirements for formal education. This is important, but forward estimates of human resource development needs should be designed also to identify on-the-job training needs, required changes in the structure of incentives, and measures for better utilization of high-level manpower . In this respect, the Tinbergen-Correa model, which ignores the estimate of occupational requirements, is particularly unsatisfactory. Human resource development should never be equated exclusively with formal education development, and any methodology which assumes that they are in inherently deficient.

Third, the validity of all the various approaches depends in the final analysis upon the judgment exercised in making assumptions. Empirical evidence upon which to make really objective findings is not now available, nor is it likely to be in the future. The development of mathematical models, though useful in giving a systematic view of possible relationships, will not itself bring about greater accuracy or precision in forward estimates.

Fourth, in practice most manpower analysis agree that it is necessary to combine different approaches. For example, the so-called "social objectives approach" which stresses enrollment ratios and comparisons between countries can be combined with the "manpower requirements" method which establishes a relationship between education and economic growth and identifies skill bottlenecks which may seriously impede economic progress. And similarly the use of mathematical models is appropriate if one is clear about what he should solve for as well as about the range of the assumptions he is making.

Fifth, once the task of estimating future requirements is completed, the problems of determining the costs of expansion of educational institutions are not serious. Data on costs are usually available, the methodologies for estimation are reasonably clear-cut, and realistic assumptions are more easily made.

Finally, as suggested earlier, the major problems of human resource analysis are conceptual. They involve the purposes of manpower estimates, the scope of assessments, and the relevancy of qualitative as well as quantitative data. The problems of methodology, particularly those requiring judgment in making assumptions, are far from solved, but

progress here would be more rapid if, there were less confusion about concepts.

The lack of empirical data, though admittedly a problem, is not a major roadblock. The development of clear concepts and systematic methodology will ultimately determine the kind of empirical data which is most relevant, and thus perhaps forestall the collection of facts and figures for which there would be little use. In any case, the present dearth of statistical data provides no execuse for failure to develop sharper concepts and more systematic methods of analysis.

C. THE TARGET-SETTING APPROACH

In estimating forward requirements for manpower, the purposes of human resource development must be clearly understood. Without some kind of normative rational , any exercise in estimating future needs is futile. Thus the first principle in the analysis of manpower requirements is that goals be specified. This is clearly a conceptual matter. Let us start with the premise that, in itself, an educated, skilled, and reasonably healthy population is an essential condition for economic growth, but at the same time it is an end in itself. There is no reason to belive that the people of the free world place a higher value on an increase im material wealth than on an increase in health, the expansion of educational opportunities, and the opportunity for self-development of their innate capacities. They want all of these things, and more.

In more specific terms, the goals of a society are often expressed by its leaders, sometimes with or without the concensus of the population. For example, the leaders of a newly developing country may propose goals such as the following: land reform and improvements in agricultural

production, universal primary education, rapid industrialization, a position of leadership in the struggle for independence against neo-colonialism, the rapid replacement of expartiates in high positions by local national citizens, a huge power and irrigation dam, a steel mill, a television network, an international airline, or an impressive university of spectacular architectural design. Some of these goals are economic, some political, some cultural, and other predominately status symbols. The advanced countries, likewise, have a mixed bag of goals. They may seek expansion of industry and trade, full employment, expansion of higher education, acceleration of basic and applied resarch, armed forces capable of defense from any enemy, more opportunity for cultural creativity, or the prestige of sending a man to the moon. To achieve any or all of these goals, high-level manpower is required. And, it would be very difficult for any country to attempt to make a sharp distinction between the human resources required for economic goals and those required for social, political, or cultural ends.

The manpower planner thus has a difficult problem. In assessing the nature of geals in a particular country, he is aware that some are openly stated, some are simply implied, and others may appear to him to be frivolous or caricious. He must some-how select those which the available evidence indicates are most important and most generally accepted. And he must check the legitimacy of his selections with opinion leaders, politicians, statesmen and others. Obviously, however, if all goals were to be attained within a short time, the costs of developing the required human resources would be beyond the means of any country. Consequently, both goals and requirements may need to be reasessed, and priorities have to be determined by the country's responsible leaders.

The second principle is that major reliance should be palced on making reasonable comparisons both within an economy and with other

countries. In modern times, most nations tend to formulate their economic, social, and political goals by comparing themselves with other countries. They may seek to follow good examples set by others; they may be intent on following divergent path from a certain country; or they may wish to avoid particular mistakes which others have made. With twentieth century means of travel and communication, it is almost impossible for a country to escape such comparisons. Similarly, the propensity is strong to compare one region of a country with another. For example, educational goals in many countries are based on the idea that the most backward regions should, in the future, be brought up to the present average standard, or that the general average should be brought up to the standard of the presently most advanced region.

The third principle is that in estimating future requirement the human resource planner should concentrate on setting targets rather than on making forecasts. The purpose of target-setting is not to make a prediction of what will take palce; nor is it to make projections on the basis of limited assumption of attainment of one or two specific objectives. Its purpose is rather to influence the future course of development. A indicates a direction for action. Its precise quantitative dimension is far less important than its function of indicating the direction of activity for achievement of specified goals.

If one is clear that he is engaged in a target-setting exercise, no apologies need to be made for basing estimates where necessary on judgment. Of course, the data, the assumptions, the projections, and the comparisons on which the judgments are based should be clearly indicated. The target should establish a correct direction for policy, but its location ought to be changed as better judgments are possible. If appropriate, a

range of targets based upon alternate assumptions may be presented. But in setting targets, the main concern is to establish a course of action, even if this must be tentative or preliminary.

A fourth principle is that requirement for human resource development be comprehensive. It is not enough to establish a single target for all fromal education. The closely associated targets for on-the-job training, for changing the structure of incentives, for importing expatriate manpower, for better utilization of skills, and for creating adequate employment opportunity should be established along with educational targets. The assessment of human resoruce development "in pieces" is perhaps the greatest single deficiency of the manpower and educational surveys which have been conducted in the past. And this deficiency, incidentally, is responsible for much of the difficulty experienced in the integration of human resource planning with general palnning for development.

Within the context of the four conceptual principles stated above, the problems of methodology come into sharper focus. Among the more important are the following: the sensitivity of estimates, relationships of occupations to education, the making of comparisons, the construction of "multipliers," and the interpretation of "shortfalls."

The sensitivity of long-range estimates of manpower requirements is governed largely by the analysis of the present situation. The occupational categories, the sectors chosen for analysis, and the problem areas which are identified constitute the base lines for construction of long-range targets. If detailed breakdowns of sectors and occupations are desired (i.e., if great sensitivity in analysis is thought to be important), then the survey of the persent situation must be designed accordingly.

It is neither necessary nor desirable to estimate needs for a large number of specialized occupations. In dynamic economies there is a great amount of movement from one occupation to another, and the needs for specialized skills are apt to fluctuate rather sharply. It is necessary, of course, to calculate the numbers of persons who should have a secondary or higher education or its equivalent, and here a distinction needs to be made between technical and general education. It is not necessary, however, to distinguish occupations requiring very specific training, particularly if much of this training can be acquired on the job. A few examples will serve as illustrations. Certainly, there is no need to calculate separately the long-run needs for carpenters, painters, fitters, welders, and so forth. A general estimate for highly skilled craftsmen is sufficient. In the sub-professional categories, principal foremen and technicians in industry may be lumped together, as can nurses and other medical technicians. But, in the higher administrative and professional categories, more distinctions are required. For example, separate estimates are desirable for doctors, scientists, and engineers, and if possible the major branches of science and the major branches of engineering (mechanical, civil, electrical, and industrial) should be distinguished. In the managerial and administrative category, a distinction must be made between executives in fairly large and complicated establishments and the manager-proprietors of small family businesses. And finally, the requirements for teachers at the three levels of education should be estimated, with a further designation, if possible, of those needed for the teaching of technical and scientific subjects. In practice, it is very difficult to get reliable information even on the limited range of occupations mentioned above, so that in most cases one is forced to use broader occupational categories.

The conversion of occupational requirements into educational

requirements is one of the most perplexing problems in manpower analysis. As we have seen, Parnes made a threefold classification of occupations based on various levels of education or their equivalents. Parnes further points out, quite correctly, that estimates of educational requirements cannot be made mechanically on the basis of the total numbers in each classification. It is necessary to make assumptions, in Class A for example, about the proportions of persons in each group who should be expected to have completed a university education or an advanced teacher's college course, and the proportion who may be expected to fall into this group because of having "equivalent" qualifications.

Except in the case of a few professions, there is no precise relationship between occupations and educational background. One cannot be sure whether an administrator or manager must have a university education. In many African countries most elementary school teachers have only a primary education, whereas in the advanced countries they require completion of some form of higher education. Presumably, skilled craftsmen need a second-level education, yet petroleum companies have demonstrated that men who are hardly literate can be trained as painters, carpenters, or welders in less than a year. As indicated already, the supply of educated manpower determines in part the demand also. In similar activities, an advanced country will absorb many more highly educated persons than an underdeveloped country. And in less developed countries, certain production processes can be designed to utilize effectively persons with very limited education.

Obviously, then the assumptions about the relationship of occupations to educational levels will differ from country to country. And here again the manpower analyst must rely on judgement rather than on precise data. His estimate may have to be provisional, or even arbitrary. And this

perhaps in fortunate, because it underlines the necessity for examining on-the-job training and other means of human capital formation, and demonstrates clearly the dangers of equating human resource development exclusively with the expansion of formal education.

The importance of using inter- and intra-country comparisions to set targets has already been stressed. There are, of course, many problems involved in making both inter-country comparisons as well as regional comparisons within a country. For example, it may be argued that an inter-country comparison is not appropriate unless the social and cultural conditions in the two countries are indentical and unless the country with which the comparison is made has satisfactorily met its requirements. This is not so. In the first place, comparisons between countries are best made a sector-by-sector basis. One compares not entire countries but rather agricultural sectors, industrial sectors, or education sectors. Secondly, it is not necessary to assume that manpower requirements have been met satisfactorily in the country of comparison. For example, if Country B which is more advanced has three times the proportion of engineers in its industrial labor force as Country A and still is short of engineers. this fact indicates that Country A may need to increase its proportion of engineers more than three times to satisfactorily attain a comparable level of industriad development. Or, if Country B has an oversupply of enginaers, then Country A might lower its estimated requirements accordingly. The same is true in the case of intra-country comparisons between regions. The advanced region does not necessarily establish the desired target for the less advanced regions. The essential point here is that the process is one of comparison of manpower problems as related to sectors at different stages of development. And, as a general rule it is wise to assume that no country has solved its problems in a completely satisfactory way.

One of the outcomes of the comparative approach is the construction of multipliers or ratios from which to construct forward targets. In order to illustrate this point, let us take a somewhat oversimplified example, Assume that a comparison between two countries, A and B, shows the following:

	Country A	Country B
Number of persons with secondary education or more per 10,000 population	25	250
GNP per capita in U.S. dollars	$ 100	$ 500

Now if we also assume that there is a high correlation between GNP and stock of manpower with secondary education, we could say that a tenfold increase in educated manpower might be necessary for Country A to have a fivefold increase in GNP. The ratio of increase in educated manpower to the increase in GNP, therefore, is 2:1. We may turn the example around, of course, and assume that Country A would have to increase its GNP by five times if it hoped to increase its stock of educated mapower by 10 times. In any case, the 2:1 ratio could be used to make an initial estimate of future requirements for persons with secondary education or more.

In practice multipliers or ratios can be calculated for particular occupational categories and for particular sectors. Adjustments are made to take care of existing shortages or surpluses in each country. And, the ratios may be constructed after making comparisons not with just one but with several countries. These and many more refinements can be used in a comprehensive assessment. It is important to remember, however, that multipliers or ratios should not be used to forecast manpower

requirements in the future. They are a means only of establishing targets which indicate an approximately correct direction for action and a general order of magnitude of required effort. Nor should one forget that the ratios are based upon assumptions rather than upon proven relationships.

Finally, we come to the significance of the "shortfall." Most surveys compare estimates of requirements for various categories of manpower with the anticipated output of the educational system as currently projected. The difference between estimate demand and expected supply is usually called the "shortfall," and targets are then suggested for expanding educational facilities to close the gap. However, the planner should never assume that this gap must be closed merely by expanding educational facilities. He should first explore the extent to which some of the requirements can be met by training on the job, by providing night-school classes for those already employed, by the temporary importation of skilled foreigners, or by improving the organization of work in order to utilize manpower more efficiently. Indeed, one of his principal tasks is the examination of alternative solutions of human resource problems, and in the end to weave them into a broad strategy of human resource development.

D. Conclusion

The estimation of long-range human resource requirements is a difficult but absolutely indispensable step in planning for social and economic development. Because this is a new field of interest, the concepts and methodologies of making forward estimates are not clearly formulated. Yet there is no reason to conclude that estimating manpower requirements is a less accurate and rigorous process than estimating the future needs for other resources. All forward estimates must be based upon assumptions, and they are accurate only to the extent that the assumptions are intelligently made.

The target-setting concept, rather than that of forecasting, is the more appropriate one for making long-term manpower estimates. And because most nations tend to formulate their goals for development by making comparisons with other countries, comparative analysis should constitute the core of the methodology for setting human resource development targets.

The targets, together with the policy measure selected to approach them, constitute the strategy of human resource development. And this strategy, in turn, should become part of a country's general paln for economic and social development.

Footnotes.

1. This paper does not attempt to describe in easy steps the procedure for making manpower surveys. For this purpose, some excellent handbooks are available, and more are likely to appear in the future.

For example, see the following:

(a) The Forecasting of Manpower Requirements, prepared by the Bureau of Labor statistics of the U.S. Department of Labor for the Agency for International Development, U.S. Department of State, Washington, February 1962 (mimeographed).

(b) Herbert S. Parnes, Forecasting Educational Needs for Economic and Social Development, the Mediterranean Regional Project, Organization for Economic Cooperation and Development, Paris, October 1962.

2. For a good description of this process, see Parnes, Op. Cit., Section II.

3. Parnes, ibid., Appendix B. PP. 77-87. An alternative approach, using six occupational levels with educational requirements, has been used by the French Manpower Committee, Raymond Piognant, "France" in the Planning of Education in Relation to Economic Growth, papers presented at Policy Conference on Economic Growth and Investment in Education, Part IV, Washington, 16th-20th October, 1961, Organization for Economic Cooperation and Development, Paris, February 1962, PP. 19-20.

Seven occupational-educational requirements categories are used in Czechoslovakian manpower planning. Jan Auerhan, "Problems of Forecasting of Skilled Manpower Requirements," mimeographed paper at Regional Seminar on Problems of Planning the Labour Force and its Employment, Cairo, 11-22 March, 1963 (organized jointly by the International Institute of Labour Studies, Geneva, and the Institute of National Planning, Cairo).

4. Note the references already cited on handbooks or manuals. By the middle of 1962, a sizeable number of manpower surveys had been made by experts from ILO, USAID, the Ford Foundation, and other organizations providing technical assistance in this field. Many others are planned or in process. Although actual publications setting forth methodological procedures are few, those persons who have made surveys can and do instruct others in the techniques involved. See also papers submitted to the United Nations Conference on the Application of Science and Technology for the Benefit of the Less Developed Areas, Geneva, 1963. (Section B-2: Techniques of Manpower Assessment and their Implications).

5. See Harold Goldstein, "Methods of Forecasting Demand for and supply of Scientists and Engineers," OEEC, STP (58) 1, June 1958 (mimeographed) for description of this and other methods of projections in European countries. Also see, Forecasting Manpower Needs for the Age of Science, OECD, Paris, 1960, S.O. Doos, "Forecasting Manpower Requirements by Occupational Categories," prepared for Training Course for Human Resource Strategists, Frascati, Italy, 1962, Directorate of Scientific Affairs, OECD, Paris (mimeographed); and National Science Foundation, The Long Range Demand for Scientific and Technical Personnel, A Methodological Study, Washington, 1961.

6. See, Parnes, op. cit., and also Wilfred Beckerman, "Methodology for Projection of Educational Requirements," Mediterranean Regional (STP-22), Directorate for Scientific Affairs, OECD, Paris, 1962 (mimeographed).

7. This is a cooperative education palnning effort by Turkey, Greece, Yugoslavia, Italy, Spain and Portugal, which was organized by the Office of Scientific and Technical Personnel of the Organization for Economic Co-operation and Development (OECD).

8. For example, A Puerto Rican manpower survey made in 1957 assumed that industrial productivity in that country would rise by 1975 to the level of the United States in 1950, and that parallel occupation groups should have equivalent educational requirements.

The survey of manpower and education requirements in Italy made its productivity calculation (except for agriculture) by assuming that in 1975 productivity would reach that attained by France in 1960.

For further discussion of problems of productivity assumptions see Parnes, op. cit., and Michel Debeauvais, "Methods of Forecasting Long-Term Manpower Needs," paper prepared for Training Course for Human Resource Strategists, Frascati, Italy, 1962, OECD, Paris.

9. See Parnes, op. cit., and Beckerman, op. cit.

10. Tinbergen, J., "Quantitative Adaptation of Education to Accelerated Growth," paper prepared for Training Course for Human Resource Strategists, Frascati, Italy, 1962. Directorate for Scientific Affairs, OECD, Paris (mimeographed).

11. W. Beckerman, "Long-Term Projections of National Income," lecutre for the Training Course for Human Resource Strategists, Frascati, September, 1962. Available through OECD, Directorate of Scientific Affairs, Paris.