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DISSERTATION

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By

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* * * * * * *

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CHAPTER I

INTRODUCTION

Despite the massive effort in the last two decades to help the emergent nations accelerate the pace of their economic and social development, more than two-thirds of the present world's population live in almost unbelievable conditions of poverty, poor health, and ignorance. Indeed, the gap between the rich and the poor regions of the world is increasing, and poor nations are under great pressure to build modern economic, social, and political institutions in response to this condition. Their success in this venture has significant implications for advanced and developing nations alike, yet very little has actually been accomplished and the problem remains as urgent as when it first attracted worldwide attention and concern.

Although the literature on economic development has reached equally massive proportions, research in the field has failed to produce either a workable theory of development or any generally accepted guidelines for the design of development policy. At best, there has emerged only an expanding and sometimes bewildering list of strategic variables and preconditions upon which accelerated development depends and to which policy
must be directed. To give only a few, most specialists now acknowledge the importance of raising the rate of national savings and investment; shifting the structure of the economy and raising the ratio of industrial production to total product; increasing productivity in agriculture; building an effective stock of human resources; providing adequate government services and infrastructure; creating a class of entrepreneurs; expanding domestic markets and changing the pattern of consumption; and adapting cultural attitudes and value systems to the requirements of economic and technical change.

Where agreement ends and the real crux of the development problem begins, however, is at the point of determining the priority variables and the intertemporal sequence of programs and policies designed to promote development. Recent experience suggests that developing economies are incapable of attacking all dimensions of the development problem at any given point in time and, even if several priority areas are identified for concentrated action, have difficulty in designing and executing policy appropriate to their needs. Indeed, the question presently is not so much what needs to be done to initiate economic change, but rather how and when it is to be done. It is, in other words, a problem of using even the fragmented knowledge about development that is now available to best advantage and being able to delineate an approach to problem-solving that may be effective in breaking barriers to sustained growth.
Development Planning and Policy

The primary reason that the design and execution of development policy is so critical is that most low income countries in Africa, Asia, and Latin America have placed great weight on the role of positive governmental action and planning to promote economic change.\(^1\) The need for such action is predicated primarily on the assumption that market arrangements in these nations are too weak and ineffective to mobilize and direct resources and that, as a result, government must perform this task if development is not to lag. As a means of guiding and orienting government development policy, planning operations have been established in almost all of these nations.

The purpose of these planning activities has been to define development objectives systematically, delineate priorities, estimate resource requirements, and design and coordinate the implementation of policies and projects. Programming techniques have been used in this context to obtain a clear perspective of developmental problems and prospects and to prepare a coordinated and consistent set of output targets for various sectors and branches of economic activity.\(^2\) These targets, in


turn, provide the basic criteria for the design of national budgetary, monetary, foreign trade, and wage policies as well as the selection of high-priority investment projects to be undertaken by the public sector.

Many of the planning operations have been comprehensive in scope in the sense that targets and policies are prepared for both the public and private sectors of the economy, the latter being coordinated either through inducements such as government tax and subsidy policies or compulsion in the form of import restrictions, control of foreign exchange, etc. Other plans have involved only a limited number of sectors or perhaps only those programs that have traditionally been the government's responsibility. Still others, of course, have been nothing more than a set of unrelated and uncoordinated projects with little impact on the economy at large. The objective of all, however, has been to foster accelerated development through positive governmental policy and action.

Recent experience suggests that development planning has not had any notable impact on the pace of economic growth in most underdeveloped nations. Target figures frequently have not been fulfilled, resources have not been allocated in the manner envisaged, and rates of income growth accordingly have been much lower than expected. ³ One of the basic reasons for

³United Nations, Department of Economic and Social Affairs, Planes de Desarrollo: Evaluación de Objectivo Y Progresos en Los Países en Desarrollo (New York: United Nations,
failure has been that plans are very ambitious and beyond the capacity of the nations to implement. In particular, little attention has been paid to the enormous problems of organizing and administering development plans or to the institutional framework in which they must be carried out. Another, and perhaps more significant, reason for the failure of development planning is the manner in which the process of economic change is conceptualized and then translated into guidelines for action at the point of formulating the plan. Many planning activities have been unduly conditioned by traditional concepts of growth economics and, despite numerous research findings to the contrary, have been almost exclusively oriented towards increasing physical capital resources as the prime means of accelerating development.

4For an excellent review of development planning in general and the administrative difficulties in plan execution in particular, see Albert Waterston, Development Planning Lessons of Experience (Baltimore: The John Hopkins Press, 1965), especially Chapters VIII and IX.

As Hirschman has pointed out, the problem stems from the transfer and application of concepts of growth formulated with respect to economic problems of advanced countries to the problems of development in the low income nations. The Harrod-Domar growth models that have been used so widely in the less advanced economies to provide a framework for assessing investment needs, for example, are simple extensions or refinements of Keynesian economics. They are relevant to a range of problems rarely encountered outside of the advanced, Western nations. They reflect the emphasis in mature economies on the role of savings, the capacity-creating aspects of new investment, and the need to maintain a rate of income growth that is compatible with the dynamic stability of the economic system. While the rate of savings and investment are clearly strategic variables in any economy, these functions are likely to be more interdependent and only tenuously related to the level of income in less advanced countries.

Furthermore, there is little reason to believe that the capital coefficient is driven to constancy.

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7. Briefly, these models show that if productive capacity is to be fully utilized and if a savings-investment equilibrium is to be achieved, income must grow at a rate equal to \( s/k \), where \( s \) is the propensity to save and \( k \) is the capital-coefficient. See G. Ackley, Macro-Economic Theory (New York: The Macmillan Company, 1961), pp. 513-529.

8. Hirschman, op. cit., p. 32.
in these economies, particularly at the very early stages of development. On technical grounds alone, therefore, there is reason to discount the value of using such models as a framework in development planning exercises. What appears to be of much greater significance is the basic assumption of these models that physical capital formation is the prime determinant of the rate of economic growth; an assumption that is implicit in virtually all planning operations which use them.

Clearly, capital accumulation is a necessary factor in the development process and most specialists still stress the importance of policies designed to increase the rate of investment. They agree, however, that it is not a sufficient condition, and a host of other variables are now considered critical to the development effort. In practice, these variables have not been incorporated into most planning operations and, planning has consisted of little more than narrowly conceived investment or capital budgeting schemes. It has left many dimensions of the development problem untouched.

Human Resource Planning and Policy

One factor increasingly recognized to be as strategic as physical capital in the development process is a nation's stock of human resources. This recognition stems principally from research which suggests that only a small proportion of

9 Waterston, op. cit., pp. 77-80.
the historical rise in gross output in several advanced nations can be explained by quantitative increases in labor and the stock of capital. Subsequently, economists began to explore a number of factors associated with the quality as opposed to the quantity of productive agents in an effort to account for the unexplained portion of the growth in national product. Considerable attention has been given to those variables affecting the qualitative dimensions of labor inputs in general, and those such as education and training which affect the acquisition of skills and knowledge in particular. Indeed, the recognition of the important role played by human resources has been characterized by extensive research activity directed at analyzing the relationship between education and economic change. This work indicates a significant correlation between a nation's educational effort and its level of development, and has helped to establish the view that education may be a prime instrument for accelerating growth.

In the sense that education has long been a primary means of producing and adapting skills to economic requirements, 

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the concept of education as a growth instrument is hardly revolutionary. What is significant in recent discussions of the subject, however, is that they have focused attention both on the inadequacy of education and training institutions in the low income nations from the perspective of development requirements and the need for increased and carefully planned investments in these institutions if development goals are to be reached. In particular, the notion that education should be planned in relation to development objectives and integrated into a nation's over-all strategy for achieving accelerated rates of income growth is very likely the most important breakthrough in development economics in the last decade.

As a result, recent years have witnessed a growing interest in the concepts and techniques or methods for planning education systems in relation to economic development objectives. Considerable methodological work has been carried out, for instance, to determine the optimum rate of educational investment from an economic point of view. The most notable of these is Gary Becker, Human Capital (New York: National Bureau of Economic Research, 1965).
More important have been the growing number of projects in the less advanced regions that have actually attempted to formulate plans for educational investment based on development criteria. These studies have been undertaken because of the recognition that traditional development planning operations do not provide an appropriate framework for determining the amount or direction of educational activity required to effect economic goals. Many of the educational planning projects have been set up, in other words, to complement the economic development planning being carried out in these countries.

Such studies have been or are being carried out in various parts of Africa, Asia, Latin America, and Southern Europe. Few have been completed to the point of publishing a plan, and it is not yet possible to evaluate them in terms of the manner in which the plan was formulated or the success it has achieved in execution and implementation. There has been, however, a common approach to the problem and it is possible to understand the nature and scope of these studies by outlining the methodology employed in the work. Moreover, much of the pathbreaking work in this field has been done in a cooperative venture of six Southern European nations under the sponsorship of the Organization for Economic Cooperation and Development (OECD). This is the Mediterranean Regional Project, and it is sufficiently important to the present discussion to warrant a brief description and evaluation.
The Mediterranean Regional Project

The Mediterranean Regional Project (MRP) was carried out under cooperative agreements between the OECD and the Governments of Greece, Italy, Portugal, Spain, Turkey, and Yugoslavia. Research teams composed of both local and foreign technicians were established in each country to prepare an assessment of educational needs during the period 1960-75 and detailed plans for action including financial estimates for meeting these needs. More particularly, the plans were to (i) estimate the graduates at each level of the formal education system required to meet development objectives as well as the enrollment levels needed to produce this number of graduates, (ii) estimate the inputs of teachers, classrooms, laboratories, etc., that would be needed to support the estimated enrollment levels, (iii) assess in qualitative terms the adequacy of educational services, e.g., curriculum, teaching methods, and so forth, (iv) assess the need for new and expanded educational programs outside of the formal educational structure, and (v) estimate the current and capital costs associated with the results of the previous steps and prepare a time table for educational expansion over the fifteen year planning period. This work was

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then to provide a basis for a set of recommendations on educational policy to be delivered by the national planning teams to the respective national governments.

The first phase of the MRP has now been completed and initial estimates following the terms of reference as outlined above have been made. 15 What is of interest is not the specific conclusions reached by each of the research teams, but rather the manner in which the planning problem was approached and the techniques used in making the assessment of educational needs. The methods employed in the assessment in each of the six countries were, in fact, similar and were a product of the kinds of problems facing each nation and the stage of their economic development at the time the Project was undertaken.

With the possible exception of Turkey, each of the MRP countries had reached a stage in their development that may be considered nearing "take-off" in Rostovian terms and characterized by an impending structural shift away from predominately agricultural-traditional activities towards technologically intensive industrial activities. In light of this structural shift and the corresponding take-off into higher and sustained

rates of growth, one of the strategic variables in the development prospects of each country was and continues to be adequate supplies of scientific and technical personnel to man industrial processes. Of considerable concern to all those involved in the development programs of these nations was the likelihood that the educational system was insufficiently geared to meet these needs, that bottlenecks might therefore occur, and that thereby the pace of growth would be impeded.

The concern about supplies of high-level manpower and the structure of education led the MRP to adopt a set of technical planning procedures which while hardly novel, tended nevertheless to set this exercise apart from other efforts to plan educational systems, viz., the utilization of estimates of future manpower requirements as the primary basis upon which to evaluate educational needs. Indeed, while manpower trends have frequently been used in advanced nations to assess various types of educational requirements, the MRP was the first major attempt to use manpower criteria in a comprehensive and systematic manner to plan educational investment.

The series of steps or procedures used in the MRP in this context may be outlined as follows:16

First, on the basis of a development plan or a systematic evaluation of future levels of economic activity where no

16Parnes, op. cit., Chapters II-IV.
plan existed, production targets were established for each eco-
nomic sector and branch of activity over the course of the plan-
ning period. Estimates of sectoral employment levels compatible
with these targets were then made primarily on the basis of pro-
ductivity trends. Then, within each sector, employment figures
were allocated among occupational categories on the basis of in-
ternational and/or inter-firm comparisons or trend analysis to
yield an occupation by industry matrix for the terminal condi-
tions of the planning period. The matrix was subsequently sum-
med by occupation to arrive at an estimate of the occupational
composition of employment that would be "required" if sectoral
output targets were to be fulfilled.

Second, manpower requirements classified by occupation
were converted into appropriate educational qualifications to
yield an indication of total employment distributed by levels
and types of educational achievement. By assessing manpower
supply conditions over the planning period, the required net ad-
ditions to the labor force by educational qualifications were
deduced. Such requirements were specified in terms of the num-
ber of graduates or "outputs" from each level of the educational
structure for each year of the plan.

Third, educational "inputs" in terms of enrollment levels
and teachers, classrooms, etc., needed to support the level of
educational "outputs" were determined through analyses of student
flow patterns and the relationships between specific inputs and
enrollment figures, e.g., student/teacher ratios. An over-all assessment was then made of the costs of specific inputs and summed to yield an estimate of the financial resources required to adapt the education structure to development needs over the planning period. Resource requirements were at that point compared to resource availabilities and the program was scaled down to fit the realities of the financial situation of the government. In this way, a framework and systematic assessment of policy options in the education sector and their relationship to the development program was made.

Dimensions of the Human Resource Problem

Despite the originality and impact of the MRP and similar planning activities, they have barely come to grips with the problem of adapting and modifying the stock of human resources to a nation's development needs. For example, the MRP focused almost exclusively on the formal education system as the prime means or instrument for changing human resource characteristics required for development purposes. Indeed, there appears in the literature and most planning operations the implicit notion that educational planning and human resource planning are the same activity.\(^{17}\) Stated somewhat differently,

\(^{17}\)See, for example, Pan American Union, General Secretariat, O.A.S., Department of Scientific Affairs, Methodological Meeting of Human Resources (Washington: O.A.S., 1963, mimeo.) and United Nations, ECAFE, Problems of Long-Term Economic Projections Development Programming Techniques Series No. 3 (New
there is a tendency, on the one hand, to equate the human re-
source problem in underdeveloped economies with the supply of
qualified personnel or the skill structure of the work force
and, on the other, to equate the skill problem with the adapta-
tion of the formal education structure. Neither one of these
premises, however, would appear to be correct. It is clear that
the formal education system is only one of several instruments
or means by which human skills can be adapted to economic re-
quirements. Others include on-the-job training, agricultural
extension work, adult literacy programs, community development,
and self-study.

Many of these alternative means for skill formation have
been recognized to be important, of course, but few have been
incorporated into planning activities. The reason is that plan-
ning exercises such as the MRP have been concerned with the
long-run adaptation of the skill structure to economic growth
requirements and many of the alternative means are essentially
short-run in nature. Furthermore, much of this work, as indi-
cated previously, was predicated on the assumption that high-
level scientific and technical personnel would likely be in
short supply and that these particular occupational groups were

York: United Nations, 1963), Chapter III. Many experts pay
lip-service to this distinction, of course, but act as if it
didn't exist. A good example is Russell C. Davis, Planning
Human Resource Development (Chicago: Rand McNally and Company,
strategically most important in terms of the development prospects of the MRP nations. This assumption, however, depends upon the stage of development and the nature of the problems facing a nation in the base year of the planning period. In many of the low income economies, for example, where illiteracy is widespread and a large proportion of the labor force is in agriculture, programs designed to give the population the simple ability to read and write are likely to have a greater impact on the "skill" structure of the labor force than any training designed to augment high-level manpower. A more comprehensive view of the skill problem and the instruments to deal with it may be necessary in other parts of the world.

Perhaps more important, skill formation is only one relevant dimension of the human resource problem in underdeveloped countries. If it is granted for the moment that one of the tasks of development policy is to build an efficient work force, then such policy must be oriented to all of the variables that may have a significant impact on the quantity or quality of human factors of production. Most specialists now agree that if this problem is to be treated in a comprehensive manner, human resource planning must consider in addition to the skills of the stock of human resources the means for maintaining and utilizing that stock as well.\(^\text{18}\)

\(^{18}\)See Harbison and Myers, \textit{op. cit.}, pp. 2-3.
The "maintenance" of the stock of human resources involves primarily the question of health. Although once considered inimical to growth because of its impact on population size, health policy is increasingly recognized to be an important form of investment in human capital and, as such, a necessary ingredient in policies designed to increase national income. Several studies in the United States, for example, show impressively large economic benefits stemming from public health programs, in most cases increasing productivity more than enough to offset any resulting pressure on population growth. Analyses in the less advanced nations have demonstrated that poor health takes a particularly high toll on the development effort through its impact on the productive capacity of the labor force, especially in terms of the loss of skills due to premature death and the loss of working time due to high rates of morbidity. It is especially this impact on the work force that has attracted the attention of human resource specialists. It is, moreover, the reason that health should be considered in any planning exercise purporting to deal with the capacity and effectiveness of the human resource stock.


Another area that has been neglected in recent human resource planning efforts is the ultimate utilization and deployment of the human resource stock. Most plans have implicitly assumed a set of patterns and/or norms of labor market behavior which result in an optimum deployment of manpower in the economy. Reliance is placed on the assumption that the labor market and its structure of incentives and rewards allocate human resources to those occupational assignments, economic sectors, and geographical areas where the need for them is greatest. Empirical research in the advanced countries suggests, however, that this assumption is unwarranted: the labor market mechanism seldom produces perfect results and market variables do not affect occupational choice, geographical location, etc., to the extent envisaged. The imperfect market arrangements in less developed nations underscore the need to include the question of the distribution and allocation of manpower in the planning operation.

Purpose of the Study

The preceding section makes explicit what a number of specialists in the field have recognized for some time. Human

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22 See, for example, O.E.C.D., Wages and Labour Mobility (Paris: OECD, 1965).
resource planning activities have been conceived in very narrow terms and the concept of planning must be broadened if it is to meet the critical problem of human resource constraints on accelerated development. While agreement exists on the need for broadening these planning operations, there has not yet been any systematic attempt to explore in specific terms how such planning might be undertaken or organized; nor has there been any consideration given to the techniques or methods that might be used to formulate a comprehensive human resource plan. The need for such an assessment, however, is implicit in the recognition that there are dimensions to the human resource problem other than skill formation through formal education and that each of these dimensions has an impact on any effort to promote development.

Since human resource policy is, or should be, a component of the over-all development strategy, there is also a need to analyze the ways in which human resource and development planning can be integrated into a logically consistent whole. As has been indicated above, most development planning operations have not seriously considered variables other than capital formation, although consistent and appropriate policy requires that they do so. Notwithstanding the fact that some human resource plans have been formulated in reference to a development plan, there has been little or no interaction between the two sets of policy, either at the point of formulation or execution.
Experts, to be sure, have argued that these functions should be closely integrated, but there has been no attempt to show how this might be accomplished.\textsuperscript{23} If both human resource and over-all development planning are to provide any help to decision-makers attempting to design development policy, this task seems especially critical.

The ultimate purpose of the present study is to explore the manner in which a comprehensive human resource plan that is related to the over-all development program may be prepared in a specific underdeveloped country. For reasons that will be made clearer below, Bolivia has been chosen for this purpose. Although the study is addressed primarily to the problem of human resource planning in Bolivia, it is meant to be a case study. As such, it should have significance for other low-income countries which may be interested in designing and executing comprehensive human resource policy.

Since little work has been done in this field, however, it is necessary at the outset to establish a general conceptual framework for assessing the nature and scope of human resource planning. For this reason, the first part of the study analyzes some of the methodological problems relating to the formulation of human resource plans, and sets forth a conceptual model of

\textsuperscript{23}See Harbison and Myers, \textit{op. cit.}, Chapter 10 for the argument but a very superficial treatment of the tasks and techniques involved in integrating these activities.
the human resource planning process. More particularly, the purpose of this part of the study is threefold: 1) to explore in relatively abstract terms the dimensions of human resource planning activities and to outline the objectives and the instruments of human resource policy, 2) to analyze how human resource planning relates to development planning and to assess how these activities can be integrated, and 3) to explore how integrated development planning relates to the design and execution of sectoral policies in such human resource areas as education, public health, and manpower allocation, and to indicate how human resource criteria might be used to formulate sectoral plans in these fields.

The second part of the study examines the actual problem of human resource planning in Bolivia. One objective at this stage of the analysis is to appraise the relevance of the planning model or conceptual framework for human resource planning in this country at the present time. Another objective is to examine Bolivia's administrative and technical capacity to plan human resource development. The results of these assessments, along with the concepts and techniques developed in the first part of the study, are then used to suggest a strategy for human resource planning in that context.

Plan of Study

The study is divided into seven Chapters: the remainder of Chapter I considers the meaning of human resource policy and
planning, and outlines a model of the planning process which has activities at both the central and sectoral levels.

Chapter II assesses the integration of development and human resource planning, and the tasks of the central level planning activity. Chapter III continues the presentation of a planning model by examining planning concepts and techniques at the sectoral level and the manner in which sectoral and central level plans can be designed in relation to each other.

Chapter IV assesses the nature and scope of human resource problems in Bolivia in order to test the relevance of the conceptual framework developed in Chapters II and III. Chapter V continues this assessment through an analysis of the administrative and technical constraints on human resource and development planning in Bolivia. Chapter VI, then, presents a strategy for planning human resources in Bolivia. Finally, Chapter VII presents a summary and the conclusions of the study.

Human Resource Planning: A Definitional Statement

Planning is fundamentally a technical function related to the decision-making process. Its purpose in the context of a development program is to assess the implications of alternative sets of policy and thereby aid the decision-makers in choosing that set which is most appropriate to the objectives of the program. In most developing countries, such policies are likely to be only for government operations, although they may have implications for or an impact on the entire economy.
if the government seeks to influence variables outside of its internal structure. In either case, the planning process implies the existence of specified objectives and a commitment on the part of the government to pursue those objectives in some conscious and consistent way.

The kinds of objectives sought by governments committed to a development program will almost certainly take time to reach and may span a time horizon of twenty or thirty years. Policy decisions related to the program, however, are made in the present period and are typically expressed within the framework of an annual budget. While the policies adopted in the current period may imply or require that similar decisions are made over time, and while one of the tasks of development planners is to spell out these implications to the policy-makers, the planning function is nonetheless concerned primarily with assessing current government policy with respect to the specified objectives of the program over time. The fact that many developing nations have established planning operations is nothing more than a recognition that today's decisions have an impact both today and in the future, and that wise decision-making should take both into account.

Human resource planning, therefore, is essentially a technical activity relating to the formulation and implementation of human resource policy. Any definition of the nature and scope of such planning, then, must begin with a consideration
of the objectives and instruments for human resource policy as well as the institutional or organizational framework in which such policy is designed and executed. This seems especially important, moreover, in light of the fact that considerable confusion and debate has arisen in recent years with respect to the dimensions and nature of human resource policy.

One difficulty stems from the different meanings that have been attached to the term human resources. In some parts of the literature, the term is used as an alternative way of expressing the "human element" in the process of economic development. Typically, what is implied in this particular usage is that there are a myriad of human behavior patterns and characteristics which influence--indeed, are the driving force behind--the development process, and that policy should attempt to adapt them to the needs of the development program. It follows, then, that human resource policy is conceived to be directed towards the adaptation of a complex array of human behavior patterns with political, cultural, social, and economic dimensions that may influence or be required by any effort to promote growth. That

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24 See the definition given, but effectively never used in Harbison and Myers, op. cit., p. 2. The differences in usage of the term was originally noted in The Ohio State University, Center for Human Resource Research, Scope and Methods of Human Resource Development Planning A Preliminary Working Paper A paper prepared for the Bolivian Inter-Ministerial Commission on Human Resources for the Bolivian Human Resource Development Project (Columbus: Center for Human Resource Research, 1966, mimeo), pp. 1-2. Parts of the present section draw heavily from this source.
human beings have something to do with development is, of course, unquestionable; but to suggest that public policy can be formulated and executed to affect all such relevant variables is operationally meaningless.

There is a variant of the view which is often alluded to in discussions of social development policy and planning. In this case, human resources are also equated to human beings and human resource policy is conceived as a means of achieving certain end-product objectives of the development process such as policy to assure universal primary education for all children reaching six years of age or the provision of universal health care. Such a definition of human resource policy fails, however, to distinguish between the ways in which human beings enter into the development process. On the one hand, they are inputs into that process as productive agents. On the other, they are the final objectives of that process as consumers of either public or private goods and services. This view of human resource policy, in other words, treats humans only as consumers or final objectives of efforts to promote growth. The concept of social development policy, of course, is similarly limited.

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25 See, for example, United Nations, ECAFE, Problems of Social Development Planning Development Programming Techniques Series No. 4 (New York: United Nations, 1964), Chapter I.

The concept of human resources has also been used in a much narrower sense to refer to human agents of production or as inputs into the development process. In its most limited form, human resources and manpower or labor are used interchangeably, and policy is directed towards assuring a match between the demand for and supply of this factor of production. In a somewhat broader perspective, human resource policy may be conceived to be directed at all of the major variables that have an effect on the quantitative and qualitative dimensions of human inputs over time. The latter view is in effect a more comprehensive version of manpower policy as it has traditionally been defined and is concerned with both short-run and long-run improvements in the productive capacity of the current and potential work force.

This view or definition of human resource policy would appear to be the most meaningful of the several variants presented above. The reason is that it is closest to both the literal meaning of the term and to the initial problem area that prompted the renewed interest in the subject of human resources in recent years, i.e., as an explanation of the unaccounted for growth in national product in studies of the aggregate production function. It is, in any event, the definition of human resources.

27Ibid.

28There is, of course, the implication in some parts of the literature that education enters into the aggregate production function independently. The work done in the field, however,
resources that will be used throughout this study. The distinc-
tion between this definition and human resource policy as end-
product or social development policy, however, must be kept
firmly in mind. The reason is that both the target and instru-
ment variables in the planning program change depending upon
which definition is used. This point is frequently over-looked
and gives rise to the kind of debate that has been sparked by
the Mediterranean Regional Project with respect to the use of
manpower criteria for evaluating educational needs. 29

**Target Variables**

Using the narrower definition, human resource policy can
be considered as an important component of broader policies
which seek to increase the economic performance of a nation. As
such, it is not directly concerned with ultimate development ob-
jectives but rather with the means to achieve these ends. It
is, in a generic sense, a type of investment policy, since it
seeks to use current resources to build the future productive
capacity of the nation. The focus of this investment activity

has been oriented almost exclusively on the effects of education
and other human resource variables on the work force. It is in
this sense that the recent interest in the field of "human capi-
tal" provides a rationale for the need for planning these activ-
ities in the framework of an economic development program.

29 See, for example, C.A. Anderson and M.J. Bowman,
"Theoretical Considerations in Educational Planning," in Don
Adams (ed.) *Educational Planning* (Syracuse: Syracuse University
Press, 1965), pp. 4-46.
is the work force and its purpose is to improve the efficiency of that force so that economic objectives can be reached.

Viewed in slightly different terms, the target variables of human resource policy are identical to those of the economic development program. They might include such typical economic objectives as a maximum rate of growth in Gross National Product, a rapid build-up of capital goods industries, achieving stability in the balance of payments, and so forth. Such objectives, of course, are not really ends in themselves but primary means for generating sufficient resources to permit a nation to improve its standard of living.

Instrument Variables

While the preceding sections give a general orientation to what is meant by human resource policy, a much more specific notion can be obtained by exploring the number and kinds of instrument variables that are related to the policy function. Stated briefly, the instruments in a human resource program are all of those policies and projects that have an effect on the formation, maintenance, and utilization of the human resource stock.

The instruments affecting the "formation" or skill structure of human resources obviously include the formal education system at its various levels and curriculum tracks. As indicated previously, however, there are many other training instruments that have an important effect on the skill structure
of the work force. These include on-the-job training, apprenticeship programs, military training, adult literacy and community development programs, agricultural extension work, and other ad hoc training of a vocational nature. It is tempting but quite myopic, however, to regard only educational and training policies as being relevant to the process of skill acquisition. Policies that influence the mobility of labor and thereby the range of work experience, such as moving allowances, housing programs, etc., may have a significant impact on the skill structure of the labor force. Similarly, government fiscal policies may have an effect on the technological processes employed in industry and thereby the need or opportunity for the work force to acquire through experience the skills associated with these processes. These same policies may be critical in terms of promoting the establishment of on-the-job training programs in private industry, and the government's relations and policy with respect to the trade union movement may be very important in expanding the opportunity of apprenticeship training. The policy instruments for manipulating the process of skill acquisition, in other words, are considerably broader than education budgets or government sponsored training programs, and extend to almost all facets of governmental policy-making and execution.

The instrument variables for "maintaining" the stock of human resources relate primarily to programs dealing with public health. This is, of course, a broad area but would include at
a minimum: (i) preventive health measures such as inoculation campaigns, health examinations, occupational health programs, etc., (ii) curative and restorative health services, (iii) environmental health measures such as the installation and maintenance of clean water supplies and waste disposal systems, housing policy, and so forth, and (iv) instruments for health promotion, especially nutrition programs and health education. These means are not mutually exclusive, of course, and may be combined in various ways to effect specific objectives in the health field. The policy instruments in this area may also be interdependent with other human resource instruments. Health education programs in the primary school is an obvious case in point.

Similarly, the instruments for effecting an appropriate pattern of utilization and deployment of the human resource stock are varied and numerous. In principle, however, most deal with the operation of the labor market and the flexibility of the supply of manpower. Included here are policies affecting the geographical movement of the labor force such as removal grants, housing policy, and immigration and emigration legislation; wage and salary policies and other incentive programs to create an efficient labor market mechanism; programs such as the employment service to facilitate the flow of labor market information and short-term matching of labor supply and demand; and policies affecting personnel practices and managerial
sensitivity to the effective use of manpower at the place of work such as productivity centers and managerial consulting services.

The Policy Function

The significance of the foregoing is that both the targets and the instruments for human resource policy are as broad as governmental operations and the development program themselves, and that both the formulation and implementation of human resource policy necessarily cut across sectoral and agency lines. The conceptual underpinning of such a policy function, however, is relatively straightforward: if an efficient and productive work force is required to fulfill the objectives of the development program, and if the factors affecting the efficiency and productivity of that work force can be identified and are amenable to policy manipulation, then governments can pursue an active and positive human resource policy as a component part of the over-all development program. Coordination of such policy can be carried out through budgetary allocations and general policy directives from either the executive or legislative branches of the government.

The basic policy question, therefore, is the amount and distribution of such allocations and the types of directives that are necessary to adapt or modify the stock of human resources to the requirements of the development program. More particularly, the question is to determine the activity levels
of the various sectoral and agency components of the human re-
source program necessary to fulfill development targets, the
changes required to reach these levels, and the costs in both
monetary and real terms of making these changes. In a generic
sense, this type of question is raised throughout the develop-
ment program, and the difference in the human resource field is
one of orientation or focus rather than kind.

The concept of human resource policy as described above
is not, however, without its difficulties for at least one rea-
son that may be worth exploring briefly. Basically, the problem
is that a policy function that cuts across a number of sectoral
and agency lines almost certainly will lead to operational dif-
ficulties both in designing and in implementing such policy.
Each of these sectors, particularly in the human resource field,
is likely to have functional objectives other than promoting the
efficiency of the work force. An obvious example is the educa-
tion sector, which has traditionally been considered as a means
for promoting individual self-fulfillment and has only been in-
cidentally concerned with narrowly defined economic goals. This
fact has stirred an extensive debate in recent years with re-
spect to precisely how far educational policy can or ought to
be influenced by economic objectives. Educationists frequently
object to the use of economic evaluations of policy in their
field lest the "true" values of education be distorted. Since
the "true" purpose of education is difficult if not impossible
to specify, the debate has been complicated by individual perceptions of what goals educational policy ought or ought not to pursue. Such perceptions, nevertheless, color the design of much policy in these fields--indeed, the perceptions are frequently institutionalized--and any multi-sectoral policy function must at some point come face to face with them. From an organizational point of view, it is possible, of course, to reduce these types of conflicts by delegating the responsibility for designing and executing human resource policy to inter-sectoral groups or councils; but, it is important to bear in mind that the nature of such policy is complex and that there is little reason to assume that its implementation should be an easy task.

The Planning Function

Human resource policy can be designed--indeed, is many times designed--in the absence of a planning activity. It is a premise of this study, however, that consistent and rational human resource policy requires that it be formulated and implemented in the framework of a planning mechanism. The reasons are the multi-sectoral and long run nature of the policy function and the absence of readily available guidelines or criteria for designing human resource programs. The establishment of guidelines in particular is quite difficult in the absence of a consistent framework showing the pattern of resource needs over
time and lies at the very heart of the planning activity. The manner in which such guidelines can be formulated and utilized in the design and execution of human resource policy is, in effect, the subject matter of the next two Chapters. The remainder of this section assesses the functional and organizational relationships of human resource planning to other planning operations.

The planning function in most underdeveloped nations in Africa, Asia, and Latin America is usually distributed by level and type of activity. Typically, there is a central planning office which is concerned with resource allocation and the formulation of medium and long-term plans for the use of society's scarce resources in relation to the objectives of the development program, and a number of sectoral units involved in the preparation of feasibility studies, projects and annual budgets in specified fields. In the ideal case, the central plan provides the guidelines for and consistency check on the design of sectoral policies, and the sectoral units report to and through the central planning office on matters of project priorities, program consistency, and budgetary allocations. It must be noted that this ideal is seldom reached and many of the sectoral groups are either organizationally autonomous and/or report directly to the Minister of Finance or other centers of power in the government. It would appear, however, that the concept of planning at various levels is not inappropriate but rather that
administrative and organizational factors must be improved if planning is to contribute to rational and consistent government policy.

Given this type of framework, nevertheless, it seems perfectly straightforward to assume that human resource planning as described above is a central level planning function and must, as a result, be incorporated into the work of the central planning office. The reason is that the target variables of human resource policy, as indicated previously, are identical to the targets of the over-all development program as well as the fact that such policy cuts across sectoral lines. The strategy for human resource development, therefore, must be formulated in the framework of--indeed, simultaneously with--the over-all development plan. Its purpose is to assess the requirements for human agents of production implied in development objectives and the feasibility of reaching these ultimate goals in light of the possibilities and/or cost of modifying or adapting the human resource stock.

It is important to note that central level human resource planning can be carried out in the absence of sectoral planning activities in education, health, etc. It is desirable, of course, that both levels design consistent policy in a joint manner, but this is not essential for human resource planning to make a contribution to the design and implementation of the development program. In the case, for instance, that sectoral
policy, say, in education, is autonomously determined or rigidly fixed in some past period, the role of the central level planners is simply to interpret the effects of this situation and human resource policy is designed around educational policy, i.e., educational policy is taken as a given.

In the opposite case, however, where the two sets of policy might be designed in relationship to each other at the same time, sectoral policy can be taken as variable within wide limits and designed with reference to the targets of the human resource strategy. If this situation exists, the role of the human resource planner is to provide criteria or guidelines for the design of policy in the relevant sectoral units so that a consistent and feasible development program can be formulated. The role of the human resource planner, in other words, is not rigidly fixed, and will vary to the extent to which relevant sectoral planning activities are tied to the central development planning operation.

The analysis in the following two Chapters assumes that both central and sectoral planning activities exist, and that a comprehensive human resource policy is to be designed as a joint function. The significant question, then is the general nature of the tasks of the planners at each level and the techniques that can be used to design or prepare a comprehensive human resource strategy for the development program.
A technical sense, the primary task of development planning at the central level is to assess the alternative
patterns of resource use that will satisfy the objectives of the development effort. The choice of a specific pattern implies a set of targets for the development program, which can then be used as a framework for designing government policy as well as basic criteria for evaluating the progress or impact of the program. The technical planning work involves estimating the current and potentially available resources and specifying their distribution among competing uses over time. Once the technical job is complete, an analysis can be made of the policy implications of this resource pattern. The primary question, however, is how resources are to be allocated to satisfy the goals of the development program.¹

Resource allocation in the planning field traditionally refers to the allocation of investment funds destined to augment the physical capital resources of the nation. At a macro-economic level of analysis, the planning problem is considered to be the determination of the amount of savings that will be available given the capital/output ratio and a target rate of growth. Once this amount is given, the task is to choose priorities and allocate these funds among competing development projects, the

¹Conceptually, this question is the same irrespective of the size of the development program or the proportion of total resources allocated directly through the government sector. It is more important, of course, in those nations that attempt to mobilize and direct a large amount of resources through governmental action and control, but this is a difference in the degree rather than the kind of planning.
sum of which constitutes the investment program and the base upon which the plan or capital budget is designed. The implicit assumption, of course, is that development objectives are a function only of capital inputs.

Such a planning procedure does not provide an adequate framework for evaluating human resource policy. If human resource and development planning are to be integrated, it is necessary to redefine the concepts of resource allocation and investment. This can be done if planners simply shift from distinguishing between developmental and non-developmental expenditures or current and capital budgets towards a broad assessment of total resource use and availability.\(^2\) The need for this shift is based not only on the premise that such distinctions cannot easily be made in the human resource field, but also on the fact that at any given point in time all uses compete for scarce resources at the margin. Furthermore, in the context of certain parts of the human resource program such as education and public health, increasing capital expenditures are very likely to call forth more than proportional increases on current account over the course of the planning period. Such increasing charges have implications for the entire development program since they require that either the taxing capacity of the government or its ability to borrow grows at an equal rate. This may

mean, for example, that the choice of revenue producing development projects to be undertaken by the government will shift because the pay-off periods of various projects are likely to be different.

Thus, the traditional starting point of development planning, i.e., a fixed investment fund to be allocated among competing uses for capital resources, must be discarded and the question of total resource use substituted in its place. In real terms, this amounts to adding variables to the assumed or estimated production function of the economy. In financial-budgetary terms, it involves an assessment of the amount, distribution, and manner in which total governmental resources are to be used to effect the development program. Obviously, given the structural dimensions of the development problem, changes in variables other than financial sums are required. It is assumed, however, that they can best be assessed initially in the context of the size and distribution of the government budget.

Steps in the Planning Process

The basic steps in the design of the development strategy, therefore, are to obtain a broad perspective of resource use and availability in the current period, and to analyze the inter-temporal pattern of resource use compatible with the objectives of the development effort. The former step constitutes a diagnosis of current and past development trends that must logically precede any planning effort; the latter is an analysis
involving, on the one hand, a statement of development goals and targets, and, on the other, an estimation of the resources required to satisfy these objectives. Assuming that a diagnosis has been made, the first important building block of a development plan is a statement of the objectives of the program. Such a statement should define both the time periods in which the goals are to be reached and their relative importance or priority in the event that they are conflicting. Conceptually, this is a task for the political authorities, although experience suggests that planners themselves may exercise considerable influence and control in the choice of and weights assigned to various goals.\(^3\)

Once the objectives of the program have been clearly stated, the next step in the planning process involves the translation of development goals into specific targets to be fulfilled by the program over the course of the planning period. Initially, targets will be set in terms of broad macro-economic variables such as gross national product distributed by final use over the long run. Working in rounds of successive approximation, specific sectoral priorities and production targets for varying lengths of time can be identified within the long-range perspective. The technical problem is to test the feasibility of meeting these targets by assessing the pattern of resource use.

implied in the figures and to fix the size of the plan, i.e., choose among the alternative sets of targets that set which is optimal and feasible as a framework for decision-making.  

The final step is to fill-in this framework with projects and programs that are designed to effect the targets and hence the objectives determined in the previous steps. Conceptually, these programs are designed by the planners in cooperation with relevant government and private agencies. Experience suggests, however, that many projects will be proposed from outside the planning structure and the targets are used then as a set of criteria for evaluating these proposals. In either case, when the programs have been designed, selected, and costed, the amount and distribution of resources to be used by the government to carry out the development program are thereby determined.

Establishing Development Targets

The major point at which human resource and development planning at the central level converge is at the second planning stage relating to the establishment of targets for the program. The reason is that each of these activities requires a firm notion of the pattern of human resource use implied in development objectives over the course of the planning period. From

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4 It must be noted that this is a conceptual interpretation of the planning process rather than a description of actual planning experience. Indeed, one of the problems in many planning exercises is that such alternatives are not assessed for their feasibility.
the perspective of the development planner, this information is needed to test the feasibility of reaching target levels of output with available or potentially available resources. Human resource planners, on the other hand, need to translate development objectives into workable targets and guidelines for the design of policy in the human resource field. The conversion factor that enables these planners to move from a broad statement of goals to detailed programs is also the pattern of human resource utilization over time.\(^5\) The point of convergence, therefore, has a dual nature and involves the projection of human resource requirements or inputs implied in over-all development objectives. Conceptually, the need for making such projections is straightforward and is analogous to the estimates of capital requirements made in most development planning exercises.

Projecting the pattern of human resource utilization is not, however, an easy task. Furthermore, it is not simply a technical problem, since (as will be seen) the relationship between development and human resource planning will change

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\(^5\)This statement requires elaboration and is considered in detail in Chapter III. The present Chapter assumes that the pattern of human resource inputs is an appropriate base upon which to design sectoral policy in the areas of education, health, and labor allocation. Moreover, it is assumed that these requirements can be automatically translated into activity levels for human resource programs and projects. The latter assumption is made for the purpose of exposition because it permits a two-step planning process to be discussed as if it were only one step. Both assumptions are examined in Chapter III.
depending upon how these projections are made. For this reason, as well as the fact that the concept of human resource projections has been the subject of some debate in recent years, it is necessary at this point to consider the role, methods, and meaning of these projections. The result of this digression should place the tasks of development and human resource planning at the central level in clearer perspective and permit some tentative generalizations about how these activities can be integrated.

Projections of Human Resource Requirements

The concept of projecting human resource requirements is not an unambiguous one, and considerable confusion has emerged with respect to the meaning and application of the concept. For this reason, the first part of this section briefly outlines several definitional points so as to place later discussions in proper perspective.

First, human resource projections must be made within the framework of the entire work force. Such a framework is necessary because independent estimates for specific segments or groups are not likely to pay sufficient attention to the inter-relatedness of the structure of the labor force and the

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possibilities for substituting these factor inputs in the productive process. Furthermore, such independent estimates may add up to be significantly different than the total labor force. Estimates cannot, of course, sum to a number greater than the labor force in any given time period nor, in the context of a development program, sum up to be considerably lower than the total active population because of the social, economic, and political implications of widespread unemployment. Upper and lower limits, in other words, are set by making the projections within the labor force framework.

Second, and perhaps more important, is that the purpose of human resource projections is to delineate the occupational, sectoral, and geographical distributions of the work force over time needed to satisfy over-all development objectives. This is significant because some specialists have criticized their use on the grounds that such projections assign zero or near zero demand elasticities for labor. It seems clear, however, that manpower projections do not deal with the demand for labor in the sense of postulating some functional relationship between the price of labor and the quantity demanded, but rather the characteristics of the labor force that are relevant to a given

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level and type of economic activity. If anything, human resource projections represent an assessment of the shape and characteristics of the aggregate production function, which is simply a technological relationship between classes of inputs and output.

As a practical matter, however, projections usually attempt to explore only one point of the production function at a given level of output and therefore have used fixed input coefficients at that point, i.e., a point along a given sectoral isoquant. This is appropriate if and only if the level of output and the amount of resources other than manpower employed at that level are assumed to be given. Such an assumption means, of course, that the relationships postulated in the projections have to be technological in nature, and, moreover, represent equilibrium conditions in the factor market. That is, projections deal with figures on employment, which is the point of intersection between the demand and supply functions and depends equally upon both of them. The appropriateness of using this assumption will be examined below; the important point here is simply to define what human resource projections attempt to do.

**Techniques for Human Resource Projections**

Given the general framework described in the preceding section, it is important to understand the specific methods that have been used to project human resource requirements. There
are, of course, several different methods that can be used and in any given situation all may contribute to the final estimates of the future stock of human resources. The methods described in this section, however, have at least one thing in common, viz., that assumptions or estimates with respect to the future size and distribution of output exist for the terminal year of the planning project.\(^9\) They are, in other words, methods by which the human resource implications of a given set of output targets can be analyzed.

First, and most obvious, projections can be made by extrapolating trends in employment by sector, occupation, and area and adjusting them in light of expected developments in the level and structure of production over the planning period. Several variations of this method can be used. It is possible, for example, to regress the ratio between certain occupational groups and total employment on employment and use the parameters obtained in the regression equation to project the future numbers.

\(^9\)This section draws heavily on Parnes, op. cit., pp. 30-36; Herbert S. Parnes (ed.) Planning Education for Economic and Social Development (Paris: OECD, 1963), especially Part Two; Ozay Mehmet, Methods of Forecasting Manpower Requirements (Toronto: Center for Industrial Relations, University of Toronto, 1965); Mariano Ramirez Arias, Los Recursos Humanos en el Desarrollo Economico y Social (Washington: Pan American Union, Department of Scientific Affairs, 1967, mimeo); M. Horowitz, Manuel Zymelman, and Irwin L. Herrnstadt, Manpower Requirements for Planning (Boston: Northeastern University, Department of Economics, 1966), Volume I; and R. G. Hollister, "The Economics of Manpower Forecasting," International Labour Review Vol. LXXXIX, No. 4 (April, 1964), pp. 371-97.
of these groups. Similar ratios can be constructed for area or sectoral distributions of the labor force.

The difficulty with this method is that data on employment, occupational and sectoral distributions, etc. are rarely available in underdeveloped nations for sufficient periods of time. In addition, trend lines normally must be adjusted to fit the terminal conditions of the plan, but there are frequently few guidelines other than informed judgement upon which to make these corrections. This brings a certain amount of bias into the planning exercise, which can be avoided with different and somewhat more complicated methods.

A second, and more satisfactory method, is to use estimates of labor productivity (or its reciprocal, the labor coefficient) and target output figures, preferably broken down by sector of economic activity. If these target figures are given, there are several variants of the productivity method that can be used to make human resource projections. For instance, productivity trends can be extrapolated and a total employment figure can be calculated for each sector. The employment figures, in turn, can be broken into occupational distributions by applying adjusted base year occupational coefficients


11 For the sake of brevity, only the occupational and sectoral distributions of the work force are considered here. Geographical distributions can be estimated once this information is available.
to the totals for each sector. Productivity targets can be established without reference to the trend rate and employment calculated for each sector. On the assumption that the occupational structure is uniquely related to the level of sectoral productivity, total employment can be broken down into occupational categories by analogy with other countries or firms in the home country whose productivity rates are similar to the forecast level.\textsuperscript{12}

It is also possible to estimate labor coefficients broken down by occupation and sector, e.g., the amount of occupation $x_1$ per dollar of output in sector 1, and to apply them to output figures. If these coefficients are assumed to remain constant, this is a way of preparing manpower projections in the framework of input-output analysis. Detailed occupational coefficients can be incorporated into the technology matrix, for example, which when inverted and multiplied to estimated changes in the final bill of goods will yield a pattern of occupational and sectoral distributions of manpower related to structural changes in the economy. These coefficients are unlikely to remain constant, however, and adjustments in the base year technology matrix must be made. If they are, methods

\textsuperscript{12}This assumption has been recently tested statistically on an international, cross-sectional basis. The results of the study support the use of such an hypothesis and, thus, the use of comparative data in human resource planning work. See Horowitz, Zymelman and Herrnstadt, \textit{op. cit.}, Chapter IV.
corresponding to the first two variants suggested above would have to be used and, hence, this method becomes indistinguishable from those alternative approaches.

Human Resource Projections: A Reassessment

Many specialists stress the difficulty in making human resource projections of the type described above because of the absence of sufficient data on employment, occupation by sector matrices, etc. in most less-advanced nations. Most believe, however, that with both increased efforts to collect and process needed information and additional research on productivity relationships, projections can be improved.

In general terms, it is difficult to argue with this position; but, in the specific context of formulating development and human resource policy, some skepticism may be raised as to how relevant such research is to the needs of human resource planners and whether or not it really is required if development and human resource planning are integrated activities. To understand the basis of such skepticism, it is necessary to explore some of the conceptual limitations of projecting human resource requirements by the methods described above.

The primary limitation of these methods is that human resource needs are deduced sequentially from previously determined choices with respect to the final bill of goods and

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sectoral production figures for the terminal year of the plan. If these figures simply represent estimates of final demand in a market sense, sequential deductions of the resources required to produce this output is an appropriate technique for use in building human resource policy. But this is not what is usually meant when a set of production targets is taken as given and assessed with respect to their human resource implications. On the contrary, the notion that the development plan itself is taken as a given datum from which requirements are deduced is almost axiomatic with human resource planners. The difference is that a number of critical choices with respect to the pattern of resource use and the economic structure are accounted for early in the preparation of the plan, and human resource needs projected sequentially are nothing more than assessments of these previously determined choices. The difficulties that are implicit in estimating human resource projections in this unilateral manner, however, are frequently overlooked or ignored. They have a significant bearing on the conceptual underpinnings of the role and meaning of human resource planning at the central level and, as a result, deserve detailed consideration.

Most important in this respect is that sequential techniques do not allow for any interaction between human resource inputs and the framework for development policy. They treat human resource policy designed on the basis of these requirements as being passively required to fulfill plan targets but not actively responsible for the optimal terminal conditions of the planning period. The absence of interaction is a significant limitation on the design of both development and human resource policy in the following ways:

To begin with, unless there is a systematic feedback mechanism built into the formulation of the plan, the set of human resource targets derived sequentially is not likely to take sufficient account of the effective utilization of the human resource stock over the planning period. This is a result of the conditions of under-employment of labor and structural disequilibrium in the factor markets that are found in underdeveloped economies, and involves the problem of employing factors of production in the proportions in which they are available. The factor availability problem in the literature on human resource planning is normally assumed away by concentrating on the long-run adaptation of the work force to development needs. Indeed, not unlike the development plan itself, the long-run nature of human resource planning is axiomatic and repeatedly stressed by specialists in the field. The need for long time periods to build certain human resource institutions
such as formal education is, of course, well known and the emphasis placed on this time period is both important and logically unassailable. The question, however, is the extent to which such emphasis should be placed on the adaptation of the work force over shorter periods of time, and, conversely, the extent to which the development plan itself must "give" or be modified over these same periods to adapt to the characteristics and assure adequate utilization of the available human resource stock.

The plan framework can be adapted in several ways to take account of the problem. Among the most important are changes in the structure of economic activity or the product mix and in the techniques of production, i.e., the combinations of factor inputs used to produce a given output. The product mix exerts considerable influence on the utilization of human resources because employment elasticities with respect to output tend to vary among sectors and sub-sectors of the economy. While this is true in advanced and less-advanced economies alike, it is somewhat more pronounced in the poor nations because of the absence of any strong degree of structural economic interdependence at the early stages of development. For this reason, it is difficult to assume that employment is systematically linked to the general level of economic activity or that the maximum income path corresponds in any way to the path towards maximum employment. It is also for this reason that utilization patterns can be modified with only slight changes
in the composition of output, assuming that interaction between these sets of variables is allowed for in the planning exercise.

Similarly, the choice of techniques of production affects utilization of various kinds of human resources by fixing the technological relationships between combinations of inputs and output. These choices may or may not call for factor combinations in proportions that correspond to their availability. Since various factor combinations even with similar levels of cost may produce divergent amounts of output, choices of factor combinations can also cause discrepancies between levels of factor utilization and output. If a development plan is literally taken as given, these choices have already been made and, accordingly, the utilization effects have been implicitly or explicitly fixed. This means that human resource policy designed on the basis of sequential deductions from the plan takes the level of utilization as given, although conceptually such a matter should be a consequence of human resource policy and not simply a given at the point of designing the program.

15While the choice of techniques affects a number of variables in a development program, only those relating to human resource inputs are considered here. An example of the types of other effects is that the choice of production technologies fixes to a considerable degree the distribution of income, which in turn has an impact on the rate of savings and investment. For an approach to development policy and planning that is oriented exclusively to determining appropriate production techniques, see A. Qayum, Theory and Policy of Accounting Prices (Amsterdam: North-Holland Publishing Company, 1960).
Much more significant, however, is the impact of the composition of output and factor combinations on the need to adapt the characteristics of the work force to economic requirements. These factors may be considered the prime determinants of the number and type of labor inputs needed to fulfill development objectives and, as such, are far too important to be taken as given by the human resource planner. The composition of output will affect the human resource program primarily through intersectoral differences in the number and type of labor skills needed in the productive process. Other parts of the program, however, will also be affected by the structure of the economy and the changes in that structure over time. For instance, the need for occupational health programs will differ to the extent that sectors such as mining and manufacturing are stressed in the development program, and policies dealing with the geographical transfer of workers to urban areas will depend upon the extent to which a shift away from agriculture and rural handicraft activities is contemplated.

The effects of the choice of production technologies, of course, are even more important. An option to promote or use labor intensive technologies instead of modern, capital intensive production processes in certain sectors has an obvious impact on human resource policy. In particular, the number of skilled and trained personnel required will differ to the extent that labor intensive or capital intensive technologies are adopted.
Because the product mix and the techniques of production are the prime determinants of the quantitative and qualitative dimensions of the human resource stock required for development purposes, they are also the factors that must be modified if it is not possible to adapt the human resource stock to the extent necessary. This being the case, there must be some point at which each of these sets of variables can be balanced that is optimal from the perspective of the development program. Briefly put, if development and human resource planning are to be integrated and the respective policies designed in relation to each other, the planning problem is to identify just such an optimum point of balance.

Stating the planning problem in these terms means that the logic and several assumptions implicit in the use of sequential techniques for making human resource projections are inappropriate and must be discarded. Among the most important of these is the assumption that a balance struck between output figures and human resource input requirements is appropriate and/or feasible at any given level of output. Such a balance is not likely to be feasible, however, because the product mix and production technology associated with that level may set requirements so high as to be impossible to adapt the human resource stock over the course of the planning period. The assumption depends, in other words, on the initial or base year
human resource situation and the possibilities of modifying the stock during the time periods included in the planning horizon.

More significant, however, is the assumption that the costs in both real and monetary terms associated with balancing human resource inputs at any given level of output are proportional to that level. This assumption has rarely been examined, and there is a need to make it explicit. The problem that is involved is, in effect, whether the cost of human resource policy is warranted by the benefits accruing to the execution of that policy. It has been ignored in the literature because costs are treated with respect to a different set of criteria in most discussions of human resource planning. In planning exercises such as the Mediterranean Regional Project, for example, manpower requirements were balanced at various levels of sectoral output and then the costs of meeting these targets were calculated by summing educational budgets and distributing them over time. Total costs were then assessed against the available or potentially available financial resources of the government and/or the ratio of educational expenditures to Gross Product and compared to the same ratio in other countries at similar levels of development, i.e., to see if the government or nation could be expected to bear the burden of these costs.16

16See, for example, OECD, The Mediterranean Regional Project, Country Report for Greece (Paris: OECD, 1965), Chapter X.
From a conceptual point of view, however, these costs should be assessed with respect to the benefits accruing to the use of scarce resources in this manner. Presumably, the benefits in the case of the MRP exercises were reaching target levels of output. Costs, therefore, should have been assessed with respect to these benefits, especially in the sense of how much output might have been lost if costs were lowered by some given amount or how much more output above the target levels might be forthcoming with only marginal increases in the costs of human resource policy. It is recognized, of course, that operationally such estimates would be difficult to make, but this should not prevent us from calling attention to the significance of the point.

In a similar way, it is not possible to assume that costs are invariant with respect to the time span of the human resource program, and the question of when a given balance is struck between targets and input requirements is as important as the level at which it is achieved. This problem depends upon the initial or base year human resource situation and the time priorities established in the development program. The costs of carrying out a massive effort in several years to modify the characteristics of the work force implied in development objectives are most likely to differ from the cost implications of the same program stretched over a somewhat longer period of time. It is plausible to assume that benefits will be affected
in an equal manner. There is a need, therefore, to assess the nature of these time-cost trade-offs over relevant periods of the planning horizon. Not unlike the other trade-off possibilities discussed above, this can be done only if the development planning framework, i.e., the level and composition of output and the techniques of production is allowed to vary in light of the feasibility and costs of adapting human resource inputs to fit the development program.

To sum up briefly, this section has attempted to show that an assessment of human resource requirements based on sequential deductions from a given development plan is limited in a conceptual sense and perhaps even misleading. The problem is that a number of critical choices affecting the number and type of human resource inputs required for the development program are made without any consideration of the feasibility and costs of supplying those inputs over the course of the planning period. The use of productivity estimates in making projections of human resource requirements amounts to a proxy variable that helps explain these previously determined choices. If human resource and development planners work jointly from the outset of the planning exercise, less reliance need be placed on such proxy variables and the interaction between human resource inputs and the framework of development policy can be coordinated along the route from the initial and tentative projections of gross product to the selection of a given set of targets for the program.
Some of the techniques that might be used in this connection are explored in the following sections.

Simultaneous Solutions: An Inquiry

From a purely theoretical point of view, what the previous section suggests is that it would be desirable to plan with a general equilibrium model in which the supply and demand schedules in all product and factor markets, as well as production functions for each product, are known. Such a model, of course, is beyond the operational capability of any planning activity at the moment, and will continue to be so for many years. There are, however, some techniques available that approximate such a general model which might be used with varying degrees of disaggregation and detail for the kinds of problems that have been discussed above. It must be noted at the outset that even these techniques are unlikely to be operational in most less-advanced economies in Africa, Asia, and Latin America at the present time, but stating the problem and its solution in terms of such a model does point out the relationships and framework that are important in planning development at the central level.

One technique that can handle the types of relationships discussed in the present Chapter, and also provides a simultaneous solution, is activity analysis. Simply put, the concept

17 This section draws heavily on the description and assessment of activity analysis in Hollis B. Chenery and Paul G.
of activity analysis is a logical extension of the Leontief input-output model, the primary difference being that it permits a given commodity to be produced in a variety of ways rather than only one way as is characteristic in the Leontief model. In so doing, it permits the level of resource use to vary and to be determined in the model's solution as opposed to being determined exogenously as in input-output analysis. Technically, these extensions of input-output analysis lead to a situation where there are more variables than equations and, hence, a variety of solutions. The second distinctive feature of activity analysis is that it is possible with the use of the mathematical techniques of linear programming to select one solution over all other solutions. It is, in other words, an optimizing technique.

As a development planning tool, activity analysis has the advantage of being able to treat variables relating to the composition of output, choice of techniques, and the level of resource utilization simultaneously and to find an optimum combination of these variables that will maximize some development objective. To illustrate briefly, it is possible with activity analysis to solve the following development planning problem: Given an objective of maximizing national income in an economy that produces two products with three factors of production,

Clark, *Interindustry Economics* (New York: John Wiley and Sons, 1959), Chapter 4, and especially pp. 82-88.
and given that each product can be produced by two alternative production technologies and the availability of each factor of production is known, what product mix, production techniques, and level of factor utilization will maximize income? The solution to this hypothetical problem requires the following information and structure:

First, it is necessary to construct a matrix showing the technological relationships between inputs and outputs for each product and for each alternative method of producing those products. In terms of the hypothetical problem, each alternative production technology would be represented as a separate activity in the model and expressed as a column vector. Since the economy to be planned produces two products and there are two alternative methods for producing each product, the technology matrix will be composed of four column vectors. The elements of each vector represent the inputs and output for each activity. The hypothetical economy has three factors of production, say, skilled labor, unskilled labor, and capital, and thus the elements of each activity vector will represent the technological relationships between these factor inputs and output.

Letting skilled labor be represented by $a_{1j}$, unskilled labor by $a_{2j}$, and capital by $a_{3j}$, where $j$ is a given activity, and expressing these input coefficients at unit level, i.e., as the amount needed to produce one dollar of output, the technology
matrix $A$ can be written:

$$A = \begin{bmatrix}
    a_{11} & a_{12} & a_{13} & a_{14} \\
    a_{21} & a_{22} & a_{23} & a_{24} \\
    a_{31} & a_{32} & a_{33} & a_{34}
\end{bmatrix}$$

Second, it is necessary to know the amount of each factor of production available to the economy. These resource availabilities represent a set of constraints on the model in the sense that the use of any factor cannot exceed the amount available. On the other hand, a set of constraints in activity analysis can be written as linear inequalities and thus some non-use, i.e., unemployment, of any factor is allowed for in the solution of the problem.\(^1\) Letting the amount of skilled labor, unskilled labor, and capital available be represented by $u_1$, $u_2$, and $u_3$ respectively, this set of constraints can be written as a column vector $U$, or

$$U = \begin{bmatrix}
    u_1 \\
    u_2 \\
    u_3
\end{bmatrix}$$

Third, since the model will have more variables than equations, and since an optimum solution is sought, it is necessary to have a criterion or objective function that permits the choice of the best solution. A criterion function is a linear

\(^1\) Actually, in the solution to such a problem, the constraints would be converted to equalities by adding disposal activities and slack vectors which would allow for the non-use of a factor input.
function of the activity levels of the model, and is taken in this illustration to refer to the maximization of national income, \( Y \). The activity levels refer to the extent to which a specific production process is utilized and are expressed in terms of dollars worth of output of each commodity produced in the economy. Letting \( x_1, x_2, x_3, \) and \( x_4 \) represent the activity levels of activities 1-4 respectively, and restricting the \( x \)'s to non-negative values so as to make sense economically, the activity levels may be written as a column vector \( X \), or

\[
X = \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix}, \quad x_1 \geq 0, \ x_2 \geq 0, \ x_3 \geq 0, \ x_4 \geq 0
\]

The problem, then, is to find or determine a set of \( x \)'s that will maximize income, \( Y \), subject to the constraints of the model.

Formally, the model may be stated as follows: to maximize \( Y \) where

\[
Y = c_1x_1 + c_2x_2 + c_3x_3 + c_4x_4
\]

and where the \( c \)'s represent the direct effect of each activity on national income, i.e., the income generated from operating each activity at the levels given by the \( x \)'s, subject to

\[
a_{11}x_1 + a_{12}x_2 + a_{13}x_3 + a_{14}x_4 \leq u_1 \\
a_{21}x_1 + a_{22}x_2 + a_{23}x_3 + a_{24}x_4 \leq u_2 \\
a_{31}x_1 + a_{32}x_2 + a_{33}x_3 + a_{34}x_4 \leq u_3
\]
or, in matrix notation

\[ AX \leq U \]

Since solutions to linear programming models are very complicated and normally involve the use of computing machines, a proof that a \( X \) vector can be determined that maximizes \( Y \) within the constraints of the model will not be offered here.\(^{19}\) The problem can be solved and it is important, in the context of this section, to understand only what the solution offers in the way of help to the development and human resource planners.

In the first place, the solution determines the composition of output that will maximize national income, i.e., it

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\(^{19}\) For an appreciation of at least the Simplex method of solution, see Chenery and Clark, *op. cit.*, pp. 130-135. It should be noted that, in linear programming terms, the hypothetical problem is a primal problem; its dual would in effect solve for the shadow prices of the factor inputs. It should also be noted that the hypothetical problem is unrealistic in the sense that if data were available, the model would probably contain so many variables as to preclude its numerical solution. It would be possible to dis-aggregate the model, however, and solve components in sequence. For instance, one model might be used to examine which economic activities were most important and/or to select those sub-sectors for import substitution or export expansion, etc. Once this information was available, detailed sectoral models, e.g., manufacturing subsectors at a two or three digit level, might be constructed to assess technological alternatives. Then, even more detailed models of specific factor inputs could be built for the technological most feasible alternatives. Such dis-aggregation corresponds closely to Dantzig's decomposition principle for the solution of linear programming models. On all of this, see Thomas Vietorisz, "Sector Studies in Economic Development Planning by Means of Process Analysis Models," in Alan S. Manne and Harry M. Markowitz, (eds.) *Studies in Process Analysis* (New York: John Wiley & Sons, 1963), pp. 401-415.
determines the amount of each of the two commodities that should be produced. In so doing, the model also determines the appropriate production technology. Recall that the alternative production techniques were represented by separate activities. By determining the level of each activity, the most appropriate alternatives with respect to the criterion function are also determined. In the case of the commodity produced by activities 1 and 2, for example, the appropriate techniques are given by the determined values for $x_1$ and $x_2$. These values may indicate that only one technique, say, $x_1$ is appropriate, and thus the solution of the activity levels would be $x_1 > 0$, $x_2 = 0$, although some combination of the alternatives is also possible, i.e., $x_1 > 0$, $x_2 > 0$.

In the second place, because of the way in which activities are defined, the determination of activity levels simultaneously determines the level of resource utilization. In the illustration above, this means that the number of units of skilled labor, unskilled labor, and capital needed to maximize national income are determined. The model, however, allows the planners to determine the pattern of resource utilization that is most appropriate from the point of view of the objectives of the development program. If the full utilization of unskilled labor, for instance, is desired, the constraint relating to this particular factor may be written as an equality and the path of maximum income compatible with this constraint determined.
This is the way in which such techniques can help eliminate the possible conflicts between development goals, viz., to treat one goal in the criterion function and other objectives as constraints on that function.

More important is the fact that it is possible to trace the implications of policy changes affecting resource availabilities on economic objectives and the structure of the economy. The implications of increasing the amount of skilled labor available to the economy through expanded educational programs, for example, can be assessed with respect to its effect on income, product mix, and production techniques by parametric adjustments to the constraint on skilled labor in the model. The costs of providing the additional units of skilled labor can then be compared with the changes in income and factor utilization to see whether such changes seem worthwhile. Since, however, activities do not have to represent industries in the narrow sense of the term and may refer to any transformation of inputs, it is possible to handle the effects of increasing skilled labor through education directly in an activity model and solve for the level of educational activity simultaneously with the other variables relating to income, product mix, etc.  

20 Such a model has been formulated and tested with data for Argentina by Professor Irma Adelman. Using several variations of an objective function that maximizes gross output, a set of equations relating inputs and outputs of the formal educational system to labor force deliveries divided into three general skill classes, another set relating the labor force to
The addition of such activities obviously makes the model more complex, but conceptually there is no limit on the number of activities or elements included in each activity that can be included in the model. It provides, therefore, a framework in which a number of development planning problems can be assessed and even determined simultaneously.

The difficulty in using activity analysis and linear programming techniques in an operational context is that insufficient information is available to permit the planner to build or construct such models. Very little, of course, is known about alternative production technologies and it would be quite difficult to construct an activity matrix for even a limited number of sectors in most underdeveloped economies. More work in this field is called for, nevertheless, and assessments should be made of the value of activity analysis, even as an

sectoral values of production, investment, imports and exports, and a set of exogenous constraints on factor availability and boundary conditions on investment, exports, and production, Adelman is able to optimize educational investment simultaneously with the structure of the economy that maximized output. The model is divided into six educational processes, nine economic sectors, and four time periods within a planning horizon of twenty years. It can be specified in 274 linear equations and solved simultaneously by computing machine.

Adelman does not consider the model operational and the study is primarily methodological in scope. The fact that the time and cost involved in solving the model was prohibitive casts considerable doubt on the construction of models with even additional and more realistic elements. See Irma Adelman, A Linear Programming Model of Educational Planning--A Case Study of Argentina Preliminary Draft (Baltimore: The John Hopkins University, December 20, 1965, mimeo).
exploratory, partial tool in planning work. The purpose of this section has been, however, to simply point out the usefulness of these techniques from the point of view of their conceptual content rather than their practical application.

Successive Approximation Techniques

Given that simultaneous solutions are not yet possible in an operational context, it seems clear that somewhat less sophisticated and more round-about techniques must be used to assess human resource requirements. It is necessary, nevertheless, to use techniques that approximate the logic of simultaneous methods, especially in the sense of permitting the criteria upon which human resource policy is designed, i.e., the pattern of human resource use, to interact with or be reflected in the preparation of the targets or framework of the development plan. This can be accomplished by using iterative methods and establishing a systematic feedback mechanism in the formulation of development targets. Such techniques will not identify optimal combinations, but should be more satisfactory than sequential deductions from a given plan.

The use of iterative or successive approximation techniques requires a series of projections of sectoral output and corresponding inputs, and methods for evaluating which combinations of output and inputs are appropriate to the objectives of the development program. Productivity estimates of the type
described above can be used for this purpose if the results are re-worked and fed back into the plan. More particularly, tentative targets for output can be set and the implications for human resource inputs worked out in reference to productivity trends. Then, evaluations can be made of the extent to which these targets provide for the effective utilization of the human resource stock and the feasibility of adapting the stock to these needs within the stated time periods of the plan. Output targets can be adjusted in light of the results of these evaluations and the process repeated until a feasible balance is reached.

This method, however, does not take explicit account of production technologies and factor combinations. As a result, it would be more satisfactory from a conceptual point of view to use estimates of somewhat more complete sectoral production functions and project all input requirements at the same time. This might be possible for at least a limited number of sectors that are considered priorities at the outset of the planning exercise if both human resource and capital planners undertake joint research studies on the nature of the existing production functions in these sectors. Indeed, if these activities are to be integrated, such studies should be included in the technical work priorities of the central planning office.

The direction of such research should be to analyze the possibilities of substituting factors of production at relevant
ranges of output. The purpose would be to see the extent to which technology can be adapted to the existing pattern of resource availability in the nation as well as the degree to which technological change can be controlled or programmed over the course of the planning period. If such possibilities are found to exist, the problem becomes one of assessing the most appropriate path for technical change to take in light of the resource situation of the nation, and resource requirements will be fixed automatically at points along this path. If, however, these possibilities do not exist, the extent to which the resource situation has to be modified will come into clearer focus and analyses can be carried out to assess the costs and benefits accruing to the modification of the resource structure.

Conceptually, then, such research must be addressed to the problem of analyzing the elasticities of substitution of factor inputs at given levels of output in selected sectors or subsectors of the economy. From the perspective of human resource planning, the research must be directed, on the one hand, to the elasticity of substitution between capital and labor and, on the other, the substitutibility among various classes or types of human resource inputs. The results of such work should indicate the ease or difficulty with which the structure of productive activity might be adapted to the resource situation and vice versa.

The need for this sort of research in developing countries
is, of course, recognized in the literature on economic development, although little has been carried out. One notable exception has been the work done by Minhas, who actually has attempted to measure the coefficient of the elasticity of substitution for 24 manufacturing subsectors, viz., at the three digit level of the International Standard Classification of Economic Activities, using international, cross-sectional data for 19 countries.  

His results show coefficients ranging only between 0.72 and 1.01.

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21 B.S. Minhas, An International Comparison of Factor Costs and Factor Use (Amsterdam: North-Holland Publishing Company, 1963), Chapter 3. Minhas' method for estimating the elasticity of substitution is so ingenious that some skepticism may be expressed about the results of his study. Specifically, Minhas begins with an empirical observation that a log-linear function relating the labor coefficient to the real wage rate provided a good "fit" to data from 19 countries, i.e.,

\[ \log \left( \frac{L}{V} \right)_i = \log a_i + b_i \log w_i + e_i \]

where \( L \) is labor, \( V \) is value added, \( w \) is the wage rate, the subscript \( i \) refers to three-digit industry groups and \( e \) is a random disturbance term. He then demonstrates mathematically that the parameter \( b \) is in fact the elasticity of substitution, and uses the results of the regression analysis to estimate elasticities for each of the industry groups. The mathematical proof, however, requires that he assume perfectly competitive factor markets and constant returns to scale, (see, op. cit. pp. 10-12). These assumptions, of course, cast serious doubt on the results of his study. Furthermore, some recent empirical work on production functions in manufacturing in the United States cast doubt on the validity of Minhas' log-linear function as well as the assumptions that are implicit in his study. See, G. H. Hildebrand and Ta-Chung Liu, Manufacturing Production Functions in the United States, 1957 (New York: The New York State School of Industrial and Labor Relations, 1965), pp. 30-41.
for the entire number of industry groups.\textsuperscript{22} These findings tend to bear out the hypothesis of at least some specialists that the technical possibilities for substitution between labor and capital in less advanced nations are limited, if not altogether impossible at most relevant ranges of output.\textsuperscript{23}

But research of this variety does not show the composition or component parts of either factor of production, and is very likely a significant difference in the ease in which factors can be substituted if these broad categories are disaggregated, e.g., if manpower is differentiated with respect to skill or occupational category. Even in this particular case, however, it is likely that certain core skill groups will not be substitutable within wide limits, but there may be variations in the use of ancilliary personnel and unskilled occupational groups.\textsuperscript{24} Unfortunately, little work along these lines has been carried out, although its importance to human resource planners would make it a valuable area for an extended research effort.

The important point, however, is that planners must investigate the technical possibilities for factor substitution

\textsuperscript{22}Op. cit., Table I, p. 20. Recall that micro-theory tells us that the elasticity of substitution can range from zero, i.e., fixed coefficients and right-angle isoquants, to infinity, i.e., a linear isoquant.


\textsuperscript{24}See, R.G. Hollister, \textit{op. cit.} pp. 385-386.
in the developing country itself. This is possible, of course, if the general line of output of interest to the planners is already being produced domestically. Detailed studies at the enterprise level should be able to identify representative techniques and factor combinations at relevant ranges of output, which can then be used to project resource requirements over time. Regression analysis might be used to measure the relationship between the level of output and factor inputs, and the parameters obtained in the regression equation then might be used for assessing the implications of changes in output levels on representative techniques and resource use over the planning period.

Some prototype analyses along these lines have been carried out and can be used as a guide for the sort of research that is needed in development planning operations. Boon, for instance, has undertaken several case studies at a micro-economic level in an attempt to construct isoproduct curves in physical terms for differentiated labor and capital inputs. He also shows how these micro-studies can be blown-up and incorporated into the framework of an input-output model to compute resource requirements. Hildebrand and Liu's use of a modified Cobb-Douglas function which takes into account differences in the quality of both labor and capital inputs in an

econometric investigation of production functions in United States' manufacturing also provides some insights into the type of research that could be undertaken. Unfortunately, these studies are partial and fragmentary, and do not solve all of the problems inherent in attempting to analyze technological relationships between classes of inputs and output. They do, however, provide a focal point for needed development planning research.

While studies of existing production technologies will offer assistance to the planner in making projections of future patterns of resource use, the results may show that the techniques of production do not use resources in the proportions in which they are available. While this helps the planner identify the extent to which the resource base must be modified over the course of the planning period if certain targets are to be met, some assessment should also be made to see whether or not technological processes in at least some sectors of the economy can themselves be modified or designed to make more effective use of existing resources.

The problem is that a large part of the production technology used in less-advanced areas has been imported from more advanced areas.\(^{26}\)

\(^{26}\)Loc. cit., pp. 49-52.

developed nations. These technological structures, however, have been designed in terms of the conditions of the advanced nations and may be ill-suited to the needs of the poor economies. The use of capital intensive industrial processes and high-level manpower in the United States makes sense in light of the historical scarcity of labor and the high level of educational attainment of the population of this nation. For the very same reason, it may make little sense to use the same techniques in Asia, Africa, and Latin America. What this implies is that work should be carried out to design production technologies that fit the needs of the less developed nations. Such work must necessarily be carried out by economists and engineers, and should be included in the technical work calendar of the development planning operation.

Methods of Evaluation and Choice

Studies of the technological structure of the economy and an iterative approach to output and hence input targets will provide a series of alternatives to the planner, from which he must choose for the purpose of designing the development strategy. While the actual exercise of postulating alternatives will likely be sufficient to identify or spot-light a specific set of targets that seem optimal from the perspective of the objectives of the development program, it is necessary from a conceptual point of view to have guidelines to which the planner
can refer in evaluating and choosing alternatives. In particular, there is a need for criteria that can be used to assess the appropriate composition of output and the techniques for producing that output during differing time periods within the planning horizon.

In a theoretical sense, these choices should be made in reference to the relative prices of factor inputs as they are determined in the market place. In the context of development planning, the same logic is applicable, but it is not realistic to use prevailing factor prices in assessing alternative factor combinations and sectoral output levels. The reason is the well-known proposition in development economics that there is usually a systematic discrepancy between social and private costs in less advanced economies and that the market prices of factor inputs do not reflect their scarcity values.\textsuperscript{28} This being so, the use of market determined factor prices will result in the mis-allocation of resources. It is in light of this proposition, moreover, that the use of shadow or accounting prices as guides for evaluating sectoral priorities and production techniques has been promoted by some specialists in the development planning field.

Briefly put, shadow prices are market prices adjusted to reflect the real scarcity values of the factors of production, i.e., their marginal productivities. It is typically assumed that foreign exchange and the price of capital are undervalued in the market and must be adjusted upwards; the price of labor is assumed to be overvalued, however, and must be adjusted downwards in the calculations. Once such shadow prices have been calculated, they can be compared to the benefits accruing to the use of resources in a given manner. A balance between inputs and outputs is struck where these benefits and factor costs are equal. Benefits, in the present context, refer usually to the direct contributions to output, although it is possible to adjust these figures for their indirect effects on the supply of savings, consumption patterns, population pressures, etc.\(^{29}\) In either event, sectoral priorities and factor use can be identified in this sort of cost-benefit framework.

Although human resource planners have rarely, if ever, dealt with the question of factor costs and shadow pricing, the integration of human resource and development planning requires that they do so. The cost of human resource inputs, indeed, are critical to the optimum pattern of resource use and are one set of criteria for evaluating the composition of output and the

techniques of production that are appropriate to a given development program. This is also significant from the perspective of the development planner, since the existence of a policy function designed to modify and adapt the characteristics of human resource inputs has an obvious impact on the shadow prices and cost calculations that are used to assess development alternatives. The question, then, is how human resource inputs can be costed and accounted for in the formulation and selection of development targets.

We should like to argue that the most reasonable approach would be to use the costs of executing human resource policy as a shadow price for human resource inputs in the productive process, i.e., to use the costs of adapting the human resource stock to economic requirements through skill formation, maintenance, and utilization policies as a shadow price for calculating the returns accruing to a given pattern of resource use. Despite the operational problems that may be encountered in making such calculations, the logic of the approach seems straightforward, particularly in light of the goal of allowing development and human resource policy to interact. The objective would be to carry out policies to adapt the human resource stock as far as the benefits accruing to those policies were greater than or at least equal to their cost. Thus, labor training activities will be carried to the point that the benefits to the development program stemming from such training are reasonably close
to the costs of providing it. This assumes that the technology studies can identify the relationships between classes of inputs and output with enough certainty to enable the planner to measure the increments to the stream of output resulting from an extension of such training activities.

While such estimates may not be possible at very refined levels of disaggregation, the approach does nonetheless allow a point of balance to be reached that is consistent with costs and requirements. The approach, in other words, does not require that the human resource stock automatically must be modified in light of development targets set by capital planners or that the development program must be designed simply in terms of the prevailing resource situation, but rather that these variables are played-off, one against the other, until a satisfactory solution has been reached. Admittedly, there are a large number of areas in such a process that rely on the planner's ability to make sound judgements and not on solid, concrete information. The number would not, however, appear to be any greater than in other parts of the development planning activity, and the fact that these judgements must be made in the context of the total framework of the plan would appear to be more advantageous than making them in a vacuum.
Design of Policy and Selection of Projects

The framework and planning tasks discussed in the previous sections do not define human resource policy, but rather are oriented towards delineating targets and guidelines for designing such policy. The actual design and execution of policies for adapting the stock of human resources over time is, or should be, the responsibility of the relevant sectoral programming units. Operationally, the formulation of the human resource strategy is carried out at both levels, working from the top down and then up again until a feasible program has been designed. The primary job of the central planners is, as has been discussed in the present Chapter, the provision of criteria to the sectoral planners for the design of programs and projects. Initially, the guidelines formulated in the central planning office will be tentative and given to the sectoral groups for preliminary estimates of costs and feasibility. This information is then plugged back into the central level plan framework to be assessed with respect to targets for such variables as the product mix and techniques of production, revised accordingly, and sent back to the sectoral groups. This process is repeated until satisfactory solutions are reached. To understand more fully how this process operates, the next Chapter concentrates on the planning tasks and techniques at the sectoral level of the planning structure.
CHAPTER III

HUMAN RESOURCE PLANNING AT THE SECTORAL LEVEL

Introduction

While the quantity and quality of human resource inputs required to fulfill the objectives of the development program are determined at the central level of the planning structure, the actual design and execution of human resource policies will be carried out at the sectoral level.¹ One of the critical problems in the planning process is to link the design of sectoral policies to the requirements of the development plan; or, stated in somewhat different terms, to translate the objectives of the development program into meaningful and operational guidelines for the design of sectoral policy. In the field of human resource planning, such a link depends upon the use of the estimated structure or characteristics of the future human resource stock as a set of criteria for evaluating needed changes in policies effecting the formation, maintenance, and allocation of human agents of production.

Although the previous Chapter assumed that the use of human resource criteria in the formulation of sectoral policy

1It should be noted that project level planning is subsumed under the general heading of sectoral programs or policies.
is a simple, even mechanical procedure, it seems clear that this is not the case. The purpose of the present Chapter, therefore, is to explore in more specific terms how policies can be designed in reference to the human resource guidelines established at the central level. It does not, however, attempt to consider the design of policies in all relevant sectors or the complete range of individual agencies and institutions within each sector. An important omission, for example, is the design of a nation's fiscal policy, particularly that part dealing with enterprise taxes and subsidies.

Further, the sectors considered below are treated along functional lines rather than in terms of specific agencies and organizations. The need for such treatment results both from the fact that the responsibility for a given function is likely to lie with several institutional bodies and from the premise that the policy of individual agencies should be designed in relation to each other. In the case of education, for instance, not all programs will be the responsibility of the Ministry of Education, but will be dispersed throughout the government structure and community, e.g., the Ministry of Labor may control vocational training and retraining programs and, in many nations, a significant proportion of formal schooling may be operated by private, church-related institutions. The substitution possibilities and cost differentials among these programs, however, requires that education be viewed as a system with interdependent
elements, even though no one agency will have complete responsibility for the system. It is assumed in the following that sufficiently strong working relationships exist between the Ministry of Education (for example) and other organizations in this sector to permit positing system relationships involving all training and education programs and, hence, the design of consistent and comprehensive sectoral policy.

**Tasks of Sectoral Planning**

In general terms, the tasks of sectoral planning units are to help in the design, supervise the execution, and evaluate the progress of sectoral programs and projects. The technical work required at the point of designing policy is of greatest interest in the present context. It involves the determination of the activity levels of each component of the total sector program that are compatible in terms of the objectives of the development plan and resource availabilities. By activity levels is meant the over-all level at which a specific program is to be operated during a given period of time. Ultimately, these levels are measured in terms of the amount of financial resources needed to carry-out the project. In real or physical terms, however, the unit of measurement will depend upon the particular sector involved.

Human resource planners must be concerned with the process of translating targets from the terminology of the global plan to that of the operational sector. One difficulty in this
regard is that activity levels will reflect more than just human resource objectives. Indeed, in the particular case of education and health programs, they will be a product of several different sets of criteria and reflect the multi-dimensional nature of these programs. While it is tempting to assume that human resource planners need not be concerned with activity targets other than those affecting the human resource program, the fact that all demands on sector policy compete for scarce resources at the margin means that attention must be given to the inter-relatedness of the objectives of the entire program. The extent to which a sector program attempts to satisfy any given set of objectives, in other words, has implications for the human resource plan, and vice versa.

In addition to determining appropriate activity levels, the sectoral planners must also assess the combinations of inputs or technology required to support those levels and the costs associated with alternative technological structures. This step is especially important from the point of view of the human resource and development programs. The reason is that there may be a variety of means for reaching a given set of activity targets. Each of these means may have different implications for the number and type of inputs needed to support a specific level and, hence, will have different costs. The basic criterion, of course, should be to choose those combinations of inputs which satisfy activity targets at minimum cost in both
real and financial terms. The reason for a minimum cost criterion is conceptually straightforward, although difficulty may be encountered in using it in an operational context.

Once such cost estimates are available, nevertheless, they can be returned to the central planning office to be incorporated in the analysis of appropriate patterns of resource use over the course of the development program. This information can then be worked iteratively in the manner suggested in the previous Chapter until a set of final policy targets consistent with their costs and benefits have been established. The sectoral planning tasks, therefore, constitute the second of two fundamental stages of the over-all development planning operation. This second stage is now examined in somewhat greater detail for the three basic human resource sectors: education and training, public health, and labor allocation.

Planning in the Education and Training Sector

The primary link between the human resource program and the education sector is the impact of the education system broadly defined on the skill characteristics of the work force. Effective human resource policy requires, therefore, that educational programs be planned in relation to needed changes in the skill structure of the work force over time. Technically, this can be done by converting the occupational structure of the estimated future stock of human resources into target output figures for the education system. More specifically, occupational
requirements can be translated into educational equivalents. Then, figures on educational qualification can be adjusted for labor force participation and attrition to the current stock of educated persons to arrive at the net outputs or "graduations" from the education and training system needed to fulfill skill targets. These output figures constitute the activity levels of the system, and can be used to work through the inputs of educational resources needed to support those levels.

From the perspective of human resource planning, the most important (yet difficult) step in this process is the conversion of figures on the future occupational structure into the required net additions to the labor force classified by educational qualification. In the literature on human resource planning, educational qualifications have been taken to mean actual educational attainment measured in terms of the number of years of school completed. Data on educational qualification have been obtained through empirical investigations of the current stock of human resources and/or international comparisons. Efforts have been made in this framework to group

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3Parnes, loc. cit.
occupations according to given levels of educational attainment so as to provide an automatic device for translating occupational distributions into educational equivalents.\(^4\)

The conventional definitions and techniques for converting occupational targets into educational equivalents are not, however, completely adequate for human resource planning. One reason is that there are a variety of educational paths leading towards a given occupational assignment and a similar degree of flexibility in the educational requirements of any given job function. Even measured in terms of the number of years of formal education completed, for example, most occupations will show a wide range and perhaps highly skewed distribution of completed years of formal schooling.\(^5\) In the planning context, even this simple measure is difficult to handle. It requires decisions with respect to the proportions of the total number of persons performing a given occupational assignment in


\(^5\) This fact, of course, complicates the use of the occupational structure as a set of criteria for educational planning in several ways. The most important of these is that while the substitution of occupations is allowed for in the assessment of sectoral production function, no allowance is made for the substitutability of educational qualifications for any given occupational assignment. This problem is exacerbated by the fact that the standards for the amount and type of education needed to practice any given occupation tend to change over time.
the future that will or should complete a specific number of years of schooling. While base year percentage distributions can be applied to the data on the future occupational structure, this assumes that the proportions are optimal from the point of view of future skill requirements and that alternative educational or training paths do not exist for at least a certain number of occupational assignments. With respect to the optimality of the distributions, it is possible, of course, to make assessments of the extent to which the amount of education for a given skill level needs to be "up-graded," although data on the actual number of years of schooling completed provide few guidelines for making such assessments or adjustments.

More important, however, is that data on the number of years of schooling tells the planner little about the type of education received or the actual preparation for performing a given job function. Such information is needed in the planning process because it shows the alternative means of satisfying skill requirements and thereby the substitution possibilities within the structure of the education and training system (broadly defined) for meeting a set of human resource targets. Included here are not only the possibilities of substituting formal and non-formal education programs, but also for substituting any type of training experience and job experience. The distribution of the human resource stock by educational qualification, therefore, should show both the amount and type of
education and training for each occupational group as well as the range of job experience associated with the performance of each occupational assignment. Additional empirical investigations of the relationship between job functions and the educational and job experience of workers performing these functions is required for such analysis to provide some insights into the substitution possibilities associated with a given set of skill requirements.6

While such information would be a vast improvement over conventional measures of educational qualification, it must be noted that it would be preferable from a conceptual point of view to assess the educational requirements of a specific job function rather than the education attainment associated with workers actually performing the jobs. The distinction between the requirements of a job and the actual educational attainment of workers who perform the job has not been applied in educational planning work in the less-developed nations, although some research along these lines has been carried out in the United States.7 In general terms, this work has investigated the traits and characteristics needed to perform a given job

6Several studies of this type for high-level personnel are currently being carried out at the Center for Human Resource Research of The Ohio State University.

function and then attempted to translate such information into educational equivalents. Applications of such an approach are needed in the less-advanced regions to assess its relevance and usefulness for planning purposes.

Reconciliation of Criteria

If human resource criteria are the only criteria to be used as guidelines for assessing needed education and training programs, the conversion of occupational requirements into educational equivalents will easily lead to the determination of appropriate activity levels for the system, i.e., the level of operation of formal university, secondary, and primary programs as well as the informal divisions of the system. System relationships, inputs of educational resources, and costs can then be calculated from these figures. It is unlikely, however, that such a narrow range of options would be considered sufficient for programming in this sector, and the final set of activity targets would probably reflect a number of functional objectives other than economic development and human resource objectives. This implies that the activity levels must be adjusted to account for these other goals. The difficulty is

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8This depends, of course, on the level of development in the base year of the plan. It may be that the economy will have to achieve significantly higher rates of growth before sufficient resources will be available for the nation to pursue what might be considered predominantly social or "end-product" goals.
that many of the "non-human resource and/or non-economic development" objectives are not easily defined or quantifiable and adjustments, accordingly, are not made easily. In an operational context, however, some quantitative estimates of these objectives must be made if they are to be accounted for in the final program for educational and training activities, and if the implications of opting for a specific set of activity targets rather than all others are to be adequately assessed.

The nature of these objectives are likely to be social, political, or cultural and cannot be specified in the general case. Taking an easy example, however, it may be decided that for political and/or cultural reasons, the formal education system should pursue an objective of extending educational opportunities to a broader population base. Estimates of activity levels—in this instance assumed to be measured in terms of enrollments rather than graduates—can be made by reference to demographic trends and/or assessments of the effective demand for places in the various tracks or branches of the system. If, for instance, it is decided that all children 6-12 years of age are to have the legal right to be educated, demographic estimates of this cohort and the transitional probabilities of passing through the system can be used to estimate the level of operation and hence costs if this strategy were to be pursued. It may also be possible to set enrollment levels on the basis of equalizing the probabilities of attending school in various
regions of the country or matching the probabilities in a neighboring country. An assessment can then be made of the transitional probabilities of students successfully completing each level or track of the system.

If such alternative sets of targets produced with respect to cultural or political criteria result in a structure of the educational system significantly different than the set based on human resource guidelines, planners must assess the opportunity costs to the development program from opting for one particular set than any other. Given the present state of our knowledge about educational processes, however, such assessments are likely to be superficial and perhaps even misleading. Ultimately, the decision to opt for a given set of targets is a political one, but the planners can perform a useful function if the implications of each alternative are examined with as much care as is possible.

Human resource planners will be interested, of course, in the results of the alternative estimates of appropriate activity levels and the modifications made to the program by sectoral planners as a result of these calculations. It is especially important, therefore, to have a continuing dialogue between the central and sectoral planners to assure that the implications of different sets of activity targets are understood by each side. Particularly important in this regard is that the planners assess the possibilities of shifting components of the total
program if specific projects designed in reference to political or cultural criteria cannot be changed. For instance, it is possible that an initial plan of incorporating, say, vocational training into the secondary school program cannot be carried out because of a political commitment to expand primary education. In this situation, planners must explore the possibilities of shifting such training to private industry in the form of on-the-job courses and programs. Involved in such an analysis, of course, would be an assessment of the financial costs and institutional feasibility of inducing firms to institute such programs.

It must be noted, however, that not all of the alternative functional objectives of the educational system will necessarily be additive or require that activity levels set in reference to human resource guidelines be modified. It is possible, for instance, to set a target for a given number of engineers to be produced by the formal educational system at the university level without specifying the training these persons will receive. Strictly speaking, human resource planners would require only that such training be relevant to the performance of engineering tasks, e.g., applied mathematics, structural design, stress analysis, etc., although it is extremely doubtful that any planner would argue that university curricula be designed to satisfy only these needs. Rather, training in this area would be geared closely to the traditional format for engineering students,
including perhaps subject matter in literature, civic affairs, history, and economics. Such educational content does satisfy many of the less tangible objectives of education, such as the transmission of cultural values, providing means for individual self-fulfillment, helping to produce politically sensitive citizens, and so forth. These goals, however, have little impact on the quantitative dimensions of, and thereby little influence on the process of allocating resources to, the education sector. The manner in which such objectives can be pursued in the context of curriculum and educational content deserves additional study in the less-advanced nations, particularly by research groups working with the sectoral planning agencies.

Analysis of Costs

Once tentative targets for activity levels or "outputs" of the several levels, branches, and tracks of the education and training system have been set, estimates of required inputs and costs can be calculated. This task is primarily the responsibility of the sectoral planning office, although, as before, the results are of critical importance to the human resource planner because of the impact of costs on the feasibility of the human resource program. The problem involves assessing in rather detailed terms the efficiency of the education system, particularly in terms of the flows of students through the system and the cost implications of changing these flow patterns.
over time.\(^9\) Stated somewhat differently, the problem involves an assessment of the educational production function and the cost implications of alternative technological relationships between classes of educational inputs and outputs.

In this context, the important question becomes the technology to be employed to meet a given set of activity targets. The planning techniques to be used are, consequently, analogous to those used to answer questions of a similar nature elsewhere in the development program. The problem can be handled in the simplest way by assessing the student flow characteristics of the system over time, and then relating direct inputs of educational resources, i.e., teaching and non-teaching personnel, classrooms, laboratories, books, and other supplies, etc., to these flows during given periods of time. These input coefficients might also be adjusted by the sectoral planners to reflect qualitative improvements in the educational process, e.g., making a downward adjustment in the student/teacher ratio on the educational assumption that (within limits) lower ratios are qualitatively superior to higher ratios. The mean or modal cost per educational input can then be multiplied by the number of each resource to be used to calculate the financial costs of the program over the course of the planning period.

From a conceptual point of view, however, it would be preferable to attempt to optimize the use of educational resources with respect to the target levels of educational output. This involves primarily a question of the combinations of educational inputs that will be used to reach a given level of output, and the cost implications of any given combination of inputs. Given the criterion of minimizing costs, the problem may be stated as minimizing the educational budget subject to the predetermined set of activity targets or educational outputs. Such a problem, of course, is amenable to linear programming techniques and, under ideal conditions, sectoral planners should make an attempt to use these tools in assessing needed inputs and resource utilization in the education sector.  

For example, it is conceptually possible to set-up and solve the following type of educational planning problem with activity analysis and linear programming techniques: Given a set of output targets for each level and branch of the educational system, a set of alternative educational activities in

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the sense of alternative input combinations to produce one educational output at each level and branch, and a set of prices for educational inputs, what set of specific educational activities will minimize the education budget? Letting A represent a \( (n \times m) \) activity matrix with elements \( a_{ij} \) as educational inputs required to operate each activity at unit level, D represent a column vector of educational deliveries or outputs, X represent a column vector of activity levels with elements \( x_{ij} \) denoting specific activities, and \( c \) be the costs of operating each activity at unit level, the problem may be formally stated as

\[
\text{Minimize } C = c_1x_1 + c_2x_2 + c_3x_3 + \ldots + c_nx_n
\]

Subject to \( AX = D \)

and \( X \geq 0 \)

Not unlike the activity model suggested in the previous Chapter, the model presented here is unlikely to be operational in most underdeveloped nations at the moment. The reason is that little is known about the technological possibilities of substituting inputs in the educational process. Moreover, the construction of an inter-temporal "technology" matrix for alternative educational processes is an enormously difficult task even if possible substitutions could be ascertained with some degree of confidence. Additional research on the structural relationships and technology of the educational system is needed before such models might be formulated and used in sectoral planning.
operations in the less-advanced economies. With the advent of such research, it might be possible to use iteration techniques in setting input requirements and flow relationships in the educational sector. Even if these procedures were crude, it might be possible to obtain some limited insights into the appropriate combinations of inputs to use and, hence, promote the most efficient utilization of scarce educational resources.

Planning in the Public Health Sector

As in other sectoral planning activities, the primary functions of health planning are to help determine the proportion of total sector resources to be allocated to alternative health programs and the technology to be employed in each of these programs. Typically, public health programs include a wide variety of policy targets and instruments, and the decision-maker has a number of options with respect to the importance he attaches to each one. Evaluations must be made, therefore, of the relative allocations to preventive health measures, curative and restorative services, environmental health programs, and health promotion activities. Evaluations must also be made with respect to the allocation of program resources among various regions of the country and perhaps among

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11 It is possible that in some countries population control programs may constitute a fifth major category or type of public health activity. Since the nature of these programs is considerably different than the kinds mentioned here, however, they are not considered in this study.
specific subgroups within the population, e.g., occupational health for industrial workers, maternal care, etc.

Equally important is that planners must help determine the types of inputs and medical technology that are to be used in each part of the program as well as the feasibility and cost of these utilization patterns. This step includes estimating the number of medical personnel and administrative workers required to carry out programs as well as the capital equipment, e.g., hospitals, mobile health centers, medical equipment, etc., and other resources that will be needed to effect program objectives. Also involved in this step is a determination of the combinations in which these inputs are to be employed and the cost implications of possible combinations, e.g., the cost implications of using qualified physicians in all projects versus the substitution of para-medical personnel for physicians where programs may technically permit such substitution.

Furthermore, the analysis requires an assessment of the time dimensions and sequences of the program. This is especially important in the health field since significant time/cost trade-offs exist. Certain disease categories, for instance, can be reduced to acceptable levels by massive campaigns carried out in a short period of time or by less intensive efforts over a longer period. Other health problems may be attacked with both preventive and curative measures in the current period or perhaps only curative services in the short-run and preventive
measures some years later. Since each of these alternatives is likely to have different cost implications, a major objective should be to decide the time periods in which different program objectives are to be reached and the sequence of activities within each of these periods.

As will be indicated later, one procedure that can be used in formulating a sectoral plan in public health is to take the preceding steps in inverse order and work up from individual health problems to the general program. That is, it is possible to specify the time periods in which different health problems are to be solved, postulate the techniques to be employed in each solution and the inputs needed to use these techniques, and sum the inputs to arrive at program content and thus the overall levels of activity. This procedure implies, however, that the health problems or disease categories to be attacked are known. It also implies that if resources are insufficient to program complete solutions from a medical point of view for every problem, the relative importance or priority of each problem is known.

It is possible, of course, that such a priority rating of previously identified health problems will be given to the planner by the political authorities, in which case the planning procedure can be carried out as envisaged above. It is unlikely, however, that the planners will know at the outset the problems to which the program is to be directed or the priority items
within the program. Much of the actual planning work, therefore, will be oriented towards an assessment of the health situation in the country and an identification of priority health problems.

It is primarily at this point that the link between human resource and health planning as well as the link between the health sector program and the central level development plan come into focus. Human resource planners, of course, are interested in health primarily because of its effect on the productivity or efficiency of the work force, and the effective implementation of their program requires that health projects and policies be designed in relation to human resource needs. Unlike the education sector, however, there are no handy or even plausible techniques for converting human resource input requirements into output requirements from the health sector and, as a result, the technical relationship between these planning activities is somewhat weaker or more tenuous than it is in the case of education and training. Nevertheless, it is both necessary and possible to relate the health program to the requirements of the human resource and development plans, even though the relationship is not particularly systematic. The manner in which this may be done is complicated and requires detailed comment. Since health planning in general and the use of human resource criteria in planning health in particular have not been given explicit treatment in the literature on human resource planning, the following sections consider this problem at some length.
Identifying Health Problems

A very difficult yet important first step in the process of health planning is the measurement or quantitative identification of the existing state of health of the population. This step is crucial because it provides the basis and raw data for assessing health needs and thus the level and composition of the health sector program. The problem is that there are few, if any, adequate measures of levels of health. Most of the traditional measures, e.g., death rates, population/physician ratios, etc., have been indirect in the sense that they identify either the absence of health or the absence of resources related to health rather than the health status of the population itself. While some attempts have been made to construct positive indicators of health levels, little progress has been made and they are nowhere available at the moment.\textsuperscript{12} The nature of these negative or indirect health indicators, however, has implications for the planning process, and their relative advantages and disadvantages are worth understanding.

The most common class of health measure, for instance, is the amount and type of health resources available to the community at a given point in time. Such information can be used to identify shortages and surpluses of health resources or

inappropriate balances among various types of resources. A classic example of this sort of measure is the physician/population ratio which frequently has been used on an international, cross-sectional basis to indicate the health situation of different countries during a given year. While such resource measures provide a reasonable first approximation to the health levels of a nation, they are limited to the extent that they imply the existence of some ideal or optimal set of coefficients for the inputs into health services, irrespective of the health situation at any given point in time. Such an approach may lead to inadequate policy solutions because it drops the step of ascertaining the specific needs that are to be served by the resources. Furthermore, it is possible that certain medical technologies may be more appropriate or efficient in some circumstances than in others. Thus, it would be preferable to analyze the health levels of the population directly, rather than relying on indirect assessments of these levels.

The most widely used indicator of the health status of the population per se is information on mortality or the number of deaths per thousand population during a specific period of time. And, indeed, cross classified by age group and cause

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13 For the variety of specific mortality indicators as well as a discussion of the International system used to classify the cause of death, see Satya Swaroop, *Introduction to Health Statistics* (Edinburgh: B. & S. Livingstone, 1960), Chapters XIII and XVI.
of death, such information can tell the planner a great deal about the levels of health in a country. Mortality data, however, have certain limitations for this purpose, for at least three reasons.

To begin with, reliable information on the cause of death is frequently difficult to obtain and interpret. Even when deaths are registered, there are often problems in interpreting the information either because of incomplete or inaccurate data in the registry or because of differences in medical opinion about the cause of death and/or the primary cause of death when multiple symptoms exist. More fundamental in the developing countries, however, is that deaths are many times not registered at all or are registered by unqualified persons.

Second, and conceptually more important, is the fact that mortality, by definition, does not tell the planner much about the health of the living, although from a development point of view, such information is important. Furthermore, death rates in the developing countries are typically U-shaped with respect to age, being much higher for the very young and the very old than for those in their middle years. This means that death rates and even marginal changes in those rates are not likely to tell the planner very much about the health of

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those persons in the productive age groups, although from a human resource planning perspective, it is just this information that is important.

Finally, there are preliminary indications, at least in the advanced nations, that mortality indexes can reach a point where their explanatory value with respect to the basic health conditions of the population is seriously reduced. A recent study in the United States, for example, shows both that mortality indexes have leveled off in the last decade and that chronic diseases and accidents will probably maintain the current death rate for some time to come, or at least until there is a major medical breakthrough. Such a finding suggests that at least in the United States little can be discerned about recent or especially future changes in the general level of health with the use of mortality figures. While this point is clearly less relevant in the developing nations at the moment, it should be noted that attempts to plan health in these areas will very likely necessitate generating a good bit of new information, and perhaps even institutionalizing the data collection process. Types of information that can serve long-run objectives should be chosen for this purpose, and it therefore does not seem premature to reflect on the future utility of mortality data in this context.

The preceding implies that an assessment of the health situation must be supplemented by other types of health status measures. One of the more important of these is that which attempts to quantify the extent of morbidity or disability of the population. In principle, this type of indicator measures the general rate of sickness or disease per unit of time, but there are a wide variety of specific morbidity measures and sources and each is only one small piece in a bigger picture. For instance, there are notifiable and registered disease data, hospital population statistics, health survey results, armed forces and insurance company records, and so forth. Even these fragmented pieces of data, however, often add up to a substantial body of very useful information to the health planner, and are basic to the calculation of the health needs of the nation.

One of the more promising sources of morbidity information is the health survey. Designed to obtain consistent data from a sample of households through interview and examination techniques, this approach represents one of the easiest alternatives for collecting this type of health information at the moment. Health surveys can measure health status in any or all of the following ways: a) through the collection of clinical


16 See, Swaroop, op. cit., Chapter VI.
evidence of the existence of disease or injury, b) from subjective evaluations by the respondent about the state of his health and physical well-being, and/or c) through the collection and analysis of information on the behavioral implications or impact of ill-health.\textsuperscript{17} The latter might be used to measure the functional or effective capacity of the population. Indicators such as the number of man-days lost from work, school absenteeism, and days of bed restriction as well as medical care expenditures and number of visits to a physician can be used for this purpose. Such data are of particular significance to planning health in the context of the human resource program, since they provide an easy method of estimating the effect of certain types of health problems on the labor force, e.g., man-days of work lost due to disability.\textsuperscript{18} While these techniques are essentially untested in underdeveloped countries, the experience of several of the advanced nations would appear to be both relevant and useful.\textsuperscript{19}


\textsuperscript{19}Among others, survey work of this sort has been or is being carried out in the United States, England, Sweden, and Canada. For a brief description of the program in the United States, see U.S. Department of Health, Education, and Welfare,
In any event, feasibility assessments of using such studies in these nations would be worthwhile.

Poor health takes its toll not only through untimely death or through loss of time from productive activity, but through debility as well. This refers essentially to the loss in efficiency or productivity due to illness and disease even though the worker may be on the job or the child in school. Parasitic disease and nutritional deficiencies, for instance, may permit a worker to continue in his job without absence, but will sap his mental or physical vigor to such an extent that productivity is greatly reduced. A priori, this would appear to be a problem of considerable magnitude in many of the developing nations, but it would often escape measurement or detection in the measures of health status discussed above.

The problem of identifying and quantifying debility, however, is a difficult one. Studies of nutrition and the magnitude of acknowledged debilitating disease will help, but cannot indicate the extent to which this health problem affects the development effort. While several guidelines for an investigation of this problem have been given elsewhere, this represents a fruitful area for research and more should be done to


see what impact such problems have on the productivity of certain groups in the population, as well as what procedures may be useful for measuring and identifying the health problems involved.

Planning Health Over Time

The health status of a nation must be considered to be in a constant state of change, a result primarily of the interaction among improved economic and social conditions, demographic changes, and levels of health. Certain health problems, therefore, may diminish over time and others may grow in importance, even in the absence of programs and policies to deal with them. Since current priorities among health problems may not remain constant over time, the health planners should make some attempt to make projections of health status into the future.

The procedures for projecting future health conditions are complicated, and there is little experience in this field from which to draw insights or technical guidelines. One method, of course, would be simply to extrapolate past trends in major health indicators, e.g., mortality rates, disability rates, etc., into the future. Since structural changes in the economic and demographic situation should be expected to take place in the developing nation, however, a more satisfactory approach would be to relate the prevalence of various classes of health problems to major economic and demographic variables in the
current period, project these variables over time, and then apply the health coefficients to the results of the projections. Examples of relevant economic and demographic variables are the age and sex composition and the geographical distribution of the population, the level of educational attainment, occupational structure, and levels of personal income.21

Essentially what the foregoing suggests is the assignment of different probabilities of "risk" to various health problems over time for different groups and sub-groups in the population. The number of deaths and the rate of disability of age-sex specific cohorts with given educational and occupational characteristics in a particular location, for example, divided through by the total number of persons in that cohort is, in fact, the effective probability of death or disease for that group. Assigning this probability to the estimated future size of this particular group and summing for all groups will yield an indication of likely changes in the aggregate health situation over time.

Establishing Health Priorities

While the foregoing type of analysis of the current and future health situations will yield a picture of the kinds and even the absolute magnitude of the problems to which the public

health program must be directed, it will not necessarily indicate the priorities for program content and hence the appropriate activity levels for components of the program. Since resources are likely to be insufficient to program complete medical and public health solutions for all health problems, choices will have to be made with respect to which problems will receive what proportions of the available resources.

As indicated previously, the human resource and development planners have a vital interest in the selection and weights attached to health priorities and should, as a result, participate in this stage of the sectoral planning activity in health. The purpose should be to relate the selection of health priorities to the needs of the human resource and development programs. From a conceptual point of view, priorities can be evaluated in terms of the economic benefits—measured by the increased output or productive capacity of the economy—stemming from improvements in health levels through the provision of specific combinations of alternative health services, relative to the costs of providing those services. Health improvements will tend to increase a nation's productive capacity in the following ways:

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a) by improving the efficiency and productivity of the current and future labor force through reductions in skill loss due to premature death and in lost working time and productivity due

to disability injury, and debilitating disease, b) by increasing the capital resources available to the economy, e.g., through the opening of new land areas once too dangerous to work and improvements in livestock, c) by increasing the consumption and saving potentials of the nation through quantitative changes in the size and structure of the population, and d) by releasing existing resources for new uses through the reduction in the need for medical care and restorative services.

Since the present study is primarily interested in human resource planning, it is the effect of health improvements on the efficiency of the stock of human resources that is of immediate importance, and it is this factor upon which the remainder of this section will focus. The planning task, in this context, is to assess to what extent various types of health problems detract from the effective utilization of the human resource stock. Such an assessment can suggest priority health problems and thus requirements for specific health measures or activities. It is in this sense, of course, that health needs can be said to be planned as a component part of the human resource plan, and that human resource criteria can be used in the formulation of the sectoral program in the public health field.

Conceptually, there are at least two methods by which human resource criteria can be used to assess health priorities, assuming that the prevalence or incidence of major disease categories is already known. First, it is possible to weight health
problems by their impact upon persons in the productive age groups, e.g., placing more weight on the disease categories affecting males between the ages 15-65 than other age groups. Similar weights might be formulated for specific sectors or regions of the country on the basis of initial priority items of the development plan. In either case, the purpose would be to reflect the greater impact that certain health problems have on development efforts, and to indicate and rank these problems by priority through weights applied to the data on prevalence of disease categories.

Since systems of weights are by nature arbitrary and difficult to formulate, a more satisfactory approach would be to carry out detailed case studies of the direct effects of major health problems on the human resource stock. The specific nature and scope of such studies would probably differ among diseases and countries, but essentially would be designed to assess how health may place constraints on the development of the human resource stock and the modifications and costs required to eliminate or reduce these restrictions. Guidelines and targets for the human resource program established at the central planning level can be very helpful in making and evaluating such studies. An important question if this approach were used, for example would be the specific diseases and health problems to be investigated in any given planning period. The absolute magnitude of certain health problems could be used as
criteria for evaluating priority areas for study as could targets and priorities derived from initial drafts of the human resource plan itself. For instance, areas that are likely to have high concentrations of the national work force or the health problems of certain strategic occupational groups might be singled out for concentrated study at the outset, and followed by other analyses of lesser priority.

More important, however, is that the results of such micro-investigations of the health situation must be couched in similar terms if planners are to be able to compare them and draw priorities from such comparisons. Stated in slightly different terms, it is necessary to couch the results of these studies in such a way as to show the relative effects of a given health problem on the human resource stock at a given point in time. This may be accomplished by estimating the effective number of man-years lost from the labor force in major sectors and regions of the country due to premature death, disability, and debility, and then rank priorities on the basis of these findings. Technically, this would involve estimates of the number of deaths of persons of labor force age (adjusted for labor force participation and classified perhaps by major skill levels) during a given period of time, the actual number of man-years lost due to disability and injury, and the reduction in effective working time due to debility. These results might then be compared to the initial set of human resource targets
to assess the relative impact of health problems on the development and utilization of the stock of human resources. While admittedly crude, this procedure might nevertheless help the planner delineate a set of priority health problems to be attacked by health policy that are related to the needs of the human resource and development programs.

**Activity Targets**

The priorities for health policy established in reference to human resource criteria will have to be adjusted in light of various social and political criteria. Such adjustments may be made to the list of relative priorities and/or the amount of resources and time needed to effect complete medical solutions even if the priorities remain the same. Assuming that modifications must be made to the priority list itself, and that they have been made, the remainder of the steps in the planning process may be carried out.

Many of the methods or procedures to be used in completing these steps must rest upon technical advice solicited from public health workers and the medical profession, especially at the point of converting priorities classified by disease category into program format and design, i.e., the specific means that might be used to combat these problems. This is a critical step, of course, but it must be assumed that the nature of the problem is beyond the technical competence of planning personnel.
Planners, however, must insist that a range of possible or alternative solutions be specified, and then direct their work towards an assessment of which alternatives are optimal in light of their costs and resource availabilities. It can be granted that optimality may be particularly elusive in this context, but even rough assessments of the cost implications of different solutions may be valuable in an attempt to design efficient policy.23

Thus, the following general planning tasks must be carried out in the design of the sectoral health plan:

First, tentative targets must be established for the reduction or elimination of priority problems to some specified level during a given period of time, e.g., that the national incidence of gastroenteritis will be reduced by 40 per cent of the current level over a period of five years; the industrial accident rate will be reduced by 60 per cent in 1967, etc. It should be noted that not all disease categories can be improved short of a major medical breakthrough, e.g., cardiovascular problems and cancer, and that target dates with respect to the number of cases to be treated and cared for will have to be established.

23 For an approach to health planning that is almost exclusively oriented toward the question of costs and resource availability, see CENDES, Programacion de la Salud (Washington: Organizacion Panamericana de la Salud, 1965).
Second, the techniques to be used in meeting improvements must be ascertained. For at least those disease categories in which improvements and reductions are possible, this involves assessing the extent to which preventive measures will be employed versus curative services or the extent to which environmental factors will be used rather than medical technology per se. Again, gastro-intestinal problems may be approached by using preventive measures or curative programs. Potable water supplies, for instance, may be needed to effect changes, or perhaps innoculation campaigns may be better suited to the program, or perhaps both are required. Based upon the technical advice of physicians and public health personnel, this step should determine a tentative policy mix or program content that is best suited to effect the targets postulated in the previous step.

Third, the health inputs in the sense of personnel and capital equipment needed to reach the targets for each part of the program must be estimated. As in other sectoral programs, the range of technical substitution among classes of inputs may be wide, and efforts to assess these possibilities are needed. If a set of deliveries in the sense of the number of persons to be innoculated, hospital beds to be provided, etc., can be quantified with some degree of confidence, and if the technological possibilities of meeting these demands can be specified, it is conceptually possible to use linear programming techniques in
the manner suggested for the education sector, i.e., to set up a model that minimizes health expenditures with respect to a set of final deliveries of health services. Too little is presently known to permit such a model to be formulated, however, and iteration techniques will likely have to be used. Planners will have to modify targets, time sequences, and/or technology until a feasible program has been prepared.

Planning in the Labor Allocation Sector

As was indicated previously, an effective human resource program requires a set of policies dealing with the allocation and utilization of the human resource stock. Most of these policies will deal both with the operation of the labor market, i.e., the mechanism for allocating human resources to those areas, occupations, and sectors where the need for them is greatest and with utilization practices on the job. They include instrument variables such as the employment service and the provision of labor market information, wage incentive systems, relocation grants, productivity centers, etc. Such a set of policies will correspond roughly to the scope of operations of the Ministry of Labor, although it is not restricted to this specific agency.

The use of human resource guidelines in designing and evaluating policy in this sector is reasonably straightforward and requires little comment. The technical planning process, however, is complicated by the fact that there are few easy or
mechanical methods for converting the requirements of the human resource plan into precise program content at the sectoral level and that the policies themselves are residual in nature and scope. This is because a certain number of programs may be needed only to the extent that the market mechanism fails to produce satisfactory results and/or other sectoral policies need to be supplemented, e.g., attempting to stem the out-migration of highly skilled persons so that the domestic economy can utilize skills produced in local schools. The steps taken in the design of policy depend, in other words, on the extent to which the labor market is considered effective in allocating manpower and on the kinds of problems existing in the base year of the plan.

The tasks of the sectoral planners, therefore, will be oriented primarily to identifying a policy "gap" and assessing alternative programs that seem appropriate to fill that gap. In the main, this may be accomplished through assessments of the operation and efficiency of the labor market mechanism and comparing the results of this work with projected human resource requirements. Such analyses and comparisons should bring a number of problems into clearer focus and should permit planners to identify and rank major policy needs. The difficulty is that such a procedure requires that a considerable amount of detailed research work be carried out before sectoral policies are designed. This is obviously true in all sectors, but it seems particularly significant in the present context. The
reason is the large and varied number of such studies that might be carried out. While not an exhaustive list, the following paragraphs consider the nature and scope of several studies or types of analysis that are needed in the planning program.

First, it is both important and necessary to assess the flexibility of the supply of human resources and the major factors which either impede or promote this flexibility. In general terms, such research should be directed towards the question of labor market behavior and the mobility of labor in the sense of movements of workers among employers, industries, occupations, geographical areas and into and out of the labor force over given periods of time. While information on labor mobility can be useful in a number of different ways, its chief value in the planning context lies in being an indicator of the operation of the labor market and, thereby, the extent to which the supply of labor may be expected to adjust itself to structural changes in the economy. Comparisons between this information and the set of human resource requirements determined at the central level may indicate to the planners the extent to which supply adjustments may be too great or too little and,

thus, the areas that may need policy or programs either to reduce movement or eliminate barriers to movement.

In the developing economies, for instance, there is likely to be significant over-adjustments in the supply of labor, particularly in the case of the complex shifts associated with migration from rural to urban areas. Indeed, one of the significant problems that almost all development programs have had to deal with is the absorption of rural workers into urban associated economic activity after the process of industrialization has started and wage rates have risen. At the same time, there may be too little mobility of certain kinds of labor resources and, as a result, too much rigidity in the market to permit the targets of the development program to be met. An example is the inability of the market in most underdeveloped economies to induce high-level personnel such as physicians to move to rural areas and small towns. In both cases, comparisons between the actual volume and direction of mobility and the amount and type of mobility patterns implicit in the requirements of the human resource plan can help bring policy needs in this sector into clearer focus.

Inextricably bound-up in such an analysis is the question of the system of incentives in the market place and the factors or instruments that may be used to eliminate constraints on the effective operation of the labor market. An important component of research designed to assess the efficiency of the
market mechanism, therefore, is an analysis of the structure of wages and the extent to which wage differentials can produce the desired allocation of labor resources. Analyses of the incentive system are useful not only for their value in explaining current patterns of mobility but also in appraising the most effective instruments for policies designed to improve the operation of the market.

It may be that the current pattern of wage differentials is not sufficient to produce the desired allocation of human resources and that a systematic wage and salary policy is needed to effect the objectives of the development program. It may also be, however, that workers do not respond to the wage structure to the extent that the traditional model of the market assumes, either because there is an absence of knowledge or information about conditions in the market or because labor market behavior is not affected by economic or wage considerations to any great degree. There is, in fact, sufficient reason to believe that labor market behavior in low income countries may not be significantly influenced by wage differentials but rather by traditional norms and value structures. Since development requires new motivations and different perceptions of status and opportunity by members of the labor force, research of the type described here should be designed to assess the ways in which workers might be induced to respond to market signals and to commit themselves to more modern forms of labor market
behavior. The findings from such studies should then suggest the types of policies that are needed to allocate the work force in the manner envisaged in the human resource plan.

Another type of study that is required for purposes of designing appropriate policy in this sector deals with the actual utilization of the human resource stock on the job. Even if the market should distribute manpower in an appropriate pattern, there is no reason to assume that these resources will be effectively utilized in the firm. In particular, there is little reason to assume that firms make the most efficient use of the scarce resources available to them. If this assumption is correct, the implication is that the effective supply of skilled manpower can be increased over short-run periods by designing policies to assure more adequate utilization of these skills, e.g., through technical assistance projects in the areas of managerial science and personnel practices to individual firms or industries. Information on the deployment of the work force gathered from a national census or periodic manpower surveys is not likely to be sufficiently detailed, however, and micro studies at the enterprise level are required. The objectives of such studies should be to test the correlation between job function and the level and type of skills possessed by the individual worker. Such studies could aid long-run policies fit skills and training to job requirements, and vice versa. In shorter-run periods, inefficient deployment could be identified
on the basis of the criterion that the highest level of skills possessed are those required by the job function, and measures designed to increase the supply of human resources by moving personnel in the direction of more suitable job functions.

Once studies of the type described in the foregoing have been carried out and the range of constraints on the human resource program stemming from inefficiencies in the labor market, patterns of labor market behavior, and utilization practices have been identified, measures can be designed to reduce or eliminate these constraints and these measures costed. Since the number of such measures will probably be greater than the resources available for the program, priorities will have to be assessed and chosen. The criteria for making an evaluation of priorities, of course, will be the set of targets prescribed initially in the human resource plan. Unfortunately, there are few hard and fast rules for the use of these criteria in choosing needed programs, and the step will depend, in large degree, upon the sophistication of the sectoral planners.

The same is true with respect to estimates of needed inputs and hence costs of the priority programs and projects. The reason is that there are few "system" relationships in this sector and, as a result, few areas in which planners can work through input requirements and their costs in a systematic manner. Such systematic treatment may be possible, however, with respect to programs such as the employment service, where
estimates of "client" loads and thus costs may be made. In general terms, nevertheless, these areas will be limited and much will depend upon the judgements of the planner and the data he brings to bear on the decision. As in other sector programs, this process will be more fruitful if alternative solutions can be proposed for a given problem and appraisals made of the optimal solution in light of the targets and costs of the program.

CHAPTER IV

THE RELEVANCE OF HUMAN RESOURCE PLANNING IN BOLIVIA

Introduction

The analysis in the preceding Chapters constitutes, in many respects, a human resource planning model in conceptual terms. The purpose of the present Chapter is to appraise the relevance of this model or conceptual framework in Bolivia by examining the nature of the human resource and general development problems facing this nation at the present time. The need for such an assessment is predicated on the assumption that planning concepts and techniques may not be invariant with respect to the level of development, the initial human resource situation, and the specific dimensions of the development problems and policy options facing a less developed nation at a particular moment in its history.

The preceding Chapters, however, have implicitly assumed the type and dimensions of the problems to which the planning effort is to be directed. Since the nature of the planning operation must be related to problem areas and policy issues, an assessment of the human resource constraints on the development
process should shed some light on the relevance of the model for planning in Bolivia. Assuming for the moment the model is relevant in the Bolivian case, the implication is that the conceptual framework presented above can be used in designing a planning program for this country.

Bolivia: A Case Study

The reasons for using Bolivia as a case study for exploring the manner in which comprehensive human resource plans may be prepared are primarily twofold:

First, Bolivia is almost a textbook case of what is meant by an underdeveloped country.1 A landlocked nation of roughly one and a half times the size of the state of Texas, Bolivia had an estimated population of 4.2 million persons in 1966.2 Although it has a superb natural resource base and a

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1 Needless to say, a general description of the social, institutional, and political characteristics of Bolivia is beyond the scope of the present study; indeed, only highlights of the economic and demographic characteristics of the nation are given. Two books have recently been completed which give a description of the society and economy. These are, U.S. Army, Area Handbook for Bolivia (Washington: The American University, Special Operations Research Office, Foreign Areas Studies Division, 1963); and Cornelius H. Zondag, The Bolivian Economy, 1952-1965 (New York: Frederick A. Praeger, 1966).

2 As will be described in the next Chapter, Bolivia has had only two general population censuses in the last 66 years, the first of which was in 1900 and the second in 1950. Population data for the current period, therefore, are estimates based upon the characteristics of the population found in the 1950 census and an annual population growth rate of roughly 2.1 per cent. The absence of such information has made the following assessment exceedingly difficult, although since it is just this
favorable land/population ratio, Bolivia is one of the poorest nations in the world. With the possible exception of Haiti, for instance, Bolivia has the lowest level of per capita income and the highest rates of illiteracy and infant mortality in the Western Hemisphere. Predominantly a rural, traditional society, its national economy still engages over two-thirds of the labor force in agricultural pursuits. But like the pattern evolved in other Spanish colonies, Bolivia was originally settled to exploit its mineral resources, and it continues to be primarily a mining economy heavily dependent upon the export of tin for earning foreign exchange.

Bolivia, however, has been one of only three nations in Latin America to have undergone a genuine social revolution in this century and, in so doing, to have distributed both political power and land to its predominant Indian population. Although troubled by political instability, the Bolivian government is nonetheless committed to the economic and social development of the nation as well as to the use of planning as an

type of situation that development and human resource planners must face in the less advanced regions, the Bolivian case study is probably more useful than if another country with a wealth of statistical resources had been used for this purpose. It should be noted that it is the lack of data which dictated the use of the year 1950 as the starting point for the assessment. Since information for the study was gathered in 1966 during the author's stay in Bolivia, no data past 1965 have been used. The use of the term "current period", in other words, refers to the situation at the beginning of 1966.
instrument for improving the performance of the national economy. Bolivia is, in other words, the type of country for which the planning model described above was designed. To assess whether or not these planning concepts and techniques may be used in such a situation seems, therefore, to be a particularly relevant exercise.

Second, Bolivia characterizes many of the kinds of development problems found throughout Latin America. This is important in two ways: (1) the development problems in Latin America are to some extent distinct from the problems facing developing nations in Africa and Asia, and (2) despite the specific nature of the development problems, there has been a great deal of interest generated in recent years in the need for human resource planning in this region. International organizations such as the Agency for International Development, the World Bank, and the Pan American Union are attempting to interest Latin American nations in undertaking human resource planning activities; in the case of the World Bank and A.I.D., by giving priority to grants and development loans to countries having or intending to establish such planning operations. A case study of a Latin American nation seems, therefore, both relevant and timely.

Dimensions of the Bolivian Development Problem

In macro-economic terms, the most striking feature of the current development situation in Bolivia is that economic
conditions and the performance of the economy have improved little, if not actually worsened, since 1950. Real per capita income, for instance, stood at roughly $118 in 1950, but was only $113 in 1965.\(^3\) The decline in per capita income was not the result of extraordinary increases in population (as has been the case in other Latin American countries), but rather a result of the 1952 Revolution and the slump in economic activity which followed. As Table 1 shows, Gross Domestic Product (GDP) and especially that portion of total product originating in the agricultural sector declined absolutely after 1952 and did not reach or return to pre-1952 levels until a decade later. While the population grew at an estimated rate of 2.1 per cent per annum between 1950-1965, output increased by only 1.9 per cent over the same period; consequently, per capita income declined.

In addition to an over-all slow rate of growth in national product, growth was quite uneven among the major sectors of economic activity, as Table 2 indicates. Particularly important were the unusually low growth rates achieved in the agricultural, mining, and manufacturing sectors. The fact that more than two-thirds of the labor force was employed in agriculture and almost 93 per cent of the nation's foreign exchange was earned in the mining sector indicates the extent to which the economy stagnated

\(^3\) Based upon a total population of 3,019,000 in 1950 and 4,148,000 in 1965. For the source of the data on Gross Domestic Product, see Table 1.
<table>
<thead>
<tr>
<th>Year</th>
<th>Gross Domestic Product</th>
<th>Year</th>
<th>Gross Domestic Product</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Agriculture</td>
<td>Industry</td>
</tr>
<tr>
<td>1950</td>
<td>355.9</td>
<td>118.1</td>
<td>104.4</td>
</tr>
<tr>
<td>1951</td>
<td>378.6</td>
<td>118.1</td>
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<td>113.1</td>
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<td>343.7</td>
<td>105.8</td>
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<td>346.2</td>
<td>101.7</td>
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</tr>
<tr>
<td>1957</td>
<td>342.9</td>
<td>110.7</td>
<td>101.2</td>
</tr>
</tbody>
</table>

Source: Data for 1950-1958 from Government of Bolivia, Junta Nacional de Planeamiento, Plan de Desarrollo Economico Y Social (La Paz, Editorial Don Bosco, 1961), Table 1, p. 40a; data for 1958-1965 computed from Government of Bolivia, Direcccion General de Estadistica Y Census, Boletin Estadistico (La Paz, 1965), Table I., p. 287.
in the last decade and a half. At the same time, nevertheless, there were significant increases in the construction and petroleum sectors. The petroleum industry, in particular, was a major factor in maintaining some momentum in the modern sector of the economy after 1952, although not enough to have kept the national product from stagnating during the decade following the Revolution.

**TABLE 2**

**AVERAGE ANNUAL GROWTH RATES OF REAL GROSS DOMESTIC PRODUCT, BY SECTOR OF ECONOMIC ACTIVITY, BOLIVIA, 1950-1965 AND 1960-1965**

(Percentage)

<table>
<thead>
<tr>
<th>Sector</th>
<th>1950-1965</th>
<th>1960-1965</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>0.7</td>
<td>2.9</td>
</tr>
<tr>
<td>Industry</td>
<td>1.9</td>
<td>5.9</td>
</tr>
<tr>
<td>Mining</td>
<td>-2.0</td>
<td>4.5</td>
</tr>
<tr>
<td>Petroleum</td>
<td>14.0</td>
<td>4.5</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>1.9</td>
<td>5.7</td>
</tr>
<tr>
<td>Construction</td>
<td>18.9</td>
<td>10.7</td>
</tr>
<tr>
<td>Services</td>
<td>2.6</td>
<td>5.5</td>
</tr>
<tr>
<td>Transport</td>
<td>4.8</td>
<td>4.7</td>
</tr>
<tr>
<td>Commerce</td>
<td>2.8</td>
<td>5.2</td>
</tr>
<tr>
<td>Government</td>
<td>0.2</td>
<td>8.4</td>
</tr>
<tr>
<td>Other Services</td>
<td>2.6</td>
<td>5.0</td>
</tr>
<tr>
<td><strong>Total GDP</strong></td>
<td><strong>1.9</strong></td>
<td><strong>5.0</strong></td>
</tr>
</tbody>
</table>

Source: See Table 1.
As Table 2 shows, however, since 1960 the economy has been growing at a rate of 5 per cent per year, and with less unevenness among the major sectors and branches of economic activity. Indeed, since the initial 1952 output levels were surpassed in the early 'sixties, the performance of the economy has expanded consistently and relatively smoothly, and some Bolivian officials now believe that the economy may finally have reached the threshold of a stage of reasonably high and sustained growth. This belief, however, may not be warranted.

Sustained development, for example, requires not only a rising volume of output but also concomitant changes in the structure of economic activity and in the overall productivity of the factors of production. Table 3 discloses that the record over the last fifteen years of structural change and productivity growth is far from encouraging. Measured in terms of both the proportion of GDP originating in each sector and the proportion of persons employed in each sector, Table 3 shows first that the economic structure has changed very little over the period 1950-1965. Most significant is the fact that the

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4 The statement with respect to the proportion of persons employed in each sector is true, however, only to the extent that our estimates of the size and distribution of the labor force are accurate. The labor force data used were estimated from computations of labor force participation rates, sectoral distributions, and occupational compositions of 1950 census materials and a household sample survey carried out in 1963 by the Direccion General de Estadistica Y Censos applied to estimated population figures. Free hand adjustments were made to these trend computations because the 1950 Census collected labor force data on the basis of the gainful worker
Bolivian economy has been and continues to be predominantly agricultural. This sector accounted for roughly two-thirds of total employment and 28 per cent of GDP in 1965, while it employed 72 per cent of the labor force and accounted for one-third of the GDP in 1950. The small structural shift away from agriculture was directed almost entirely towards the service sector, and the industrial sector was almost identical in terms of both employment and the relative share of GDP in 1950 and 1965. Although there were some relative shifts within branches of the industrial and service sectors, the aggregate structure of the national economy in 1965 was little different from what it was fifteen years earlier.

The record of factor productivity has been equally stagnant. Table 3 shows, for instance, calculations of real gross product per employed person in 1950 and 1965. It can be seen that productivity was absolutely low in both years and that there were few significant changes over the period. In the aggregate, labor productivity grew at somewhat less than 1.0 per cent per year, while product per worker increased hardly at all

concept, while information on the economically active population in the 1963 survey was obtained in terms of the current activity concept of employment and unemployment which is frequently used in the advanced nations. Adjustments were also made to allow for a 5 per cent rate of open unemployment outside of the agricultural sector, in 1966. Needless to say, much of the argument in the next few paragraphs depends almost entirely on the extent to which these estimates may or may not be accurate.
<table>
<thead>
<tr>
<th>Sector of Economic Activity</th>
<th>GDP 1950 (000,000)</th>
<th>Employment 1958 (Per 000)</th>
<th>GDP per Employment 1958 (Dollars Per Cent)</th>
<th>GDP 1965 (000,000)</th>
<th>Employment 1958 (Per 000)</th>
<th>GDP per Employment 1958 (Dollars Per Cent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>118.1</td>
<td>33.2</td>
<td>1,087.5</td>
<td>131.7</td>
<td>28.0</td>
<td>1,146.2</td>
</tr>
<tr>
<td>Industry</td>
<td>104.4</td>
<td>29.3</td>
<td>199.4</td>
<td>145.4</td>
<td>30.9</td>
<td>226.7</td>
</tr>
<tr>
<td>Mining</td>
<td>52.1</td>
<td>14.6</td>
<td>48.4</td>
<td>38.7</td>
<td>8.2</td>
<td>51.3</td>
</tr>
<tr>
<td>Petroleum</td>
<td>2.5</td>
<td>0.7</td>
<td>48.4</td>
<td>18.1</td>
<td>3.8</td>
<td>51.3</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>48.0</td>
<td>13.5</td>
<td>122.3</td>
<td>63.8</td>
<td>13.6</td>
<td>145.4</td>
</tr>
<tr>
<td>Construction</td>
<td>1.8</td>
<td>0.5</td>
<td>28.7</td>
<td>24.8</td>
<td>5.3</td>
<td>30.0</td>
</tr>
<tr>
<td>Services</td>
<td>133.4</td>
<td>37.5</td>
<td>221.2</td>
<td>192.7</td>
<td>41.0</td>
<td>337.8</td>
</tr>
<tr>
<td>Transport</td>
<td>19.7</td>
<td>5.5</td>
<td>23.8</td>
<td>40.1</td>
<td>8.5</td>
<td>35.9</td>
</tr>
<tr>
<td>Commerce</td>
<td>40.5</td>
<td>11.4</td>
<td>63.8</td>
<td>61.7</td>
<td>13.1</td>
<td>102.6</td>
</tr>
<tr>
<td>Government</td>
<td>41.0</td>
<td>11.5</td>
<td>133.6</td>
<td>43.5</td>
<td>9.3</td>
<td>199.3</td>
</tr>
<tr>
<td>Other Services</td>
<td>32.2</td>
<td>9.0</td>
<td>133.6</td>
<td>47.4</td>
<td>10.1</td>
<td>199.3</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>355.9</strong></td>
<td><strong>100.0</strong></td>
<td><strong>1,508.1</strong></td>
<td><strong>469.8</strong></td>
<td><strong>100.0</strong></td>
<td><strong>1,710.7</strong></td>
</tr>
</tbody>
</table>

in the agricultural sector and actually declined in the mining and service sectors. Similarly, it can be seen that productivity in manufacturing increased only marginally over the period. On the other hand, there were relatively substantial increases in product per worker in the construction and transport sectors.

Notwithstanding the absence of precise data, the estimates of product per worker imply widespread underemployment of labor throughout the national economy. Needless to say, the problem is a serious one, and will require careful consideration in the design of future development policies. The problems of low productivity and underemployment may be understated in the data presented in Table 3, moreover, to the extent that the estimated growth of the labor force over the period was some 0.9 percentage points lower than the estimated growth in total population—a situation that has not prevailed in most other Latin American countries in the Post-War period. There are, as a result, few reassuring signs from the recent historical performance of the Bolivian economy that a take-off stage has or will be reached in the near future.

Some Significant Barriers to Development

Agriculture

The absence of any significant prospects for a high and self-sustaining rate of growth in output per head can be
explained more precisely in terms of the kinds of barriers to change now prevailing in the economy. From the perspective of the historical experience of the advanced nations, the most important of these would appear to be the poor performance of the agricultural sector. As shown above, the growth of agricultural output has been extremely low, viz., on the order of 0.7 per cent per annum between 1950-1965 and only 2.9 per cent between 1960-1965. More significant is that output per worker in this sector has been and continues to be only slightly more than $100 per year. Underemployment of labor appears to be endemic, and some experts believe that a large proportion of the agricultural labor force could be removed from the sector without substantially affecting the volume of production.⁵

Paradoxically, Bolivia has a range of climatic conditions, natural resources, and a land/population ratio, that are conducive to high levels of agricultural production. It is estimated, for instance, that less than 0.5 per cent of the total land area of the nation is under cultivation, and these lands are not even the most fertile or productive of the total available for farming.⁶ The fact is, however, that the agricultural


sector does not produce enough food to satisfy domestic demand and, in recent years, almost 25 per cent of the nation's total imports were basic foodstuffs.\(^7\)

One reason for the poor performance of agriculture is that much farming continues to be on a subsistence basis outside of the monetized, market economy. Small farms of less than three acres, worked by an individual family with little capital equipment or modern farm technology are typical. Such farms probably account for more than 90 per cent of total agricultural activity. They flourish because of the low levels of personal income and the consequent lack of effective demand in most parts of the country as well as the lack of infrastructure in the form of roads and transport facilities which are needed to expand market activity.\(^8\)

Subsistence farming, however, has also been a product of governmental policies, particularly those stemming from the Agrarian Reform Bill of 1953. This bill was the primary thrust of the 1952 Revolution and was directed at the elimination of the great feudal estates (landifundia) and the ultimate transfer


\(^8\)Transport facilities, for example, are still inadequate from the perspective of economic development, despite the relatively rapid growth in this sector in recent years. In particular, the nation has less than 900 miles of existing highways, of which only 10 per cent are paved and only 30 per cent can be used year around.
of the land to the Bolivian peasant. The problem was that most of the plots distributed to the peasants were so small that nothing more than subsistence farming was possible. More important, however, is that the legal disposition or transfer of titles to the properties has been slow and cumbersome, and almost half of the legal processing of the titles has yet to be completed. As a result, many peasants are cautious about increasing production over and above their own needs, since the land that they are farming does not belong to them. Without legal title, moreover, agricultural credit is hard to obtain, which further reinforces a pattern of labor-intensive, subsistence farming.

While the Agrarian Reform changed land patterns, there have not been other needed changes in the agricultural sector. Production technology must be improved through the introduction of mechanization and the use of fertilizers and insecticides. Facilities for marketing farm products also must be improved. Similarly, the distribution and utilization of the agricultural labor force must be changed; the importance of such an improvement is discussed in greater detail within the context of human resource policy below.

Diversification and the Mining Sector

Another significant obstacle to the potential development of the Bolivian economy is that it is primarily undiversified
and heavily dependent upon mining and mineral exports. Although the mining sector accounted for only 8 per cent of Gross Domestic Product and less than 3 per cent of the total employed labor force, it earned more than 93 per cent of the nation's foreign exchange in 1965. This fact is of considerable importance—both historically and currently—since it helps to explain some of the other constraints on the development process as well as the focus of recent development policies. It was, for instance, the inefficiency in this sector after the large mines were nationalized in 1952 that led the government to undertake huge deficits to subsidize efforts to improve mining operations. These deficits, in turn were primarily responsible for the rampant inflation during the mid 'fifties, and the consequent preoccupation of the government with monetary control measures.

Perhaps more important is that much of the Bolivian economy was built around or shaped by the mining sector: transportation routes, for example, still reflect traditional mining needs rather than the current requirements for effective communication and mobility among diverse parts of the country. While Bolivian agriculture is currently unable to feed the nation, it was able to do so fifty years ago; but the influx of foreign exchange earnings from mining has always made it easier

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9 Boletin Estadistico, loc. cit., pp. 226-228.
10 On this problem, see Zondag, op. cit., pp. 55-67.
to import agricultural products than to tackle the job of improving the performance of the domestic agricultural sector.

It is also significant to point out that the mining sector itself is characterized by an undiversified mix of products, with almost three-quarters of exportable production accounted for by tin. In a very real sense, then, the Bolivian economy is dependent upon the world market conditions for tin—a market, of course, rarely noted for its long-term stability. The fact that the market has improved in the last several years accounts for some of the increase in national economic activity. Present levels of productivity and economic efficiency, nevertheless, are comparatively low, and the mining sector is not contributing as much to national development as might be expected. For instance, while the value of tin exports rose by 117 per cent between 1960-1965, physical production only increased by 23 per cent, and production costs (in the nationalized sector) increased by 35 per cent. The reliance on mining and the efficiency of the sector itself must be changed, in other words, if the development prospects of the Bolivian economy are to improve.

Technology and Scale

In addition to the problems in the agricultural and mining sectors, the development of the economy is impeded by

11Data provided by the National Mining Corporation, COMIBOL.
an industrial sector characterized by low productivity, small scale production units, and rudimentary and basically labor intensive techniques of production. Although precise data are lacking, an impression of the typical scale of operations in Bolivian industry, i.e., in manufacturing, mining, construction, and energy, can be obtained by looking at the percentage distribution of firms registered with the Social Security Fund by the number of persons employed in each firm. Table 4 shows that fewer than 3 per cent of the total number of firms registered with the Fund employed 100 persons or more, while 59.3 per cent employed fewer than five workers and almost 89 per cent employed fewer than 25 persons. Even in the manufacturing sector, two-thirds of the firms employed fewer than 5 workers as did almost half of the firms in the mining and petroleum sectors. Since there is significant under-registration in the social security system, it is likely that the proportion of firms employing fewer than 5 workers is substantially higher than the figures presented in Table 4 indicate. One and two-man "artisan" activities are widespread throughout the country and probably account for upwards of 90 per cent of the total number of enterprises in the industrial sector.

12The present author estimates that fewer than one-third of the total number of non-agricultural firms in the nation are registered in the Social Security Fund.
### TABLE 4

PERCENTAGE DISTRIBUTION OF REGISTERED INDUSTRIAL ESTABLISHMENTS IN BOLIVIA ACCORDING TO THE NUMBER OF EMPLOYEES, BY BRANCH OF ACTIVITY, 1965

<table>
<thead>
<tr>
<th>Branch of Activity</th>
<th>Total Number of Firms</th>
<th>Number of Employees</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>5-Less</td>
</tr>
<tr>
<td>Mining and Petroleum</td>
<td>769</td>
<td>47.6</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>2142</td>
<td>65.2</td>
</tr>
<tr>
<td>Food</td>
<td>856</td>
<td>75.5</td>
</tr>
<tr>
<td>Non-Food</td>
<td>1286</td>
<td>58.3</td>
</tr>
<tr>
<td>Construction</td>
<td>146</td>
<td>36.9</td>
</tr>
<tr>
<td>Energy</td>
<td>12</td>
<td>41.7</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>3069</strong></td>
<td><strong>59.3</strong></td>
</tr>
</tbody>
</table>

Source: Files of the Caja Nacional de Seguridad Social, La Paz.

One problem in the industry sector is that these small firms have been and continue to be static in their perception of new opportunities and the possibilities of expanded activity. In the main, they have shown little inclination towards increasing production or their share of the market. An impetus to higher rates of industrial growth in the form of entrepreneurial exploitation of new opportunities, in other words, seems to be missing at the present time in Bolivian industry.

Related to the problem of small scale operations is the widespread use of relatively crude and labor intensive production...
technologies. This problem, in part, stems from the general shortage of capital in the country and the extremely low levels of domestic savings. The capital situation has improved in recent years, since gross capital formation is estimated to have been running at roughly 15 per cent of Gross Domestic Product since 1958 and the rate of gross domestic savings is similarly estimated to have risen from 9 per cent to almost 14 per cent of GDP over the same period. Nevertheless, the national stock of fixed capital is estimated to have been only $960 million in 1965, or roughly about $560 per worker. While data needed to give an adequate description of the capital position of the national economy are unavailable, these figures imply that the amount of capital used in the production process is low and that the general technological level of the economy is rudimentary.

The problem of technology and factor proportions, however, also stems from governmental policies, particularly those

13 Computed from Boletin Estadistico, loc. cit., Tables I and IV, pp. 286 and 287.

14 Author's estimate based upon Ibid., and Government of Bolivia, Junta Nacional de Planeamiento, Plan De Desarrollo Economico Y Social 1962-1971 (La Paz: Editorial Don Bosco, 1962), Table 21, p. 98a. It should be noted, however, that there appears to be considerable inefficiency in the use of capital resources as well as a sizable amount of unutilized capacity, particularly in the manufacturing sector. There is, moreover, reason to believe that recent increases in production in this sector have resulted without any significant increases in productive capacity. See, Camara Nacional de Industrias, Industrias XXXIV Memoria de la Camara Nacional de Industrias, 1965.
relating to the employment of labor resources. Although the national government has not had a conscious and systematic employment policy, it has taken a number of steps which amount to a de facto policy of promoting labor-intensive techniques of production. In the early 'fifties, for instance, the government granted foreign exchange rate privileges on the basis of the number of workers employed in the firm. At the same time, trade unions pressured the government into writing provisions into the Labor Code which prevented firms from dismissing workers, even with cause. Although the Labor Code was later revised to permit dismissal with cause, a number of provisions requiring the payment of substantial severance allowances were maintained, and the actual dismissal of any worker continues to be extremely difficult to carry out. Many firms, as a result, have been forced to maintain a labor force many times the size that they might actually require and, thereby, to continue to use relatively labor-intensive techniques of production.

Limited Markets

Related to the problem of scale and technology is the inability of firms to sell increased output and thereby justify expansion and a change in production techniques. There is at least some evidence to suggest that one of the principal

15See, U.S. Army, op. cit., p. 510.
restrictions on the development of the country is the absence of any sizable markets and efficient market facilities. In the main, the present low levels of income and the high proportion of the population in subsistence farming, together with the lack of communication and transport facilities, make it especially difficult to expand domestic consumption and local markets. While the volume and structure of the nation's imports imply a sizable number of import substitution possibilities, many of these possibilities are contingent upon larger scales of production and more sophisticated technology. The situation, in other words, is almost a standard textbook case of certain types of vicious circles restricting the potential development of the nation.

The problem of markets, scale, and technology is to a considerable extent a function of the low degree of structural interdependence in the Bolivian economy, i.e., the absence of any strong intersectoral economic relationships. Table 5 shows a partial measure of the degree of interdependence in the Bolivian economy in 1958 by presenting calculations of backward and forward linkages.16 Backward linkages are defined as the ratio of purchases by a specific sector from all other sectors to

### TABLE 5

**DEGREE OF INTERDEPENDENCE IN BOLIVIAN ECONOMY: BACKWARD AND FORWARD LINKAGES, 1958**

(Percentage)

<table>
<thead>
<tr>
<th>Sector of Activity</th>
<th>Including Intrasectoral Transactions</th>
<th>Excluding Intrasectoral Transactions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Backward Linkages</td>
<td>Forward Linkages</td>
</tr>
<tr>
<td>Agriculture</td>
<td>14.06</td>
<td>17.42</td>
</tr>
<tr>
<td>Mining</td>
<td>22.97</td>
<td>5.44</td>
</tr>
<tr>
<td>Petroleum</td>
<td>40.48</td>
<td>64.67</td>
</tr>
<tr>
<td>Manufacturing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food</td>
<td>31.94</td>
<td>7.92</td>
</tr>
<tr>
<td>Non-Food</td>
<td>44.56</td>
<td>31.18</td>
</tr>
<tr>
<td>Energy</td>
<td>16.84</td>
<td>79.09</td>
</tr>
<tr>
<td>Transport</td>
<td>22.77</td>
<td>27.65</td>
</tr>
<tr>
<td>Commerce</td>
<td>15.99</td>
<td>23.60</td>
</tr>
<tr>
<td>Construction</td>
<td>28.26</td>
<td>0.00</td>
</tr>
<tr>
<td>Other Services</td>
<td>13.26</td>
<td>23.79</td>
</tr>
</tbody>
</table>


Total production, and forward linkages are defined as the ratio of interindustry sales to total sales of a specific sector. It can be seen that the linkage effects in 1958 were slight, particularly if intrasectoral transactions are deducted from the calculations. The agricultural sector, for instance, sold less than 4 per cent of its total output to other sectors of the national economy in 1958; non-food manufacturing firms sold only 7 per cent of their output to other sectors during the same year.
On the other side of the equation, non-food manufacturing purchased only a fifth of their inputs from other sectors if intra-sectoral transactions are deducted from the calculations and still less than 45 per cent if they are not deducted. Given the importance of and focus upon the mining sector in the Bolivian development effort, it is of some interest to point out that it sells less than 6 per cent of its output to the rest of the domestic economy and purchases only 23 per cent of its inputs from other sectors. The possibilities of improved operations in the mining sector having any substantial impact on the rest of the domestic economy may be less than is commonly believed.

While the data from which these linkage effects have been computed are somewhat suspect and now almost a decade out of date, there is reason nonetheless to believe that the relative absence of any strong degree of structural interdependence in the Bolivian economy is essentially correct. If this is true, a number of important and varied implications for the development program follow, many of which will be assessed in the analysis below. In the present context, however, the significance of this fact relates primarily to the obstacle that small-scale markets and the relative independence of economic sectors present to the development potential of the national economy. Demand as well as supply conditions, in other words, must be improved before high and sustained growth in output may be possible.
The Human Resource Position

The human resource situation in Bolivia must be assessed in the context of the historical trends and major obstacles to change discussed in the preceding section. Within this perspective, it will be seen that the current human resource stock both quantitatively and qualitatively constitutes not only a serious constraint on the potential growth of the national economy, but one that is an integral part of the total set of development problems currently facing the nation. Furthermore, it will be seen that the nature of Bolivia's human resource problems are as broad and complex as the characteristics of the problem implicitly assumed in the first part of the study. That is, the human resource problem is composed, in almost equal parts, of specific sub-sets of problems relating to the skills, health, and allocation of the work force. As will be seen below, these sub-problems must be dealt with in a comprehensive manner if the nation is to cope successfully with the larger problem of low and relatively stagnant levels of national productivity. Within this context, then, the following considers the human resource constraints on the Bolivian development effort.

Skill Formation and Education

One of the least surprising but nonetheless important features of Bolivia's current human resource stock is that its
general level of skills is very low. Furthermore, the skill structure has changed very little over the course of the last fifteen years. Viewed in terms of the occupational composition of employment, for example, Table 6 shows that the work force has been and continues to be composed primarily of unskilled personnel.

TABLE 6
PERCENTAGE DISTRIBUTION OF TOTAL EMPLOYMENT BY MAJOR OCCUPATIONAL GROUP, BOLIVIA, 1950 AND 1965

<table>
<thead>
<tr>
<th>Occupational Groups</th>
<th>1950</th>
<th>1965</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professional and Technical</td>
<td>1.7</td>
<td>2.7</td>
</tr>
<tr>
<td>Administrative and Managerial</td>
<td>0.4</td>
<td>0.4</td>
</tr>
<tr>
<td>Clerical</td>
<td>1.4</td>
<td>1.9</td>
</tr>
<tr>
<td>Sales (Including Proprietors)</td>
<td>4.6</td>
<td>5.9</td>
</tr>
<tr>
<td>Farmers, Fishermen, and Related</td>
<td>70.9</td>
<td>67.1</td>
</tr>
<tr>
<td>Miners, Quarrymen, and Related</td>
<td>2.4</td>
<td>2.4</td>
</tr>
<tr>
<td>Transport and Related</td>
<td>0.7</td>
<td>1.1</td>
</tr>
<tr>
<td>Craftsmen, Production Workers, and Related</td>
<td>9.8</td>
<td>11.3</td>
</tr>
<tr>
<td>Service</td>
<td>6.2</td>
<td>5.6</td>
</tr>
<tr>
<td>Occupation Not Reported</td>
<td>1.7</td>
<td>1.6</td>
</tr>
<tr>
<td></td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source: See Table 3.

Interestingly, the most significant changes over the period 1950-1965 have been within the higher level occupational categories. There was, for instance, a relatively substantial increase in the proportion of the work force in professional and
technical job functions. The problems, however, of enumeration as well as the small absolute numbers of professional workers (i.e., only about 46,200 in 1965) cast serious doubt on the significance of these changes. Thus, in general terms, the occupational composition of employment can be considered to be little different than it was a decade and a half ago.

The occupational structure, nevertheless, should be viewed in terms of the structural or technological requirements of the economy. Indeed, the occupational composition of employment is only a reflection of the fact that most production processes are rudimentary and labor-intensive. Furthermore, the fact that the occupational structure has not changed significantly over the last fifteen years reflects little more than the absence of any significant changes in the structure of economic activity. This statement is not a mere truism, and its importance lies in the implication that a relatively widespread shortage of specific skills cannot automatically be assumed to exist in the Bolivian economy. To be sure, there is sufficient evidence to suggest that considerable upgrading of existing skills is needed if productivity is to be improved. But there are also some indications that any sizable increase in the number of skilled workers, particularly within the higher-level occupational groups, probably would not be effectively absorbed into the economy or have any significant impact on productivity --unless, of course, such an increase were accompanied by a
corresponding shift in the level and structure of economic activity.

High-level personnel, for instance, appear to have difficulty finding suitable employment in Bolivia at the present time. A partial indicator of this problem is that many professionals leave the country each year to find jobs elsewhere. Indeed, it is likely that Bolivia is a net exporter of highly skilled workers, although sufficient data are not available to prove whether or not this is true. Another indicator of the inability of the economy to absorb skilled personnel is that a very large proportion of professional workers is employed by the national government, frequently in job functions that are unrelated to the training and skills of the individual. Few job opportunities exist in the industrial sector, e.g., it is estimated that only 12 per cent of the total number of professional and technical workers were employed in the industrial sector in 1965, and many accept employment in government ministries, if perhaps for no other reason than for the security such jobs afford.

Assuming, however, that an effort will be made to promote changes in the economic structure, the current level of skills must be considered a problem of serious magnitude. That is, while the current structure of economic activity is incapable of absorbing an upward shift in the composition of skills, it is equally unlikely that future changes in this structure can
be effected without a significant modification in the number and type of available skills. The future prospects for economic expansion, therefore, are more relevant to an assessment of the skill structure than is the current set of labor requirements. While the subject will be discussed in greater detail in the next chapter, the implication is that changes in the composition of skills must be planned in close relationship to the prospective changes in the structure of the economy.

The occupational and skill structure is also a product of the national system of education and training, and the structure, capacity, and efficiency of this system helps to explain the generally low levels of skills as well as the nature of the constraints on needed changes in the stock of human resources over time. Like other Latin American countries, Bolivia has had a long tradition of education for elite groups, and it is only since the 1952 Revolution that any real attempt has been made to expand educational opportunities to a broader population base. The long neglect of education in Bolivia has taken its toll on the quality of the human resource stock, however, and even though there has been an increasing concern by the national government for improving and expanding educational services in

17 It is important to note that there are few, if any, known informal training programs in Bolivia at the present time, other than the traditional father-to-son techniques common in agriculture and the artisan sector. The analysis in this section, therefore, is limited to the existing formal educational system.
recent years, progress has been slow and the current supply of educated persons to the economy is little different than it was prior to 1952.\textsuperscript{18}

Literacy rates, for instance, continue to be extremely low: it is estimated that only half of the population over ten years of age was able to read and write in 1965.\textsuperscript{19} In 1950, about 38 per cent of the population was literate.\textsuperscript{20} While a system of adult literacy training was established after the 1952 Revolution, the annual number of persons receiving such training has never exceeded 15,000 and, as a result, the situation has failed to improve substantially. The high rate of illiteracy affects not only the supply of skills to the economy, but also the pattern of consumption and thereby the size of the markets in the country. For both reasons, the literacy of the population must be improved if the effort to accelerate development is to succeed.

\textsuperscript{18}One indication of this change is that the proportion of the total governmental budget estimated to be spent for educational purposes has increased from 15 per cent in 1952 to 25 per cent in the current period. It must be noted, however, that data on governmental expenditures by function are almost non-existent, and it is difficult to assess whether or not this estimate is realistic. It is primarily for this reason that published budgetary data have not been considered in the present study.

\textsuperscript{19}Based on information collected in the 1963 Household Sample Survey by the Dirección General de Estadística Y Censos, Table 28.

\textsuperscript{20}Government of Bolivia, Dirección General de Estadístico Y Censos, \textit{Censo Demográfico, 1950} Table 52, p. 136.
Table 7 discloses, on the other hand, that the amount of formal education embodied in the population has increased over the period 1950-1963. Much of the increase, however, has occurred in terms of the proportion of the population completing the first several grades at the primary level of the formal education system, and the expansion of opportunities has not been sufficient to maintain the functional literacy of a significant proportion of these persons or to have effectively increased the stock of educated persons in the country. For instance, while 70.8 per cent of the total population 5 years and older in 1950 had never attended a formal school, this proportion dropped to about 47 per cent by 1963; but, while 91.2 per cent of the population in 1950 had never reached the sixth and final grade of primary school, the proportion in 1963 was still almost 84 per cent. At the other end of the system, only 1.0 per cent of the population in 1963 had reached the university, while 0.6 in 1950 had attained this educational level.

Furthermore, there are considerable variations by sex and between urban and rural population groups in the amount of formal education completed, and these variations have not changed significantly over the last fifteen years. In both 1950 and 1963, for example, the proportion of males having completed some primary schooling was more than one and one half times greater than the proportion of females. Table 7 shows that sex differentials were even greater at the secondary and university levels.
### TABLE 7

PERCENTAGE DISTRIBUTION OF TOTAL POPULATION 5 YEARS AND MORE CLASSIFIED BY HIGHEST GRADE OF FORMAL EDUCATION COMPLETED AND SEX, BOLIVIA, 1950 AND 1963

<table>
<thead>
<tr>
<th>Highest Grade</th>
<th>1950 Males</th>
<th>1950 Females</th>
<th>1950 Total</th>
<th>1963 Males</th>
<th>1963 Females</th>
<th>1963 Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>62.7</td>
<td>78.6</td>
<td>71.0</td>
<td>37.0</td>
<td>58.0</td>
<td>47.4</td>
</tr>
<tr>
<td>Primary</td>
<td>30.1</td>
<td>17.1</td>
<td>23.4</td>
<td>52.1</td>
<td>33.3</td>
<td>42.7</td>
</tr>
<tr>
<td>1-5 Years</td>
<td>26.5</td>
<td>14.2</td>
<td>20.2</td>
<td>44.6</td>
<td>27.9</td>
<td>36.3</td>
</tr>
<tr>
<td>6 Years</td>
<td>3.6</td>
<td>2.9</td>
<td>3.2</td>
<td>7.5</td>
<td>5.4</td>
<td>6.4</td>
</tr>
<tr>
<td>General Secondary</td>
<td>5.1</td>
<td>3.2</td>
<td>4.1</td>
<td>8.0</td>
<td>6.4</td>
<td>7.2</td>
</tr>
<tr>
<td>1-5 Years</td>
<td>4.4</td>
<td>2.7</td>
<td>3.5</td>
<td>6.6</td>
<td>5.4</td>
<td>5.0</td>
</tr>
<tr>
<td>6 Years</td>
<td>0.7</td>
<td>0.5</td>
<td>0.6</td>
<td>1.4</td>
<td>1.0</td>
<td>1.2</td>
</tr>
<tr>
<td>University</td>
<td>1.0</td>
<td>0.1</td>
<td>0.6</td>
<td>1.7</td>
<td>0.3</td>
<td>1.0</td>
</tr>
<tr>
<td>1-5 Years</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>1.4</td>
<td>0.3</td>
<td>0.9</td>
</tr>
<tr>
<td>6-More Years</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>0.3</td>
<td>0.0</td>
<td>0.1</td>
</tr>
<tr>
<td>Other, n.e.c.</td>
<td>1.1</td>
<td>0.9</td>
<td>1.0</td>
<td>1.1</td>
<td>1.9</td>
<td>1.7</td>
</tr>
<tr>
<td></td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>


Although data for 1950 are not available, estimates for 1963 disclose equally large differences between the educational attainment of the population residing in urban and rural areas. 21

Thus, while more than 80 per cent of the urban population 5 and over had been to school, less than one half of the rural population had even entered the first grade of the primary system. The differences were much greater at the higher levels of the

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211963 Household Sample Survey, Table 34.
educational structure, e.g., 7 per cent of urban males as opposed to 0.3 per cent of rural males had attended the university, and 21.3 per cent of urban females as against 2 per cent of rural females had received some secondary schooling.

Thus, even though the over-all proportion of the population having had the opportunity to enter the formal education system has increased, the relative flow of persons through the system—especially after the second or third grade at the primary level—has remained almost constant since the 1952 Revolution. One of the important implications in this regard is that the efficiency of the formal education system is as critical to the flow of educated persons into the work force over time as the absolute size of the system. The significance of the problem can be seen more clearly in the context of the current capacity and structure of the formal system in Bolivia.

**University level education**—Beginning at the peak of the educational pyramid, Bolivia has a university system comprised of seven institutions of higher learning, each of which is located in a major region (departamento) of the nation. It is estimated that the system had an enrollment of 9,500 students in 1965.\(^{22}\) While this was three times the enrollment level in 1950, enrollments amounted to only 2 per cent of the estimated

\(^{22}\)Information provided by the Social Programming Division, Secretaria Nacional de Planificacion y Coordinacion.
population of university age, i.e., 19-25, in 1965.\textsuperscript{23} There is evidence to suggest, moreover, that even this rate is overstated, since there tends to be a wide dispersion of ages of students attending the university, e.g., in the larger faculties such as law and economics, perhaps a fifth to a quarter of the students are 30 years or more.

The capacity of the university system, nevertheless, is still greater than its efficiency. It is estimated that perhaps as few as 5 per cent of initial matriculants finish the coursework required in the respective programs of each faculty.\textsuperscript{24} Measured in slightly different terms, most estimates disclose that some 65-70 per cent of total enrollments in each faculty are concentrated in the first year of the program, while the final year or grade accounts for only 5 per cent of the total student body. Part of the reason for such high attrition rates is the lack of adequate facilities and equipment as well as a poorly trained and largely part-time teaching staff. Another reason is that students typically work full-time while attending the university and do not have sufficient time to devote to

\textsuperscript{23}Author's estimates based upon Secretaria Nacional de Planificacion Y Coordinacion, "Proyeccion de la Poblacion de Bolivia," (La Paz, 1966, Typescript), Table III-1, p. 22.

\textsuperscript{24}Based on an assessment made by the author of enrollment data for the Universidad Mayor de San Andres, La Paz.
their studies. Many students, as a result, drop out of the system before completing the entire course of study.

Even if the efficiency of the system were improved, however, the structure of university training seems inappropriate from the perspective of the likely or needed shifts and technological requirements of the national economy. Table 8, for instance, shows the distribution of total enrollments among the various faculties within the system during a recent year for which there is reasonably accurate information. It can be seen that the heaviest concentration of students is within the social science faculties, which account for 41.5 per cent of the total student body. Science and technical subjects such as engineering, architecture, and agricultural sciences, however, accounted for somewhat less than 28 per cent of total enrollments. Interestingly, 31 per cent of total enrollments was accounted for by medical science students. Since there is a high rate of attrition in the medical faculties, however, the proportion of graduates from these faculties to total graduations is considerably lower than the proportions enrolled.

The difficulty with the structure of the university system, nevertheless, is the concentration of students in the faculties of law and economics. While such concentration is traditional throughout Latin America university systems, the problem may be compounded in Bolivia for the following reasons. In the first place, even though university level scholarship
TABLE 8
UNIVERSITY ENROLLMENTS BY FACULTY,
BOLIVIA, 1962

<table>
<thead>
<tr>
<th>Faculty</th>
<th>Number</th>
<th>Per Cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social Sciences and Humanities</td>
<td>2,846</td>
<td>41.5</td>
</tr>
<tr>
<td>Economics</td>
<td>1,514</td>
<td>22.1</td>
</tr>
<tr>
<td>Law</td>
<td>1,262</td>
<td>18.4</td>
</tr>
<tr>
<td>Philosophy</td>
<td>70</td>
<td>1.0</td>
</tr>
<tr>
<td>Scientific and Technical</td>
<td>1,883</td>
<td>27.4</td>
</tr>
<tr>
<td>Agricultural Sciences*</td>
<td>279</td>
<td>4.1</td>
</tr>
<tr>
<td>Basic Sciences</td>
<td>168</td>
<td>2.4</td>
</tr>
<tr>
<td>Engineering and Geology</td>
<td>782</td>
<td>11.4</td>
</tr>
<tr>
<td>Other (e.g., Architecture)</td>
<td>654</td>
<td>9.5</td>
</tr>
<tr>
<td>Medical Sciences</td>
<td>2,121</td>
<td>31.0</td>
</tr>
<tr>
<td>Dentistry</td>
<td>572</td>
<td>8.4</td>
</tr>
<tr>
<td>Medicine and Nursing</td>
<td>1,549</td>
<td>22.6</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>6,850</td>
<td>100.0</td>
</tr>
</tbody>
</table>

*Note: Includes Veterinary Medicine.


Rates are extremely low, the demand for places in institutions of higher learning is relatively great, and graduates of secondary schools seeking admission are required to sit for entrance examinations. There is reason to believe that the entrance examinations given in the law and economics faculties are markedly easier to pass than the exams given in other faculties; consequently, the probabilities of gaining admission to the university are greater in the faculties of law and economics than in
other courses of study. Although this premise is difficult to prove with the data that are available, it does provide a plausible explanation of the concentration of student enrollments in these fields.

Equally important may be the fact that unlike other faculties, law and economics courses meet only on a part-time basis, typically for an hour in the morning and another hour in the early evening. This arrangement permits both students and teaching staff to hold full-time jobs during the day. Since employment is necessary to allow many students to pursue their training, a disproportionate share are attracted to these courses of study.

The result of these forces is a relatively wide imbalance in the type of highly-trained persons available to the national economy. The current imbalance may not be as serious as it appears at first blush, because of the current structure and level of economic activity. But it seems clear that it is not adapted to the needs imposed by modern technology, and the university structure will have to be modified if accelerated development is to be achieved. Some of the institutional problems involved in any effort to modify the university structure are discussed in greater detail in the next chapter.

Middle level education.--The middle level of the formal school system is composed of academic secondary schools, vocational training institutions, and normal schools. A
disproportionate share of the enrollments at this level, however, are concentrated in the six year academic secondary course, viz., about 89 per cent of middle level enrollments in 1965. This situation is explained almost entirely by the fact that only graduates from the academic course are eligible to sit for university entrance examinations. Much of the secondary system, in other words, is oriented towards preparation for the university, although the small numbers of students actually attending institutions of higher learning as well as the composition of university enrollments makes this orientation of dubious value to the nation.

The middle level system is also divided structurally between urban and rural areas and between public and private operations. Government or public schools accounted for about 63 per cent of total enrollments at this level in 1965. More significant is that almost 97 per cent of total enrollments were located in urban schools. The implication is that the opportunities for attending secondary school in rural, agricultural areas—where the largest proportion of the total population resides—are remote at best. It is primarily for this reason that


26Ibid., Table 11.

27Ibid., Table 1.
scholarity rates at the middle level are believed to be extremely low, although the absence of both population and education statistics makes it extremely difficult to document the situation. Official estimates of the Ministry of Education place enrollments in 1965 at 18 per cent of the relevant age group, i.e., 12-19, which is double the estimate for 1950.\textsuperscript{28} It is widely recognized, however, that official enrollment figures are inflated, because the education budget is allocated on a per student basis. Moreover, the age distribution of secondary students extends beyond the 12-19 age cohort, which also leads to a sizable over-statement of the enrollment rate.

Compounding the problem of limited capacity is a high attrition to the flows of secondary students through the middle level system. Estimates of attrition also vary, but perhaps fewer than one-fifth of initial year enrollments actually complete the sixth year course. But these data are not adjusted for students who repeat courses; consequently, the official calculations of attrition are probably too low. Although there are likely a host of exogenous factors responsible for the high rate of attrition, much can be explained by the internal conditions of the system itself. Most buildings are delapidated and in need of repair, and educational materials such as textbooks and blackboards are nowhere available. Indeed, less than 5 per cent of the public school budget is spent for any purpose.

\textsuperscript{28}Ibid., Table 10.
other than salaries for teaching and administrative personnel. The teaching staff, however, is poorly trained and rewarded accordingly.

Interestingly, the student/teacher ratio—which is usually considered to be an important indicator of the quality of education—is quite favorable in the secondary level system. It is estimated, for example, that the ratio is 20:1 in public, academic secondary schools. The reason for this is complicated. To begin with, teaching personnel are required to teach only 25 hours a month to obtain their base salary. Since the base salaries are very low, (ranging from $40-$70 per month in 1965) most teachers hold a second job to supplement their income. This fact, in turn, requires the school system to hire more teachers than would normally be required so as to be able to staff classes throughout the day. The result is an artificially low student-teacher ratio.

It must also be noted in this regard that only a small percentage of the total teaching force may be adequately prepared to perform its duties. The Ministry of Education estimates that almost half of all secondary school teachers lacked the minimum training required for legal certification. It is plausible to assume that this situation is responsible to a large extent for the high rates of attrition at the middle level of the formal school system.

29Computed from Ibid., Tables 10 and 16.
Primary level education.--At the base of the formal education system lie the primary schools, which operate on a six year cycle. Although the only compulsory component of the entire school system, the primary track is plagued with the same kinds of problems that have already been discussed. Its capacity, especially in the rural areas, is extremely limited and its efficiency in terms of the attrition to the flows of students through the track is similarly very low. While reasonably accurate data are not available, the Ministry of Education estimates that the aggregate enrollment rate in primary schools in 1965 was 51.3 per cent of the total age group 6-12. Many Bolivian educationists believe that this estimate is perhaps ten or fifteen percentage points too high. Even if the official estimates are correct, however, the rate is very low, and the extent to which children have an opportunity to attend school lies at the heart of the education problem in Bolivia. Furthermore, even official estimates disclose a significant disparity between scholarity rates in urban and rural areas. While 68 per cent of the relevant age group in urban areas attended primary school in 1965, for example, only 39 per cent of rural children were in school. It must be noted, however, that rural enrollment rates have increased more rapidly since 1950 than have urban rates,

30 Ibid., Table 2.
31 Ibid.
viz., rural rates rose to their current level from approximately 12 per cent in 1950, while the urban rate was slightly more than 50 per cent in that year.\textsuperscript{32}

As at the middle level of the education system, attrition rates are extremely high, particularly in the rural areas. Even official estimates place attrition at 95 per cent of an initial cohort over the six years of the primary cycle. This high rate implies not only that few children are being educated, but also that the cost of educating them is enormously high. It is estimated, for instance, that educational inputs in the form of teachers, classrooms, etc., must be provided to accommodate 60 student years simply to graduate one student from the primary track of the education system. As in secondary schools, this problem is a function, in part, of the conditions within the primary track itself. School buildings are frequently little more than mud hovels which lack even desks and chairs, and the qualifications of the teaching staff are seriously deficient.

The foregoing description of the capacity, structure, and efficiency of the formal education system tends to explain why the general level of skills available to the Bolivian economy are low and why the composition of skills has not changed significantly over the course of the last fifteen years. It seems clear that systematic policy and planning will be required

\textsuperscript{32}Ibid.
if formal education is to be able to respond to the economy's changing requirements for trained manpower. It also seems clear, however, that the formal system will have to be supplemented by a large number of informal training programs operated under the auspices of private firms, the national government, and international organizations. The problem is that very few informal education programs have been or are being carried out in Bolivia. The agricultural sector, for instance, has never had an effective or widespread extension service, and, with the exception of the traditional "apprenticeship" training given from father to son in the artisan sector, private industry has provided very little training. New skill sources such as these must be established if the number and type of trained persons needed for the development effort are to be available.

Public Health

The dimensions of the human resource problem in Bolivia are considerably broader than simply shortages of skills and educational services. Indeed, one of the most serious constraints on the economic development of the country appears to be the extraordinary poor health of the general population. There is some evidence to suggest, for instance, that there is a widespread state of malnutrition throughout the country. The level of nutrition seems very low, and it is estimated that the average per capita caloric intake amounts to only 80 per cent
of the minimum daily requirements set by the United Nations. Furthermore, the average diet is poorly constituted, with cereals and heavy, starchy foods accounting for more than 80 per cent of total caloric consumption and high protein food such as meat, fish, and dairy products less than 0.7 per cent. Since the composition of the diet is a product of deep-seated cultural attitudes, it is unlikely that a simple increase in the food supply will be a satisfactory method of solving the problem. The problem must be solved, however, before any meaningful attempt can be made to improve the general level of health of the population.

Viewed in terms of the traditional indicators of health status, Bolivia has the lowest levels of health in Latin America. Average life expectancy was estimated to be 50 and 52 years respectively for males and females in 1965. In 1950, the average life span of a male was 44 years and 46 years for a female. While accurate data are not available, the over-all mortality rate is officially estimated to be 14.1 per thousand

33Junta Nacional de Planeamiento, op. cit., p. 69.

34Data provided by the Human Resource Division, U.S. Agency for International Development/Bolivia.

35Data provided by the Oficina de Planificacion, Investigacion y Evaluacion, Ministerio de Salud Publico, La Paz.

36Ibid.
population. Most experts, however, feel that the official estimate is too low and that the true rate is more likely between 20-25 per thousand population. Most experts also feel that mortality rates in the rural areas are probably significantly higher than the national average. There is little disagreement on the rate of infant mortality, which was estimated to be 130 per 1,000 live births in 1965. While this was the highest infant mortality rate in Latin America, it should be noted that the rate in 1950 was estimated to be 320 per 1,000 live births.

Although no accurate morbidity data are available in Bolivia, most specialists assume that the general rate of sickness and disability is extremely high. The assumption is inferred from crude estimates of mortality by cause of death, which show that three-quarters of all deaths are caused by respiratory and gastro-intestinal diseases. It must also be assumed, therefore, that debility rates are extremely high. The widespread prevalence of parasitic infections reported by most medical personnel acquainted with the Bolivian situation tends to confirm this assumption.

38Information provided by the Human Resource Division, U.S. Agency for International Development/Bolivia.
39Ibid.
40Ministerio de Salud Publico, op. cit., p. 75.
In addition to the toll that the low general level of health exacts from the economic productivity of the nation, Bolivia has a number of significant occupational health problems per se. The most important of these is found in the mining sector, where there is a very high incidence of silicosis and silico-tuberculosis among miners. While estimates vary, most health officials place the proportion of miners suffering from these diseases at more than 20 per cent of the total currently employed. The economic costs accruing to this problem are also assumed to be enormously high each year—a significant proportion of which is accounted for by the cost of indemnification (through the Social Security Fund) for those miners no longer able to work because of their health. Since miners were until recently paid a bonus for working in conditions dangerous to their health, efforts to improve health conditions in the mines, e.g., ventilation, have been resisted. The payment of such bonus was eliminated in 1965 and, in the same year, a National Institute for Occupational Health was established to deal with health problems in the industrial sector.

Low levels of health of the general population and subgroups such as the miners are a function of both the attitudes of the Bolivian—particularly the Indian population in the rural areas—about maintaining his health and the shortage of health resources and facilities. The problem of attitudes and values refers primarily to the excessive use of alcohol and coca by a
large proportion of the population. Excessive group drinking is the primary activity of festivals and community social functions which are held with great frequency in the rural areas. The enormous consumption of alcohol is not only injurious to health, but has had a significant economic effect in terms of excessive absenteeism from work. Coupled to this problem are nutritional deficiencies and the long-standing custom of the Indian population of chewing coca leaves with alkaline ash, which releases cocaine and produces a mild narcosis. If workers are not absent from work because of these factors, many still do not have the physical or mental vigor to complete a reasonably productive work day. It is basically for these reasons that interviews with government officials and private businessmen about health and labor productivity almost always stressed the consumption of alcohol and coca as a high priority health problem.

The limited capacity of the public health system is also responsible for poor health in Bolivia. The Ministry of Public Health, for instance, estimates that less than 58 per cent of the total population in 1964 had access to even rudimentary health services. Although exact data are not available, it is probable that only 20 per cent of the total population outside of the major cities are served by any type of medical facility. Despite the fact that there are constitutional guarantees for publicly maintained health services including free medical

41Ibid., p. 97.
care, construction and maintenance of sanitary facilities, and the organization of a national system of hospitals and clinics, the situation has grown more severe in recent years. It seems clear that the extent to which progress can be made in providing health services and facilities will have a major impact on the economic productivity of the nation.

An indication of the capacity of the health system in Bolivia can be obtained by looking at the number of trained health personnel available to the total population. There were, for instance, only 1,032 qualified physicians working in Bolivia in 1965, or approximately one physician for every 4,000 inhabitants. The shortage of physicians was further aggravated by the fact that almost all of them work and live in urban areas, with perhaps 60 per cent of the total concentrated in the two largest cities in the country, La Paz and Cochabamba. Furthermore, there were only 653 qualified dentists in the nation in 1965, or roughly one dentist for every 6,300 persons. The number of trained para-medical personnel was placed at 1,509 during the same year, the majority of whom were nurses, nurses aides, and mid-wives.

42 Government of Bolivia, Secretaria Nacional de Planificacion y Coordinacion, "Natalidad, Mortalidad Y Morbilidad en Bolivia," (La Paz, Secretaria Nacional, Typescript, 1966), Table S-32. It should be noted that the average ratio of population to physicians in Latin America is about 1750-2000:1.

43 Ibid.
Adequate health care provided by qualified medical personnel, therefore, is enjoyed by relatively few people in Bolivia, most of whom are probably upper-income, urban dwellers. Indeed, it is likely that the vast majority of Bolivians do not have any access to qualified medical advice, but must rely on the services of *curanderos*. Untrained and/or unqualified, *curanderos* include such diverse groups as moon-lighting medical students and witchdoctors. Since these activities are illegal, there is little information available on the number and type of such persons. The present author estimates, however, that as many as 6,000 *curanderos* may be practicing medicine in the country at present.

There is also a shortage and a mal-distribution of health facilities. In 1965, there were approximately 9,200 hospital beds available in the country in both public and private hospitals and medical centers. Of this total, less than 30 per cent of the total number of beds were in rural areas. About 41 per cent of the total number of beds in privately operated institutions were in rural areas, while only 17 per cent of the beds available in public hospitals and medical centers were outside of the cities. The public health system, however, did provide medical facilities in the rural areas in the form of small dispensaries staffed by one or two persons. In 1965, 131 such *puestos* were being operated in the country, about a quarter of

which were staffed with trained physicians and the remainder with nurses and other para-medical personnel.

Equally important is that facilities needed to promote environmental health are lacking. For instance, it is estimated that only one-half of the population in urban areas, one-third in smaller cities and towns, and none of the persons living in rural, agricultural areas are currently being served by potable water.\textsuperscript{45} Less than one-third of the total number of dwelling units in the country, moreover, have any sewage facilities at all, and many of these are only outhouse facilities. Given the prevalence of intestinal and parasitic diseases, the shortage of these facilities has a serious impact on the health status of the nation. Thus, even minor increases in potable water supplies and sanitation may have a substantial effect on the health and thereby the productive capacity of the country.

\textbf{Labor Allocation and Utilization}

While the low levels of national productivity in Bolivia are, in part, a function of the skill structure and the health status of the human resource stock, they are also a product of the distribution of that stock among economic sectors and geographical areas. Indeed, even a superficial analysis based on inadequate data tends to show that labor productivity could be

\textsuperscript{45}Based upon 1963 Household Sample Survey, Table 18a.
increased substantially over the course of the next few years if the distribution of the work force could be modified.

The problem is that there have been and continue to be large concentrations of workers in unproductive sectors and areas of the country. As Table 3 above shows, for instance, more than two-thirds of the labor force continues to be engaged in agricultural activities. A shift, in other words, from agriculture towards urban associated economic activity and the corresponding movement of workers from the countryside to the cities has not yet taken place in Bolivia. While this has eliminated for the time being the problems inherent in mass population movements into urban areas, it has produced a serious set of problems in the agricultural sector, not the least of which is the sector's ability to absorb further increases in the labor force. Although the government's position is far from clear on this point, it appears that it would prefer to absorb excess labor in agriculture irrespective of the effects on productivity rather than promote any significant shift in the population towards urban areas. One of the basic reasons for this seems to be that underemployment in agriculture is less visible and therefore less volatile in a political sense than it would be in the cities.

Yet, the situation in Bolivian agriculture is such that productivity could be increased not only by a movement of workers out of the sector but by a re-distribution of the
agricultural labor force among various regions of the country as well. More particularly, agricultural activities are highly centralized in the traditional farming areas of the Altiplano (High Plains), and this region accounts for 80 per cent of the total land under cultivation and probably an equal proportion of the agricultural labor force.46 The problem is that the farm lands on the Altiplano are arid, rocky, and unproductive. Stemming from a decrease in rainfall over the last several decades as well as from traditional farm practices, e.g., the absence of crop rotation, soil erosion has become a serious problem and has been partly responsible for the decline in agricultural production. At the same time, vastly more productive and fertile lands in the tropical and semi-tropical zones of the country's eastern region are not being worked because of manpower shortages. Since these lands, particularly in the valleys and farm lands near Santa Cruz, hold great agricultural promise, efforts to reallocate labor resources would likely contribute to increasing output and productivity in this sector over both short-run and longer-run periods.

The national government, in fact, has attempted over the last 12 years to colonize the eastern region, although the program has not been notably successful. Two types of projects have been undertaken: one has been to colonize foreign groups, e.g.,

46United Nations, op. cit.
Okinowans, and the second type has attempted to relocate high-
land Bolivian Indians. These projects have been carried out under the auspices of both the national government and the United Nations. While the projects involving foreign groups have been relatively small, they have succeeded. Efforts to move the indigenous population, however, have failed. One indicator of this failure is that while the government had contemplated moving 40,000-60,000 persons each year between 1962-1971, the actual number of persons recruited for these projects over the recent past has been less than 10 per cent of the projected annual target. More important is that only 20 per cent of the total number of Bolivians recruited for these colonies have remained at the site of the project.\textsuperscript{47} With few exceptions, the remainder of these groups have returned to their original locality on the Altiplano.

One of the reasons for the relative failure of the colonization program has been that it has lacked adequate management, usually from the point of choosing a site through the actual operation of the colony. Another and perhaps more fundamental reason, however, has been the inability of the highland Indian—at least over short-term periods—to adapt to new cultural and socio-economic surroundings. Indeed, nowhere has the

\textsuperscript{47}Information provided by the Social Programming Division, Secretaria Nacional de Planificacion Y Coordinacion.
constraint of traditional values and attitudes on the development process been more apparent than in the rural Bolivian's perception and reaction to the colonization program. This problem, of course, is fundamental to the entire human resource situation of the nation and thereby to its development potential, because if highly structured or directed attempts to affect the distribution of the labor force have failed, it is unlikely that appropriate labor market behavior can be induced through the market. It is in light of the difficulties with the colonization program and the value structure of the Indian, in fact, that a number of serious Bolivian economists argue that the development of the national economy will be possible if and only if there is a mass influx of European immigrants.

The level of national productivity may also be increased by the re-deployment of non-agricultural workers. There is, for instance, a heavy concentration of professional and technical workers in the government sector, although these scarce skills might be utilized more efficiently elsewhere in the economy. There is also a significant imbalance of skilled and semi-skilled personnel between urban and rural areas. It is estimated that in 1965 more than 73 per cent of the total number of craftsmen, artisans, and semi-skilled production workers worked in Bolivia's nine cities with a population of 2,000 or more.\(^{48}\) As indicated

\(^{48}\)Based on 1963 Household Sample Survey, Table 41.
previously, the same type of imbalance exists with respect to
the number of professional personnel working in rural areas,
e.g., 60 per cent of the total number of qualified physicians
practice medicine in either La Paz or Chochabamba.

Such imbalances may be modified by inducing changes in
labor market behavior through the market mechanism, although
current indicators of the operation of the market are far from
being reassuring. It must be recognized at the outset, however,
that a mechanism or institutionalized set of relationships for
allocating labor resources has only recently evolved in Bolivia.
Given the feudal-like conditions of the economy prior to 1952
and the large proportion of the labor force engaged in tradi­
tional activities since that time, it is plausible to assume
that only a small fraction of the active population has ever had
any real contact with the labor market. Viewed from a slightly
different perspective, it is estimated that in 1965 one-third
of the total labor force and almost 60 per cent of the total
number of women in the labor force were unpaid family workers. 49
Estimates also show that less than 20 per cent of the work force
in 1965 were wage and salary earners; and that only 40 per cent
of Gross Domestic Product measured at factor cost is accounted
for by wages and salaries. 50 The national labor market in

49 Ibid., Table 43.
50 Dirección General de Estadistica y Censos, Boletín
Estadistico, Table III-IV, p. 279.
Bolivia, as a result, may include fewer than 350,000 persons. The implication is that a substantial segment of the current labor force has not yet had an opportunity to learn appropriate forms of labor market behavior or to respond to anything other than traditional norms and values.

It is not clear, therefore, that efforts over the short-run to improve the efficiency of the market through modifications of the wage structure or provision of labor market information will have any substantial effect on the allocation of the labor force. It is likely, in fact, that a simple expansion in employment opportunities will have a greater impact on labor market behavior than would attempts to improve the operation of the market. Yet, over the long-run, improvements in the allocation mechanism will have to be made, and the government will probably have to play a leading role in this effort.

With the exception of the colonization program, however, the government has not undertaken any systematic policies or projects designed to affect the allocation of labor resources. A major case in point is that it has not had a systematic wage policy, although the government's role as a major employer as well as its administration of the Labor Code would permit it to modify the wage structure and the system of incentives if the need arose. While reliable information on wages and salaries is not available, data collected by the Ministry of Finance and presented in Tables 9 and 10 show that significant sectoral,
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occupational, and regional wage differentials do exist at the present time. It is difficult, of course to evaluate whether or not these differentials are consistent with the needs of the development program or actually have had any impact on the deployment of the labor force. Assuming that workers will respond to such incentives in the future, however, implies that the government must study the wage structure in some detail and design a wage policy that is related to development requirements.

Another example of the lack of any policy dealing with the allocation of the human resource stock is that the government has not attempted to deal with the imbalance of skilled personnel between urban and rural areas. A notable exception is a policy related to the process of licensing physicians, which requires that graduates of medical schools practice for at least one year in a rural zone before being permitted to practice in the city. The fact that the graduates immediately return after their one year stint and because Bolivian medical schools have been graduating only 50 people a year implies that this policy has not had any significant impact on the health status of rural population groups.

Finally, there have not been programs and policies designed to influence occupational choice, provide for the dissemination of labor market information, or to match the short-
TABLE 9

AVERAGE MONTHLY AND HOURLY EARNINGS ACCORDING TO EMPLOYMENT CATEGORY AND SEX, BY SECTOR OF ECONOMIC ACTIVITY, CITY OF LA PAZ, JUNE, 1965

(1965 Dollars)

<table>
<thead>
<tr>
<th>Sector</th>
<th>Salaried Employees</th>
<th>Wage Earners</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean Monthly</td>
<td>Mean Hourly</td>
</tr>
<tr>
<td></td>
<td>Earnings</td>
<td>Earnings</td>
</tr>
<tr>
<td></td>
<td>Male   Female</td>
<td>Male   Female</td>
</tr>
<tr>
<td>All Sectors</td>
<td>65.66  42.13</td>
<td>0.36   0.25</td>
</tr>
<tr>
<td>Mining</td>
<td>82.97  61.37</td>
<td>0.39   0.31</td>
</tr>
<tr>
<td>Manufacture</td>
<td>67.23  41.32</td>
<td>0.35   0.23</td>
</tr>
<tr>
<td>Construction</td>
<td>49.24  29.43</td>
<td>0.22   0.14</td>
</tr>
<tr>
<td>Energy</td>
<td>63.34  50.31</td>
<td>0.33   0.30</td>
</tr>
<tr>
<td>Transport</td>
<td>85.07  70.90</td>
<td>0.45   0.42</td>
</tr>
<tr>
<td>Commerce</td>
<td>67.44  46.31</td>
<td>0.39   0.26</td>
</tr>
<tr>
<td>Services</td>
<td>46.94  32.00</td>
<td>0.26   0.22</td>
</tr>
</tbody>
</table>

TABLE 10

AVERAGE MONTHLY AND HOURLY EARNINGS ACCORDING TO EMPLOYMENT CATEGORY AND SEX, BY SECTOR OF ECONOMIC ACTIVITY, CITY OF COCHABAMBA, JUNE, 1965

(1965 Dollars)

<table>
<thead>
<tr>
<th>Sector</th>
<th>Salaried Employees</th>
<th>Wage Earners</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean Monthly Earnings</td>
<td>Mean Hourly Earnings</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>All Sectors</td>
<td>43.67</td>
<td>24.58</td>
</tr>
<tr>
<td>Mining</td>
<td>85.90</td>
<td>47.86</td>
</tr>
<tr>
<td>Manufacture</td>
<td>32.72</td>
<td>22.14</td>
</tr>
<tr>
<td>Construction</td>
<td>96.35</td>
<td>78.70</td>
</tr>
<tr>
<td>Energy</td>
<td>23.62</td>
<td>33.33</td>
</tr>
<tr>
<td>Transport</td>
<td>54.99</td>
<td>46.65</td>
</tr>
<tr>
<td>Commerce</td>
<td>38.16</td>
<td>28.24</td>
</tr>
<tr>
<td>Services</td>
<td>19.99</td>
<td>12.64</td>
</tr>
</tbody>
</table>

Source: Ibid.
term demand for and supply of labor. The Ministry of Labor, however, does have on its organizational chart a public employment service, but the program is inoperative. The reason is that its primary task was to assist in the recruitment of families for the government's colonization program, but because this program was being operated by another government agency, the activities of the public employment service were never effectively required. This service will have to be revitalized and its terms of reference modified if a concerted effort is to be made to improve the operation of the labor market.

51 It should be noted at this point that other than a recently created National Productivity Center, there have not been any known attempts to design policy for intra-firm utilization practices. Since the Productivity Center has been in existence only a short period of time, it is difficult to evaluate its program, and this important subject is omitted from the present discussion.
CHAPTER V

THE CAPACITY TO PLAN HUMAN RESOURCES IN BOLIVIA

Introduction

The basic conclusion which emerges from the foregoing analysis is that Bolivia is faced with a set of serious human resource constraints on the potential development of the national economy. Although clearly not the only barriers, the analysis does suggest that the low level of available skills, poor health conditions, and the inflexibility of the supply of labor have been responsible in large measure for the stagnant growth rate of real output over the recent past. Implicit in the analysis, moreover, is that human resource policies have been inadequate at best and that a systematic strategy for human resource investment is a necessary albeit not sufficient condition for higher levels of output to be achieved in the future. In fact, the national government has paid insufficient attention to human resource considerations in its efforts to improve the performance of the economy, and recent development strategy has concentrated almost entirely on reducing monetary instability and increasing the profitability of the nationalized mines. Many Bolivian officials now regard this strategy as
myopic in nature and scope, and argue that (among other things) a concerted effort in the human resource field is needed if development is not to lag. These officials also recognize the need for planning to support the design and execution of human resource policies.

The nature of the human resource constraints on the development of the national economy suggests that the planning model set forth at the outset of this study is an appropriate guide for the preparation of a comprehensive human resource plan in Bolivia. One important reason is that Bolivia must mount a simultaneous attack on a number of diverse problems if the quantitative and qualitative dimensions of the human resource stock are to be improved. Another reason is the interdependence between human resource problems and other barriers to Bolivian development such as the low levels of agricultural productivity and the technological structure of the economy. The implication is that a number of sectoral programs in the human resource field must be designed in relation to the overall strategy for accelerating economic development. The planning model, of course, sets forth a series of planning tasks and techniques which could be used for just such a purpose.

There are, however, a number of institutional and technical constraints on the planning process in Bolivia which make any application of this model exceedingly difficult. For instance, the kinds of institutional relationships between the
central planning office and sectoral planning units needed to design consistent human resource policy are nowhere to be found in Bolivia at the present time. The organization of the planning mechanism may have to be modified, in other words, before effective human resource planning can be carried out in this nation.

Thus, the purpose of the present Chapter is to assess, in light of the conceptual framework established above, the administrative and technical capacity to plan human resources in Bolivia. Administrative capacity includes the ability of the government to coordinate and elicit the participation of relevant agencies and organizations in both the preparation and implementation of the plan. Technical capacity means primarily the availability of information needed to carry out the planning program as well as the availability of trained and technically competent persons to execute the planning work. The results of this examination will then be used to design a strategy for human resource planning in Bolivia. Since the nature of the existing planning mechanism also tends to define a nation's ability to plan human resources, the first part of this Chapter briefly examines the development planning operation in Bolivia.
The Planning Mechanism

Planning Prior to 1961

While efforts by the national government to promote economic development were made as early as 1941 with the creation of the Bolivian Development Corporation, a formal commitment to the use of planning is of relatively recent origin in Bolivia. The first real effort to assess the dimensions of the development problem in a comprehensive manner, for instance, was not undertaken until 1950. In that year, the Bolivian government requested the United Nations to provide a technical assistance mission to analyze the nature of the nation's development problem and to recommend steps that might be taken to solve these problems. A team of 14 technicians, headed by H. L. Keenleyside, was subsequently sent to Bolivia for a period of 3-4 months to prepare a technical report. Including, in various degrees of detail, assessments of the resource picture, public administration, monetary and fiscal policy, and input requirements in several of the economic sectors, this report provided a list of priority recommendations believed by the mission to be both necessary and sufficient to improve the economic performance of the national economy. The most important suggestions

related to the need for improving public administration and for the government to deal with development policy in a consistent and coordinated manner, viz., to concentrate a number of piecemeal projects and programs under a proposed Economic Administration Commission.²

The recommendations of the Keenleyside mission were never effectively considered or implemented because the 1952 Revolution took place only months after the publication of the final report. The revolutionary government came to power, however, with a commitment to promote economic and social development as well as a recognition of the usefulness of planning to the development effort. Indeed, the government established the National Commission for Coordination and Planning in 1953 for the purpose of promoting the development of the country. This was the first organization charged with the responsibilities for development planning in Bolivia, and it was to last eight years before being disbanded. There was, however, little planning done during this period. The reasons were that the Commission became primarily involved in the day-to-day administrative affairs of the government and that it lacked the necessary technical support to carry out planning activities. Thus, the Commission was unable to prepare a much needed planning program or guidelines for development policy.

²Ibid., p. 4.
The Commission, nevertheless, did initiate work that was ultimately to lay the groundwork for a long-term development planning program. In 1956, the Commission requested and obtained technical assistance from the Economic Commission for Latin America (ECLA) for the purpose of preparing a diagnosis of the development problems and prospects of the Bolivian economy. A team of specialists under the direction of the ECLA Secretariat was sent to Bolivia for a period of three months to collect the data needed to complete the diagnostic study. The results of this analysis, which were subsequently published by the United Nations, included detailed assessments of the performance of the national economy, foreign trade, the effects of inflation on Bolivian development, and the problems of the industrial, energy, transportation, and agricultural sectors of the economy.\(^3\)

Since the study was completed rather quickly and based upon questionable statistics, the results were not as useful as originally envisaged. In particular, few guidelines for the design of programs and policies emerged from the analysis and, as a result, the study had little impact on the development strategy pursued by the government. The Commission, however, did draw upon the study to sketch out a "Plan de Prioridades" at the end of 1960. This plan was nothing more than an outline.

of suggested courses of action, and contained few concrete proposals or operational guidelines. It was never effectively considered by the national government or used in the preparation of policies and projects.

In light of the failure of the Commission to prepare an acceptable development program, it was finally disbanded and replaced by the Junta Nacional de Planeamiento (National Planning Board) in October, 1960. An autonomous agency headed by the Vice President of the Republic, the Junta was created for the express purpose of preparing for the government's consideration comprehensive and operational plans for economic and social development. The creation of the Junta, as a result, can be viewed as the first real commitment to planning by the national government, and the role and impact of planning on the development effort realistically should be assessed from this point forward.

The Ten Year Plan

The primary work and major accomplishment of the Junta was the preparation of the Plan for Economic and Social Development, 1962-1971. The Junta received a continuation of technical assistance from the ECLA Secretariat, and this group, along with the Junta's staff of 36 technicians, worked on formulating the Ten Year Plan for a period of 9 months during 1960-1961.

The plan was submitted to the executive branch of the national government and approved by the Cabinet in July, 1961. Since the Bolivian planning mechanism in a real sense was created and shaped by the framework of the Ten Year Plan, it is worthwhile to explore briefly the nature and scope of the plan. One important reason is that the plan itself reflects many of the limitations or constraints on effective planning in Bolivia.

While a complete description of the Ten Year Plan is beyond the scope of the present study, it may be summarized as a comprehensive attempt to chart a path of balanced development for the Bolivian economy over the period 1962-1971. The primary objective of the plan was to raise the standard of living of the population, which was defined in terms of nutritional standards, educational attainment, levels of health, goods available for consumption, and the reliance of the national economy on external assistance. These objectives were to be fulfilled by a concentrated attack on a series of important structural constraints or bottlenecks on the national economy, which included the instability of the external sector, the absence of fiscal resources for the operation of the government, the administration of the public sector, insufficient savings, monetary instability, and the distribution of the rural or agricultural

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5Ibid., pp. 66-85.
population. The plan proposed to eliminate these constraints through import substitution policies, administrative reform, colonization, and increasing the rate of national savings.

Viewed in slightly different terms, the Ten Year Plan called for an extremely high rate of growth in real Gross Domestic Product to enable the economy to fulfill planned objectives. Specifically, GDP was projected to increase at 8.6 per cent per annum between 1961-1966 and 7.4 per cent between 1966-1971. Since the plan was predicated on the need for balanced growth, sectoral growth rates were projected to be similarly high. These rates were required to permit net investment to increase more than 1.6 times its level in 1961 over the course of the planning period and thereby to eliminate entirely the need for external assistance by 1970. Needless to say, these targets were extremely ambitious and, as the analysis in the previous Chapter suggests, none had been fulfilled by the end of 1965. Although sufficient data are lacking, it may be assumed that progress toward improving the over-all standard of living of the Bolivian population has been equally disappointing.

One important reason for the poor performance of the Ten Year Plan is that it was both conceived and formulated in

6 Ibid., pp. 105-113.
7 Computed from Ibid., Table 21, p. 98a.
8 Ibid.
an administrative or institutional vacuum. Carried out primarily by foreign technicians from ECLA, the preparation of the plan was envisaged as a technical activity that did not require the active participation of relevant government agencies or the private sector. This problem was manifested in the failure of the planners to specify the sectoral or agency responsibilities required to achieve planned targets or the kinds of projects and programs that would have to be carried out to make the plan operational. Thus, targets were set and economic variables such as Gross Domestic Product by sector of origin were projected into the future with little indication of how these targets were to be reached or even why the projections should have been expected to hold. In those instances where recommendations were made, e.g., the need for administrative reform in the public sector, there was little indication of the type of reform that was required or the agencies that should be responsible for promoting such changes.

More particularly, the planners failed to delineate the role or responsibilities of individual sectors within the framework of the total plan. Even such a critical and sensitive demarcation between public and private investment requirements, for instance, was not clarified in the plan. This lack of

\[9\]An indication of this problem is that the Ten Year Plan does not contain any analysis of required resources for current operating expenditures or even the burden placed on the recurrent portion of the national budget by increased capital expenditures.
clarity also extended to the division of responsibility among agencies of the government itself. The significance of this problem is that the type of planning structure initially envisaged by the Junta de Planeamiento was a central planning office which would coordinate a series of sectoral planning operations. Organizationally, this structure was never established and the Junta existed as a single, comprehensive planning agency, cut off from the rest of the government structure.

The Ten Year Plan, however, included a series of sectoral plans within the framework of the general development plan. These sectoral plans were prepared by the central planners without the benefit of any participation by the relevant operating agencies in these sectors. Stated in slightly different terms, the Junta absorbed all planning functions under its roof but did not seek to coordinate these activities with other government agencies or the private sector. It is hardly surprising, therefore, that the Ten Year Plan was almost universally viewed as an interesting technical document that had little relevance to the actual process of decision-making in either the public or private sectors.

It also appears that the technicians responsible for preparing the plan neglected a number of critical elements of the development problem in Bolivia. In the main, this difficulty stemmed from the heavy emphasis given by the planners to

10 Junta Nacional de Planeamiento, op. cit., pp. 147-267.
the need for increasing the physical capital resources available to the national economy. This emphasis resulted in a series of inconsistencies or at least gaps in the development plan, which further reduced its usefulness. For instance, while the plan estimated that employment opportunities for 50,000 persons would have to be created each year over the planning period, it did not provide an assessment of whether these persons would be employable, i.e., whether or not their skills and location would match economic requirements.\(^{11}\) Furthermore, while sectoral programs in education and health were included within the framework of the Ten Year Plan, no effort was made to analyze the relationship between projected changes in these services and projected changes in the level and structure of economic activity.\(^{12}\)

More important, perhaps, is that the planners did not assess the constraints imposed upon the development of the national economy by traditional attitudes and cultural values. An example is that projections for needed food supplies were based on the assumption that minimum daily nutritional standards set by the United Nations would be reached by 1971.\(^{13}\) It seems clear, however, that traditional dietary habits in Bolivia,  

particularly those of the highland Indian population, are so deeply rooted that nutritional practices are unlikely to change even if these food supplies were available. Another example is that the planners failed to consider the ability of the Indian population to adapt to new economic and cultural situations when they estimated that the colonization program would be able to recruit 40,000-60,000 persons each year over the period 1962-1971.  

Thus, the Ten Year Plan was prepared in a fashion that precluded its implementation. Based on questionable assumptions of both a technical and institutional nature, it tended to deny the recent historical experience of the nation as well as future development prospects and possibilities. The result was that the Ten Year Plan was ignored and subsequently abandoned.

Planning Since 1961

The failure of the Ten Year Plan led to two events in 1962 that had a significant impact on the current orientation and structure of the planning mechanism in Bolivia. First, because of the lack of detail in the Plan, the United States government extended in July, 1962, a grant of $80 million for the purpose of making feasibility studies and designing projects that would qualify for international assistance. Second, and perhaps more important, the Junta de Planeamiento was disbanded.

14 Ibid., pp. 141-144.
one year after this grant and replaced by the Secretaria Nacional de Planificacion y Coordinacion. The purpose of the change was to provide for closer contact between the planning operation and the administration of the national government. This was accomplished by placing the Secretaria in the Executive branch of the government, while simultaneously establishing a ministerial level position for the head of the organization. This organizational structure was still in existence in 1966.

The grant from the United States and the reorganization of the planning agency prompted the formulation of two short-term plans for the periods 1963-1964 and 1965-1966. These plans were prepared within the framework of the Ten Year Plan, and were designed to specify the kinds of projects and programs that would be required if sectoral growth targets were to be achieved. The Two-Year Plans, in other words, were extensions of the Ten Year Plan at the project level. As such, they were limited in the same way that the Ten Year Plan was limited. Furthermore, the projects were designed without adequate regard to detail. As a result, few have actually been carried out and a large proportion of the funds available for these purposes have never been obligated.

15 These plans were published in mimeographed form for each sector by the Secretaria Nacional de Planificacion y Coordinacion.

16 Of some 55 planned projects, for example, only five have been carried out thus far.
Stemming principally from the poor results achieved under the 1963-1964 Plan, disillusionment about the role of planning in the development effort became apparent throughout the government in late 1965 and early 1966. This was manifested both in the fact that most of the technical staff of the Secretaria were not working on matters related to development planning and in a debate that emerged among Bolivian planners about the desirability of using the doctrine of balanced growth as a theoretical underpinning in the formulation of a development plan. Some planners argued, for instance, that the government was incapable of promoting development on a broad front and should restrict its development activities to a small number of strategic sectors, e.g., mining, petroleum, and/or agriculture. Neither this debate nor the future calendar of work for the Secretaria had been resolved by late 1966, however, and the future of the Bolivian planning mechanism may well hang in the balance of decisions affecting these matters.

The Administrative Capacity to Plan

While the brief description of the planning mechanism above gives some indication of Bolivia's capacity to design and

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implement a development program, the purpose of this section is to assess the administrative capacity to plan in somewhat greater detail. This assessment should involve the planning capabilities at both the central and sectoral levels as well as the interaction or coordination between each of these levels of the planning structure. Such an analysis in the case of Bolivia is complicated, however, by the fact that the planning function continues to be concentrated under the control of a single agency, the Secretaria de Planificacion y Coordinacion. As indicated previously, the concentration of planning activities began with the Junta de Planeamiento at the time of the preparation of the Ten Year Plan. Even though the Junta was ultimately disbanded, the planning structure remained unchanged. An assessment of the capacity to plan, therefore, must begin with a description of the capabilities of the Secretaria.

In 1966, the Secretaria employed 56 persons, 30 of whom were planning technicians, and operated on a budget of roughly $250,000. Limited in an absolute sense by the size of its staff and budget, the Secretaria's ability to plan was further hampered by the lack of coordination with agencies responsible for making development policy and consequently by the absence of control over the process of resource allocation. Part of this problem, of course, is a function of the ineffective administration of the public sector—a problem that is characteristic of underdeveloped nations. Another part of the problem,
nevertheless, is a function of the planning agency's desire to plan and coordinate development policy in a comprehensive manner. Despite the small size of its staff, the Secretaria had eight operating divisions within its organizational structure in 1966. These included divisions of global programming, infrastructure, productive sectors, social programming, evaluation of projects, special studies, regional programming, and coordination of technical assistance. Although manned only by one or two technicians, each of these divisions had the responsibility for programming and coordinating policy in its respective area.

The responsibility for the design and execution of policy even in the national government is widely dispersed, which means that each planning division must have a wide range of contacts or relationships if it is to plan and coordinate policy. The problems facing the productive sectors and infrastructure divisions, which have technicians working on plans in the agriculture, mining, petroleum, manufacturing, energy, transport, and construction sectors, are instructive in this regard. In the mining sector, for instance, there are at least four important groups in the public sector alone that prepare and execute policy; these include: the National Mining Corporation, COMIBOL; the Mining Bank; the Ministry of Mines and Petroleum; and the executive committee of an international group working
on the renovation of the mines, i.e., the Triangular Plan.\(^{18}\) Although nominal contacts between the Secretaria and these agencies have been made, there has been little coordination at the point of preparing policies for the mining sector. Indeed, sectoral plans for mining have been prepared by two technicians employed by the Secretaria with little contact with the sector.

This situation also prevails in other areas. For example, policy affecting the manufacturing sector is set by several ministries of the national government, semiautonomous agencies such as the Bolivian Development Corporation, the Industrial Bank, the National Chamber of Commerce, and projects carried out under the auspices of foreign assistance programs. The responsibility for planning in the manufacturing sector, however, rests with three technicians of the Secretaria's staff, none of whom has time or the authority to coordinate policies in this field.

The lack of coordination between policy-makers and planners is exacerbated by the fact that the Secretaria is isolated from the budgetary process and thus from the national government's direct and indirect control of economic resources. If autonomous organizations such as COMIBOL and the Bolivian Development Corporation are included as components of the public sector, the resources at the disposal of the government are

sufficiently large to affect the entire pattern of resource use in the national economy. It is estimated that 40 per cent of the Gross Domestic Product and roughly half of the non-agricultural labor force is directly under the control of the public sector. The budgetary or fiscal process, however, is controlled by the Ministry of Finance—a fact that makes this agency the effective nerve-center of the entire governmental structure.

The Secretaria has little coordination with the Ministry of Finance, and the work of each agency is carried out independently of the other. Indeed, sectoral or ministerial budgetary allocations are typically determined by direct consultation between the Ministry of Finance and the sector, without any consultation by either party with the planning agency. It is not known whether the guidelines established by the Secretaria play any significant role in these consultations, although recent planning experience suggests that it is minimal at best. Much the same pattern prevails in the allocation of foreign assistance funds, particularly the foreign aid funds disbursed through the U.S. Agency for International Development mission. The result, of course, is that the Secretaria is divorced from the major means by which development plans can be implemented and, consequently, is little more than a paper organization.

Human Resource Planning

It is against this background that the institutional or administrative capacity of the nation to plan human resource
development must be assessed. More particularly, since this study has assumed that human resource planning is essentially a central planning function, it seems clear at the outset that Bolivia's capacity to plan human resources is limited to the same extent that the Secretaria's capabilities are limited. There are, however, at least two factors that tend to further aggravate the current situation.

In the first place, until quite recently there has not been an identifiable group or division within the Secretaria charged with the responsibility of formulating and coordinating human resource policy. As indicated previously, there have been sectoral plans in the fields of education and public health, but these plans were conceived primarily in "end-product" terms and were not related to other facets of the development planning operation. These plans were prepared by a small group of technicians employed in the Social Programming Division of the Secretaria, and much of their work was carried out in isolation from both the activities elsewhere in the Secretaria and the agencies responsible for policies in these areas. Organizationally, this situation was modified in early 1966 with the signing of a technical assistance project designed to build and maintain a human resource planning team as well as to prepare a long-term human resource plan.\(^\text{19}\) This project was organized within the

\(^{19}\)The technical assistance was provided by the Center for Human Resource Research, The Ohio State University, under a contract with the U.S. Agency for International Development.
framework of the Social Programming Division, and efforts were begun to modify both the perceptions and work plan of the technicians in this division so that they could operate an effective central level human resource planning activity.

In the second place, there is such a large number of institutions or organizations that have an impact on the formation, allocation, and maintenance of the stock of human resources in Bolivia that the possibilities for preparing a coordinated set of policies seem quite limited. Interestingly, there are sectoral planning units in two important human resource sectors, viz., in public health and formal education. The Social Programming Division of the Secretaria, however, has had only nominal contact with these sectoral units, and continues to operate on the assumption that it alone has the responsibility for formulating sectoral plans in these areas. There has been, in other words, some duplication of effort between the sectoral units and the Secretaria, which should be eliminated if the planning mechanism is to function efficiently. Yet, even if adequate working relationships could be built between the Secretaria and these sectoral planning agencies, significant problems in coordinating human resource policy would remain. The problem stems from the myriad of agencies affecting human resource development and, since it lies at the very heart of the feasibility of human resource planning in Bolivia, a brief examination appears warranted.
The Education Sector

In the education sector, for instance, there are a substantial number of agencies and institutions responsible for formal education programs alone, and the lack of coordination among these groups is a significant constraint on the development of a systematic strategy for Bolivian education. In the formal sector, the basic difficulty is that the responsibility for the public school system at the elementary and secondary levels is divided between two ministries of the national government, the Ministry of Education and Fine Arts and the Ministry of Rural Affairs. This split stems from the 1952 Revolution and the creation at that time of a ministry to assume responsibility for programs and policies in the rural areas. Since there were few if any educational facilities in the rural areas prior to 1952, the Ministry of Rural Affairs was given the responsibility of implementing educational reforms in the countryside. Thus, the primary school system in 1966 was divided between the rural system under the control of the Ministry of Rural Affairs and the urban system under the control of the Ministry of Education.

Furthermore, under the Educational Code of 1955 large firms are obligated to provide basic educational services to the dependents of their employees. As a result, the National Mining Corporation, the National Petroleum Corporation and several large private corporations are also providing primary
schooling in 1966. While these schools are under the nominal control of the Ministry of Education, the schools are operated and funded by these industrial concerns. The same is true for a small number of pre-vocational and rehabilitation schools within the primary system that are operated by the Ministry of Labor. The number of agencies involved in primary level education in the public school system, therefore, is relatively large. There are also, of course, a large number of private schools at the primary level with perhaps as much as 26 percent of total primary school enrollments. These schools are operated by the Catholic Church, various non-Catholic church groups, and non-church related private groups, some of which are sponsored by the foreign community, e.g., the American school in La Paz.

At the secondary level of the school system, the situation is similarly complicated. Since secondary academic education is offered only in the urban areas, the largest proportion of this system is controlled by the Ministry of Education. But teacher training in the rural areas is considered secondary level schooling and is operated by the Ministry of Rural Affairs. In addition, the Universities operate middle level agricultural schools, and the Ministries of Defense and Public Health are responsible for middle level military and nursing schools respectively. As at the primary level, the National Mining Corporation and the National Petroleum Corporation operate secondary
level academic and vocational schools. A relatively large private school system operated by both Church related and non-church groups also exists at the middle level of the formal school system.

The fact that there are a significant number of diverse agencies and organizations providing educational services at the primary and secondary school level implies that an effective mechanism for coordination is required if the formulation and execution of educational policy is to be carried out along functional lines. As indicated previously, there is a sectoral planning unit in the Ministry of Education, but it has not been able to provide the leadership necessary to promote coordination among the various institutions in the sector. Understaffed and operating on a limited budget, the educational planning unit watched passively while the Social Programming Division of the Secretaria prepared educational plans for the 1963-1964 and 1965-1966 Plans. It has been similarly unable to coordinate activities in the education sector. One significant constraint in this regard is the unit's organizational ties with the Ministry of Education and, hence, its inability to participate actively in the preparation and execution of rural educational policies. Another important problem is the private school's deep-rooted suspicion of the Ministry of Education and their consequent refusal to cooperate with the educational planning agency.
More important perhaps is the fact that even if the agencies responsible for formal primary and secondary schooling could be coordinated, it is unlikely that the university system would be willing to participate in the formulation or execution of a systematic strategy for the education sector. Indeed, the system of higher education in Bolivia constitutes one of the most serious constraints on the nation's ability to plan human resource development. The reason is that, like other Latin American nations, Bolivia has had a long tradition of autonomous higher education in the sense of being independent of the political process and the control of the national government. As described in the previous Chapter, the Bolivian university system is composed of seven autonomous institutions located in various regions of the country. While this may be thought of as a system, it is nonetheless true that each institution jealously guards its autonomy and operates entirely on the basis of policies established by the local faculties and students.

The universities, however, are financed primarily from public funds, the basic source of which is indirect taxes earmarked for this purpose. These funds are disbursed by the

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20 It should be noted that there was in 1966 a planning office for the university system in La Paz. This office, however, was staffed by only one person, and operated more in the area of public relations than in the field of planning.
Ministry of Finance to each university on the basis of direct (and typically secret) negotiations between these two parties. It is instructive to note that educational planners have not been permitted to participate in this process. It is essentially for this reason that few planners believe that meaningful human resource or education planning can be carried out in Bolivia at the present time. The implications of the constraints imposed by the university system on the capacity to plan (as well as the constraints imposed by the lack of coordination elsewhere in the formal education system) will be explored after an assessment of the planning capabilities in other human resource sectors.

**The Public Health Sector**

In general terms, the capacity to plan in the public health sector is limited in the same way that the education sector is limited. To begin with, while there is a sectoral planning office within the organizational structure of the Ministry of Public Health, it has had little contact with the development planners working in the Secretaria and has not been able to coordinate the preparation or implementation of the policies of a wide range of institutions that have an impact on the health status of the Bolivian population. Created in early 1965, the primary function of this health planning unit was to prepare a long-term plan for the provision of public health services.
first approximation of the long-term plan was completed in May, 1966. Although the plan was delivered to the national government through the office of the Minister of Planning and Coordination, it was not related to the development planning framework, either in terms of the health programs proposed in the Ten Year and Two Year Plans or in terms of the health requirements of the economic development program. Interestingly, a technician in the Social Programming Division of the Secretaria was working on a plan for the health sector at the time that the Ten Year Health Plan was being submitted to the national government. There has been in recent years, in other words, some duplication of effort in the area of health planning.

In addition to the lack of coordination between planning units, there is no effective mechanism for coordinating the policies of the large number of agencies and institutions in the public health sector. In the national government, for instance, health services are provided not only by the Ministry of Public Health but by the Social Security Fund of the Ministry of Labor as well. As might be expected, environmental health facilities are provided by the Ministry of Public Works and the National Housing Commission. The policies and programs of these agencies, however, have not been coordinated, with a consequent lack of consistency in the government's over-all approach to

the health problems of the nation. Further complicating the design of policy in this sector are the existence of several semi-autonomous agencies such as the Thorax Institute, the Transmissible Disease Institute, and the Center for Occupational Health, as well as the health programs operated under the auspices of international organizations, e.g., the malaria control program, the San Joaquin Hemorrhagic Fever Program, UNICEF, the U.S. Peace Corp, and Food For Peace.

While programs within the public health sector have been carried out in virtual isolation from each other, public health policies in general have been isolated from complementary programs in other sectors. Most significant in this regard is the apparent lack of coordination between the health authorities and the faculties of medicine in the universities. There has not been any effort, moreover, to coordinate health education programs in the school system or to relate matters of health promotion and personal hygiene within the framework of adult literacy or community development programs. Indeed, it is the piecemeal program isolated from other policies in the field that characterizes the approach to public health in Bolivia. A major effort would have to be undertaken, in other words, to coordinate and relate policies in this sector before any meaningful attempt to plan public health can be carried out.
Labor Allocation

It is difficult to assess the current capacity to plan the allocation and utilization of labor resources because there has not been any attempt to formulate policies in this field other than the colonization program, and because there has not been any identifiable planning agency in the sector. It is true that in 1966, there was a Manpower Directorate in the Ministry of Labor charged with the responsibility for studying the labor market and designing programs to help match the short-term demand for and supply of labor. However, principally as the result of political instability within the Ministry and a succession of different Ministers and sub-ministerial personnel, this Directorate was inoperative and staffed by only one person. While such an agency may provide a focal point for efforts designed to build and maintain a sectoral office for planning programs related to the deployment of labor, it is perhaps too early to speculate on its ability to carry out this task.

As in other human resource sectors, the need for a coordinating mechanism in this sector seems of vital importance. As indicated in the previous Chapter, there were several agencies involved in the colonization program, including the Ministry of Agriculture, the United Nations, and the Bolivian Development Corporation. None of these efforts was coordinated with programs carried out elsewhere in the government, despite the importance of responding to the education, health, housing, and
other needs of the migrants to newly colonized areas. Similarly, while the Finance Ministry has been responsible for the wage and salary policy for employees of the national government and will be responsible for the proposed civil service administration, it has not cooperated with the planning agency or attempted to relate its policy to the requirements of the economic development effort.

The InterMinisterial Human Resources Commission

It was primarily in response to the historical proliferation of agencies in the human resource field and the lack of effective coordination among them that the national government established the InterMinisterial Human Resources Commission in October, 1965. The stated purpose of the Commission is to analyze and plan for the human resource needs of the nation. The Commission includes representatives from the Educational Planning Office of the Ministry of Education, the Labor and Rural Justice Division of the Ministry of Rural Affairs, the Manpower Directorate of the Ministry of Labor, and the Ministries of Finance, Health, and Economy, and is headed by the Sub-Secretary of the Secretaria Nacional de Planificacion. The Social Programming Division of the Secretaria was requested to provide the technical support for the Commission, and the Director of the Division also sits on the Commission. The Commission met for the first time in March, 1966, on the occasion of the arrival
of a technical assistance group which had been contracted under USAID auspices to provide technical direction for the preparation of a long-term human resource plan.

While the InterMinisterial Commission appears to satisfy the need for a coordinating mechanism in the human resource field, it probably is not adequate for at least two reasons. In the first place, only a small fraction of the total number of relevant agencies and organizations affecting the stock of human resources in Bolivia is represented on the Commission. And even in those cases where the agency is represented, the representatives are not from the most relevant offices or divisions. For instance, while there is a representative of the Ministry of Finance, he is representing the newly created Civil Service Administration. Since he had been nominated to represent the Ministry of Finance, the head of the Commission was reluctant to name other members from the same Ministry, although personnel from the budget office and the division of statistics would clearly be desirable.

Second, there is little evidence to suggest that the members of the Commission are intimately involved in the decision-making process of their respective agencies or are able to speak for their institutions. This problem stems from the general unwillingness of high-level personnel in public administrative posts to delegate authority or responsibility to even relatively highly placed subordinates. There is little reason
to suppose, therefore, that the InterMinisterial Commission will have any substantial impact on the coordination of human resource policies in the near future. The implications which follow from these problems with the Commission are explored more fully below.

The Technical Capacity to Plan

The myriad of institutions and the lack of coordination are not the only constraints on the nation's ability to plan human resource development. Indeed, an equally serious problem is Bolivia's technical capacity to plan, in the sense both of the availability of planning information and competent planners. The principal difficulty in this regard is that there have been only two population censuses in Bolivia in the twentieth century, the first of which was taken in 1900 and the second in 1950. The enormous problems encountered in assessing the size and characteristics of the human resource stock without census materials are obvious and require little comment. It is interesting to note, nevertheless, that the absense of this information has produced a situation wherein the national government not only does not have accurate data upon which to design and evaluate its policies but where different parts of the government utilize substantially different estimates of the demographic conditions of the country. In 1966, for instance, there were no fewer than eight different projections of the current
size and structure of the population, which were based on a per annum rate of growth ranging from 1.8 per cent to 2.8 per cent. Thus, it hardly seems surprising that assessments of policy requirements varied greatly among different agencies of the government or that policies have been difficult to coordinate, even at the stage of preparation.

Some efforts have been made to generate new information on the demographic conditions of the nation, but none has met with any notable success. The most important of these was a sample survey of 8,000 households carried out in 1963 under the auspices of the Department of Statistics and Census and assisted by an advisory team from the United Nations. Designed to substitute for a complete census, this survey used census interview schedules. The information collected from the sample households was later "blown-up" with the use of differential urban-rural estimates of the sampling ratios and reported in terms of national totals. Unfortunately, the national government refused (and continues to refuse) to accept the results of the study and, consequently, to publish the final tabulations. The universal explanation for this refusal is that the study was poorly done and technically invalid. Unofficially, however, it

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22 Population projections have been prepared by the United Nations, Inter-American Statistical Institute, Economic Commission for Latin America, CELADE, Dirección de Estadística Y Censos of the Ministerio de Hacienda, Secretaría Nacional de Planificación Y Coordinacion, and the Ministerio de Salud Pública.
is conceded that the results wounded national pride by showing a considerably smaller population than is boasted by the government, and that the results appeared too soon after the 1962 Congressional elections—an election marred by charges of stuffed ballot boxes and a debate on the number of eligible voters. Results of this survey, in any event, have not been used in the design of governmental policy or in the preparation of the development plans of the nation.

Even if census materials were available, however, the current data situation would not be adequate for purposes of human resource planning. One reason is that most government agencies have not established procedures for systematic reporting and channeling of information through the organization and/or have established procedures that tend to impede the collection and tabulation of accurate data. The public school system, for instance, does not have a procedure for regular reports on the size and characteristics of present school enrollments. It has, however, traditionally requested local school administrators to estimate, on the basis of the first day of classes, likely enrollments over the course of the school year. These estimates are used for budgeting purposes, since funds are allocated primarily on a per student basis. As a result, the meager data that are available on school enrollments tend to overstate the number of children actually attending school.

23 The total population shown in this survey was only 3,088,600 inhabitants.
Such estimates cannot be revised because the government has very little contact with local operations. Although the Ministry of Education has a division of school inspectors, most of these personnel are acquainted only with the schools in the larger cities and urban areas. Some schools in the rural areas may be visited by the school inspector only once every two or three years, and there are a few cases where the inspectors have never seen the school. Current information on the health status of rural population groups is lacking for similar reasons. The Ministry of Public Health does not have a reporting system and few, if any, of its personnel visit the Ministry's dispensaries or puestos in the countryside.

A second problem has been the inability of the government to administer and process information that is a normal by-product of its operations in a form that is useful to planners. The Social Security Fund, for instance, might be a source of data on the occupational, sectoral, and geographical distributions of the non-agricultural labor force as well as on the movements of workers over given periods of time. But the Social Security Fund does not request information on current occupational title or geographic location from insured workers. More important perhaps is that administrative control over the collection of data from insured workers is weak if not altogether nonexistent. For example, because workers can change jobs without being required to report the change and because in such
circumstances workers typically register anew to assure their membership, the Social Security Fund did not know how many workers were insured in the system in 1966.

The generation of new and more accurate data is also hampered by the highly centralized nature of the data collection process and the location of the central statistical agency. More specifically, the legal responsibility for the collection of information required by the government rests with the Department of Statistics and Census of the Ministry of Finance. The perogatives of the Department of Statistics are jealously guarded, and ministries and agencies of the national government are typically forced to work through the Department in any data gathering activity. The problem is that the Department of Statistics is understaffed and operates on a limited budget and, hence, is unable to provide adequate statistical services. Its insistence on being involved in all efforts to collect data, moreover, tends to reduce the incentive of individual agencies to obtain needed information and, in fact, constitutes a serious bottleneck to the expansion of the nation's statistical resources.

Equally important in this regard is the fact that the Department of Statistics is located within the Finance Ministry. This is significant because it is exceedingly difficult for the Ministry of Finance to collect information from the private sector of the economy. The reason is the widespread practice
in the private sector of avoiding the payment of taxes. Efforts by the Ministry of Finance to collect economic information are typically viewed as a devious method of double-checking tax returns, and firms usually do not respond to requests for data or falsify their answers for this reason. While the Department of Statistics usually states that the data to be collected will be kept in strict confidence and that individual firms will not be identified, its credibility has been impaired in the recent past by the fact that it turned information over to the tax division for review. It is hardly surprising, as a result, that efforts to generate new information have typically produced meager results.

Finally, it should be noted that the apparent priorities for developing statistics in Bolivia have not been compatible with the data requirements for human resource planning. Within the planning organization, for instance, the development of data has essentially reflected the macro-economic and capital oriented approach to the development problem utilized in the formulation of the Ten Year and Two Year Plans. In the main, statisticians in the Secretaria have concentrated on estimating Gross Domestic Product, Capital Formation, and foreign trade statistics. Although such information is clearly important to development planning, the emphasis that has been placed on these figures is difficult to justify, particularly in light of the absence of any accurate demographic information. This situation results
primarily from the priorities established by and interests of the foreign technicians advising the Secretaria, although there are also some Bolivian planners who argue that rather than a population census the most urgent requirement is the construction of a new and expanded interindustry grid. The fact that these planners wish, at the same time, to use per-capita income as a target variable in the development plan can only be viewed as somewhat disconcerting.

Statistical resources, however, are not the only constraint on the nation's technical capacity to plan. Equally serious is the shortage of competent planners, at both the central and sectoral levels of the planning structure. All of the planning agencies in Bolivia are under-staffed and under-financed, and a large proportion of the personnel employed in these offices are not sufficiently trained in the field of planning to make a positive contribution to the work. Although all of the high-level technicians in the Secretaria were university trained, a substantial proportion were trained in fields other than the area in which they were working, e.g., a number of planners were trained in law and architecture. Similar situations exist in the sectoral planning offices in the Ministries of Public Health and Education.

Another problem is that the mentality of Bolivian planning personnel is little different from that of functionaries working elsewhere in the government. They disdain any job
function other than white-collar, desk related activities, and enjoy office routine. The planning operation has been severely limited, indeed, by the reluctance of the planners to leave the office, to engage in the collection of data, and/or to travel outside of the capital city to assess the development conditions of the country first hand. Rather, memoranda are distributed and re-distributed, and time is spent insuring that procedural guidelines are followed.

These problems stem not only from the tradition of government employment in Bolivia but also from the technical assistance given by foreign planners and advisers. The notion, for instance, that planners need not consult the government or the private sector at the point of preparing the plan can be traced to the mentality of the foreign advisers working in the Secretaria. The fact that there are few trained planning personnel can also be traced to foreign technical assistance, since foreign advisers have assumed major responsibility for the preparation of plans and have not been concerned with training local technicians to carry on the work after they have left the country. If planning is to become an effective force in the development effort in Bolivia, these factors must be changed. Most important is that Bolivians must be given the responsibility for preparing and executing development plans, and they must be trained so that they will be able to accept this responsibility.
CHAPTER VI

A STRATEGY FOR HUMAN RESOURCE PLANNING IN BOLIVIA

Introduction

Despite the apparent need for a comprehensive human resource plan in Bolivia, the preceding analysis has suggested that difficulty would be encountered in planning human resources in the manner envisaged in the first part of this study for at least two reasons. First, the administrative machinery for planning is weak in Bolivia, particularly in terms of the relationship between the development planning operation and the agencies actually responsible for the design and execution of policy. Second, the technical capacity to plan in terms both of the competence of the planners and the quantity and quality of the data with which they must work is limited. Thus, the design of a comprehensive plan for human resource development will depend upon a prior attempt to eliminate or at least reduce the prevailing set of institutional and technical constraints on the planning mechanism.

The primary purpose of this Chapter is to suggest a strategy for planning human resources in Bolivia. The first
part of the Chapter specifies the kinds of modifications in the planning structure and the technical work that are needed to permit a human resource plan to be prepared and executed. The remainder of the Chapter then focuses on the nature and scope of the initial human resource plan for this country and suggests the major planning tasks and techniques required for its formulation.

Organization for Human Resource Planning in Bolivia

The conceptual model set forth at the outset of this study was designed in reference to a planning mechanism with a development planning operation at the central level and a series of human resource programs at the sectoral level. Within this framework, it was assumed that the human resource planning activity would be organized as a division in the central planning office. It was proposed that this division would, on the one hand, work jointly on the preparation of the over-all development plan with other components of the central planning office and, on the other, coordinate the actual design of policies with sectoral planning agencies in the areas having an impact on the formation, maintenance, and allocation of the stock of human resources. It was also proposed that these sectoral planning units would coordinate the design and execution of policies among the various governmental and private agencies within their specific sphere of responsibility. This structure
permitted policies to be designed both from the top down and from the bottom up, and thus allowed for feasibility and consistency checks on the formulation of specific policies at several fundamental stages in the preparation of the total development program.

The preceding Chapter has shown, however, that the planning mechanism in Bolivia is not organized to permit policies to be prepared in the manner envisaged. It is necessary, as a result, to modify this structure if the nation is to be capable of formulating and executing effective human resource policy. Specifically, it is necessary to modify the prevailing institutional relationships at both the central and sectoral levels of the planning structure.

At the central level, the most important task is to change the organization and perspectives of the central planning agency, i.e., the Secretaria Nacional de Planificacion Y Coordinacion, so as to permit it to perform those functions for which it was initially created. Included here should be both an internal reorganization of the Secretaria and a change in the relationships between this agency and the rest of the national governmental structure.

An internal reorganization of the Secretaria should be carried out along two fundamental lines. First, for the purpose of providing general orientation to decision-makers both inside and outside of the national government, the Secretaria should
eliminate its direct involvement in sectoral and project level planning and concentrate on the design and ultimate execution of an over-all development strategy for the country. Second, the Secretaria should reorganize its internal divisions and units along functional lines rather than in terms of particular branches of economic activity or geographical areas. In a concrete sense, this amounts to changing the agency's structure so that all personnel employed by the Secretaria—rather than only a handful in one division—are "global" planners. This, in turn, requires that the central planners concentrate on establishing criteria or guidelines for the design of a wide range of programs and then coordinate the actual preparation of policies in each sector rather than on designing a limited number of projects themselves in a vacuum, i.e., designing the projects without coordination between or the participation of those agencies responsible for the ultimate execution of the programs.

From the perspective of human resource planning, moreover, it would be desirable to organize the Secretaria into divisions or units corresponding to types of inputs into the development process rather than by economic sector or geographical area. Thus, for instance, it would be desirable to have divisions for human resources, natural resources, capital resources, technology, and perhaps markets as opposed to the internal structure of the Secretaria as it presently exists. Such a reorganization would tend to bring the interdependence
of the development effort into clearer focus as well as to emphasize the global aspects of the planning work to be carried out by the Secretaria.

These changes will not be particularly meaningful, however, unless the work of the Secretaria can be coordinated with the design and implementation of government policy in general and with the budgetary process in particular. It is, after all, idle to assume that development planning will have an impact on the allocation of national resources unless some bridge is built between efforts to assess the required pattern of resource use and the instruments which affect that utilization. The most critical instrument in this regard is, of course, the annual budget of the national government. As was pointed out above, however, the budgetary process in Bolivia is controlled by the Ministry of Finance, and there is little coordination between the work of this agency and the Secretaria. Such coordination must be established before any effective planning can be carried out in this nation.

While it is tempting to assume that an administrative reorganization which would place the planning agency within the Ministry of Finance (or vice versa) would provide the needed coordination between these activities, it is unlikely that such a reform would be politically feasible at the present time. Furthermore, such a merger would tend to place a heavy day-to-day administrative burden on the planning process, which may
further aggravate the problems of planning rather than alleviating them. Rather, what is required are new organizational channels which would permit the Secretaria to participate in the preparation of the national government budget. In the short-run, the planning agency might participate in the budgetary process in a simple advisory role. Later, it would be advantageous for the Secretaria to actively engage in the preparation of the annual budget. A movement in this direction is essential. Without it, future development planning (as in the past) will provide little more than interesting technical documents which have no relevance to the design of programs affecting the rate and direction of economic change.

There are equally severe administrative problems at the sectoral level which must also be remedied. The problem is that coordination and consistency in the design of the development program cannot be achieved by the central planning agency alone--irrespective of that agency's efficiency or capabilities. As described in Chapter V, the problem in Bolivia is that there are a host of independent agencies in each of the main human resource sectors which must be coordinated if rational human resource policies are to be designed and executed. Stated in slightly different terms, each of the human resource sectors is comprised of a large number of sub-systems, which have little or no relation with one another. This, of course, seriously limits the possibilities of effective human resource planning.
in Bolivia. The reason is that there is no assurance that these independent sub-systems will respond to new requirements for policy or even avoid duplicating old programs. The situation is also aggravated to the extent that new policy instruments and organizations may be needed to carry out human resource programs in the future, e.g., the need for informal and on-the-job training programs in the education sector.

While it is relatively easy to set forth a proposal for administrative reforms which would eliminate the problem of coordinating policy at the sectoral level, such a proposal would probably not be politically feasible over the course of the next decade or two. An important case in point is centralizing the administration of the public school system by eliminating the Education Division of the Ministry of Rural Affairs and placing the responsibility for rural schools in the Ministry of Education. In fact, such a reform has been proposed several times in recent years, but institutional rigidities and resistance from the Ministry of Rural Affairs have kept the reform from being instituted. It is likely that similar problems would be encountered elsewhere in the government and private sector.

A somewhat more feasible solution would be to establish coordinating committees in each human resource sector which are composed of representatives of every agency within the sector. In education, for instance, a coordinating committee composed of representatives of the Ministries of Education and Rural
Affairs; the universities; the nationalized enterprises in mining, petroleum, etc.; the private schools; international organizations; private firms; and the teaching profession should be created for the purpose of designing and supervising the execution of sectoral policy. Similar committees could easily be established in the health sector and for the agencies affecting labor allocation and utilization. The establishment of such bodies implies that the InterMinisterial Commission which currently functions at the central level is less relevant for the purpose of planning than coordinating mechanisms within each sector. Indeed, it is likely that these sectoral bodies would have a greater impact on the design of programs and projects than would a more complicated mechanism at the central level of the planning structure.

Technical support for the sectoral committees could be provided by the programming units which currently exist in the Ministries of Education and Public Health. In the area of labor allocation, however, it will be necessary either to expand and strengthen the planning unit which exists on paper in the Ministry of Labor or to create a new unit elsewhere. These programming units can then provide a focal point for coordinating the activities of the central planners and the sectoral committees. Consistency in the design of policy among the various human resource sectors, in other words, must be obtained through the interaction of planners from the central and sectoral offices.
While current planning personnel may be ill-equipped to perform such technical coordination at the moment, experience and additional training will probably prove to be sufficient, and will thus allow the planning offices at each level to work in a coordinated and consistent manner.

Technical Base for Human Resource Planning in Bolivia

In addition to the aforementioned changes in the organization for planning, the preparation of a comprehensive human resource plan in Bolivia will also require changes in the technical base for planning. The primary constraint in this regard is the absence of reliable information on the current stock of human resources. In large measure, what is required is a relatively complete diagnosis of the present human resource situation and its relation to the level and structure of the Bolivian economy. Ideally, such an expanded set of basic planning data would be gathered through a new and much needed population census as well as censuses in agriculture and industry. Such sources of data, however, are not likely to be available before 1971 or 1972. Yet, planning can and must be carried out before relatively complete census information is available. Simply stated, planners must work with somewhat less refined data and techniques than would otherwise be desirable at the outset of the planning program. The following paragraphs explore the minimum requirements for planning data needed to begin planning and the methods that may be used to collect them.
Diagnosis of the Current Work Force

The most urgent requirement for preparing a plan in Bolivia is to obtain reliable information on the national work force. This, in turn, requires more complete data than is currently available on the size and composition of the total population. Such demographic information is crucial, of course, because it provides the basic framework in which human resource priorities and problems may be evaluated.

In order to obtain current population data, planners must undertake an intensive evaluation of existing population projections and estimates. Assumptions implicit in these projections must then be tested so that the planners can choose a particular estimate as being the most realistic one available at the moment. In particular, assumptions with respect to mortality and fertility must be tested. This may be done through a series of small-scale sample surveys of households in both urban and rural areas. Since the volume and direction of external migration has had and will continue to have a significant impact on the size and structure of the Bolivian population, these surveys must be supplemented by an analysis of recent flows of emigrants and immigrants. Such a study also has import for other parts of the human resource planning program, e.g., with respect to the question of the utilization of high-level personnel, and may be carried out through an examination of the files
of the major embassies and consular offices in the capital city, La Paz. Although crude, these tasks can lead to the construction of a demographic framework that is useful for planning purposes, at least until a new census program is forthcoming.

Within this framework, an assessment of the current size and structure of the labor force may be executed. Three basic objectives must be sought in this assessment: First, the analysis must provide usable information on the occupational, sectoral, and geographical distribution of the present labor force. It must also provide information of the productivity or efficiency of the labor force as well as an analysis of the relationship between these characteristics and the level and/or structure of economic activity. Second, the assessment must identify and quantify the types of manpower utilization problems that Bolivia currently faces. At a minimum, this must include estimates of unemployment and underemployment, the emigration of skilled workers, and the extent to which there is a relationship between a worker's educational preparation and his occupational assignment. The assessment must also provide some indications of the extent to which the labor market is operating in an efficient manner. This must include information on the wage structure and other incentives in the marketplace as well as estimates of the volume and pattern of the occupational, industrial, and geographical mobility of the labor force. Finally, the assessment must provide data that are specifically useful
for the purpose of projecting future human resource requirements. Included in this category are raw data on the relationships between human resource inputs and output and human resource inputs and other inputs, especially capital. Also included are measures of the educational experience of the work force and the current health status of workers. These measures are needed for the design of sectoral programs in the education and health sectors.

Stated in slightly different terms, the foregoing suggests the minimum data requirements for planning human resources at the central level. In the absence of a complete census program, the important question is the manner in which these data may be acquired. The most plausible answer is through carefully designed sample surveys, primarily at the level of individual enterprises or economic units. Such an approach requires, in turn, a two-stage work program for the central planners. First, aggregate labor force and economic information must be estimated through extrapolations of past census data, surveys, and whatever other data that may be available. Then, sample surveys must be designed within this framework to obtain the kinds of information discussed above. The sample data may later be "blown-up" to match the aggregate data elaborated in the first stage.

The first step is necessary, in other words, to provide a frame of reference for the purpose of designing sample surveys.
At a minimum, it must include trend analysis, e.g., between 1950 and 1963, of labor force participation rates as well as the trends in the occupational, sectoral, and area distribution of the economically active population. The assessment of the labor force distributions can be made in relative, i.e., percentage, terms and then applied to the population estimates resulting from the demographic analysis discussed above. In addition, it will be necessary to estimate both the number and size of firms or enterprises in each sector and branch of economic activity. Initial data for this purpose can be obtained from the Social Security Fund. Both sets of data can be used as "universe characteristics" in the design of sample studies.

The second step would then fill-in or document the specific characteristics of the work force within the total framework prepared in the first stage of the work. Such information can be collected on the non-agricultural labor force through a relatively extensive sample survey of establishments in each non-agricultural sector and branch of economic activity. The reasons for using establishments as sampling units instead of, say, households are the nature of the required data and the fact that in Bolivia firms will be easier to sample and contact. Because in most sectors there are a large number of small, relatively homogenous firms and a smaller number of large firms employing more sophisticated technology, the sample for the establishment survey should be stratified on the basis of the number
of employees in each unit. The sampling ratios for the larger firms should be proportionally greater than for smaller establishments.

For each of the establishments included in the survey, a two-stage sampling procedure should be employed. In the first stage, interviews with the owner or manager of the firm must be conducted for the purpose of obtaining information on productive capacity, factor inputs, and the potential growth of the firm. The second stage would collect information from individual workers in the firm. Conducted either by interview or questionnaire, the purpose of this stage must be to obtain data on the personal characteristics, current job function, intra-firm and past mobility patterns, hours of work and salary, educational attainment, health problems, and attitudes towards the labor market of individual members of the labor force. Information obtained from both the production units and the employees of those units should then be expanded to match the over-all totals established in the previous step. While admittedly crude, the survey suggested here would appear to be the most feasible and least expensive method for obtaining needed information on the non-agricultural labor force.

Similar information on the agricultural labor force is also needed for planning purposes. Such data may be gathered from a sample survey of households in the rural areas of the country. For each household, a two-stage sampling procedure
should be used so that both economic and labor force information can be collected. Such a survey may also incorporate questions relating to the demographic analysis discussed above as well as certain kinds of health information suggested below. Needless to say, the design of a representative sample for such a survey will not be an easy task, but some effort in this area must be made if planners are to have a sufficient base upon which to prepare policy.

**Diagnosis of Human Resource Policy Instruments**

In addition to an assessment of the human resource stock at a given point in time, effective planning will also require a relatively detailed diagnosis of the policy instruments currently effecting that stock and the feasibility of introducing new policy instruments over the initial planning period. At a minimum, an evaluation of existing instruments must include an analysis of the Bolivian systems of education and public health.

In education, a diagnostic study is needed to ascertain in both quantitative and qualitative terms the output of the system at each of its levels and tracks, the inputs into the system, and the efficiency relationships between inputs and outputs. While the analysis of the formal education system in Chapter IV suggests that these efficiency relationships are very low, a major effort is nonetheless needed to quantify the situation for the purpose of designing future educational policy.
It seems clear that supplementary studies will also be needed to examine in more detail the endogenous and exogenous factors associated with the inefficiency of the system. An example is research on the impact of family perceptions, income levels, and the need to work on the attrition rate of student enrollments in the formal school system. Realistically, however, it is difficult to specify the kinds of supplementary studies that may be required until the quantitative analysis is completed. Once this is done, a more refined research program must be designed to examine the factors affecting the efficiency of the system.

Quantitative information on the capacity and efficiency of the school system must be obtained from educational establishments themselves. In the short-run, such data must be collected by means of stratified sample surveys of individual schools and educational programs. Although information needed for an historical examination of student flows may be difficult to obtain by such methods, reliable data on educational inputs and outputs can nonetheless be obtained. Cross-sectional analyses of the relationships between inputs and output can then be made in a relatively easy manner. In the long-run, of course, it is necessary to establish an effective reporting system from individual schools to the sectoral planning office. Such a system will permit an evaluation of the current characteristics of
educational inputs and outputs as well as an evaluation of changes in these characteristics over time.

As in education, there is a need to carry out a detailed assessment of the capacity and efficiency of the Bolivian system of public health. This analysis must involve, on the one hand, investigating the health resources currently available in the country and, on the other, quantifying in as much detail as is possible the health levels of the population. An evaluation of the efficiency of the system must be made by relating current health needs to available health resources. Data on health resources may be gathered over the short-run by sample survey techniques. Interviews in a selected number of health establishments such as medical puestos, hospitals, private clinics, etc., as well as area surveys can be used to collect needed information on both medical and environmental health resources. Different sources will have to be exploited, however, to collect information on health status. In the long-run, of course, a major effort is needed to improve the collection of vital and health statistics at the community level. In the immediate period, however, the only realistic alternative is to conduct a sample survey of households for the purpose of obtaining information on morbidity and debility. Such information may be collected in the household survey in rural areas discussed above. Similar surveys may also be conducted in the urban
areas, although it is possible to obtain most of the needed information within the framework of the interviews for individual workers in the establishment survey. Furthermore, impressions and advice from the medical profession should be sought to supplement the information obtained by survey techniques. Together, this information should add up to a much more detailed picture of current health problems in Bolivia than is currently available. These results must then be compared to the quantity and quality of health resources available in the nation to ascertain whether health needs are being met.

While the collection and analysis of data described above will shed some much needed light on the characteristics of existing human resource instruments, it must be noted that it will also be necessary to ascertain the feasibility of establishing new policies and programs over the period of the initial human resource plan. It will be necessary in education, for instance, to explore the feasibility of instituting informal training programs in private industrial firms. The nature of such an assessment would essentially be to discover the policy instruments that can be used to induce Bolivian industry to perform this function. Information needed for this evaluation may be obtained within the framework of the establishment survey or through a small survey conducted only for this purpose by the sectoral planning office. Similar evaluations must also be made of the feasibility of combining training programs
within the context of on-going projects of a somewhat different nature. The most important of these is the feasibility of incorporating vocational training for agricultural workers into the framework of community development programs in the rural areas of Bolivia.

Because there is almost certain to be a serious shortage of qualified physicians in Bolivia for some time to come, one study that must be undertaken in health is an evaluation of the prospects and problems of utilizing para-medical personnel for the provision of basic health care. This study should consider, on the one hand, the possible reaction from recipients of such care and, on the other, the likelihood that the medical profession will be willing either to train or work with such personnel. As in other areas, this type of assessment should ultimately ascertain the range of possible policy instruments that may be used to induce either recipients or the medical profession to use the services of para-medical health workers. This information can give the planners a firmer notion of the substitution possibilities among resources needed to carry out health programs, and hence a firmer notion of the alternatives that must be considered in the planning program.

Towards the Design of a First Generation Human Resource Plan for Bolivia

Assuming that the planning mechanism can be organized in the manner specified above and that the basic diagnostic
studies suggested in the preceding section can be carried out, it will be possible to design a first generation plan for Bolivia. The scope of this human resource plan will have to be restricted at the outset, and perhaps limited only to the public sector. The plan can, nonetheless, establish for both long-run and short-run periods a consistent set of targets for a relatively wide range of policy instruments which have an impact on the formation, maintenance, and allocation of the stock of human resources. It is possible, in other words, to design a feasible set of policies or strategy which seeks to modify the stock of human resources in relation to the over-all requirements of the development program. After the preparation of the plan, additional research and data collection will be needed to refine the initial set of targets and to evaluate the initial choice of policy instruments. This section considers, however, only the tasks and techniques that are required to prepare a first generation human resource plan for Bolivia.

From a technical point of view, the preparation of this plan will require a new and expanded work program at both the central and sectoral levels of the planning structure. At the central level, i.e., within the Secretaria de Planificacion, there is the basic need to prepare an initial set of human resource guidelines which can be used in the formulation of sectoral programs. At the sectoral level, the planning work must be directed towards using these criteria in the design of
specific programs and projects. Central to the technical task of planning, in other words, are projections of the human resources required to promote accelerated economic development in Bolivia. These requirements must be consistent with the other aims of the development program as well as feasible in terms of the government's ability to execute policy. Like the planning program itself, these requirements may be partial and restricted to certain sectors or types of human resource inputs at the outset. But the lack of orientation and consistency among policies in the human resource field in this country requires that planners make an effort to prepare such projections.

In order to begin preparing such a plan, however, it is essential that the national government clarify the objectives and goals of the development effort in as much detail as is possible. This step is critical because it provides the basic orientation for the plan. In Bolivia, it is also critical because it would tend to clarify the government's real commitment to the development effort and, in so doing, to provide a rationale for allocating sufficient resources to the planning agency to permit it to carry out the work program. Such a clarification of goals is not likely to be easy or to be delineated in terms that will be very useful for purposes of planning. The reasons for this are because there are no really stable political institutions and because the continued operation of any government will be contingent upon a wide distribution of
political power and coalition support. This means that almost any objective established by the national government will have to satisfy a wide range of diverse interests and opinions.

Despite the detail in which the objectives may be stated, however, no meaningful planning can be carried out unless the political authorities provide such information.

In this regard, one of the first tasks of the central planning office might be to set forth a series of relatively broad options or alternatives for the direction of the development program which are at least consistent and realistic. The Secretaria might then seek to have the political authorities choose one such alternative which appears to them to be politically feasible. Even this type of information would be extremely useful to the development planners, and would provide a base upon which at least the first approximation of the development program could be prepared.

Once even a tentative set of objectives can be provided by the political authorities, central planners can begin to prepare a much needed long-term perspective plan. Designed for a period of perhaps 15-20 years, such a plan would provide the basic framework in which shorter-term plans and annual budgets may be prepared. This perspective plan should be "rolled" each year by adding one year to the plan for each year that has been completed. In this fashion, modifications to the over-all
framework for planning can be made periodically as new information becomes available or the development situation changes.

It is primarily within the context of such a perspective plan that an initial set of human resource requirements must be projected in Bolivia. Such projections should not be extremely detailed, and should be used essentially as first-round approximations in delineating human resource policy. In particular, the occupational and sectoral distributions of the labor force need not be projected in any greater detail than the one digit level of the standard classification systems for occupations and economic sectors. Needless to say, even such aggregate projections will have to be made in relatively simple and crude fashion because of the data that will initially be available.

It will be possible, nonetheless, to project the labor/output ratio (and the corresponding ratios for the sectoral and occupational distributions of the labor force) over time and to use these estimates as the basic framework for the target-setting process. The most feasible technique for making these estimates is the use of inter-firm or intra-sectoral comparisons of levels of productivity. It may be assumed, for instance, that the terminal productivity levels for an entire sub-sector will be roughly similar to the highest quartile of the current range of levels of productivity in that sector. Information on the current levels of productivity will, of course, be available from
the establishment survey discussed above. Occupational structures related to various levels of productivity as uncovered in this survey may also be used for estimating the occupational distribution of the labor force for the terminal conditions of the perspective plan.

These figures can then be used as a framework for projecting the required pattern of human resource use over shorter periods of time in somewhat greater detail. It is likely that a planning horizon of roughly one half of the total time period of the perspective plan, i.e., 8-10 years, can be used for this purpose. It must be recalled, of course, that a major proportion of the human resource program will not require setting targets for more than a decade in the future, and even those programs that require a longer planning horizon, e.g., university level education, may initially be evaluated within a perspective of one decade and later adjusted or extended over time.

Given the data that will be available, it seems clear that even these shorter-run human resource projections will be considerably more haphazard and crude than those envisaged in the first part of the study. One problem is that, even with the kinds of diagnostic studies suggested above, it will be extremely difficult to obtain detailed information on factor inputs and output. This means that estimates of sectoral production functions will necessarily be crude and only a rough notion about the complementarities or substitutability among factor
inputs can be obtained. Such estimates are nevertheless of critical importance to the human resource planning process in Bolivia. The reason is that the need to adapt or modify the Bolivian human resource stock depends almost entirely upon corresponding changes in the availability and utilization of other factor inputs; consequently, projections of human resource requirements may be wide of the mark unless they are prepared in the framework of relatively complete, albeit crude, production functions for each sector.

More particularly, it is likely that increases in real output in Bolivia over the next decade or two will depend more upon the exploitation of natural resources for purposes of building exports and the establishment of industries to produce goods currently being imported rather than any significant shift or expansion in the internal demand for goods and services. This situation is likely because of the natural resource position of the country, the absence of any significant structural relationships or economic interdependence among economic sectors, and the "openness" or degree to which the present economy is dominated by the external sector.

The implication of the foregoing is that output targets and projections of resource requirements will both turn on assessments of potential bottlenecks to increases in the supply or production of certain goods and services. This seems especially true for primary activities in the Bolivian economy such
as agriculture, mining, and petroleum, which undoubtedly will continue to account for a large proportion of total economic activity. It should be noted, of course, that the foregoing does not imply that the external demand for Bolivian goods is perfectly elastic or that patterns of domestic consumption will necessarily remain constant; indeed, analyses of trade restrictions and both external and internal income elasticities of demand must be made. It does seem, however, that factors affecting the supply of production will dictate the level and structure of economic activity over the next few years in Bolivia.

This being so, the central level planning work must be directed towards relatively broad assessments of the range of factor inputs and their combinations needed to break barriers to growth. These assessments should be carried out jointly by all of the operating divisions of the Secretaria de Planificación. The Human Resource Division should concentrate, however, on projecting more refined requirements for human resources. Data on capital/labor ratios and technological variations among firms gathered from the establishment survey will have to be used for this purpose. The objective must be to ascertain ranges of output for which a given set or type of factor input is needed. That is, since the relationship between various classes of inputs and output is likely to be discrete rather than continuous in most sub-sectors of the Bolivian economy, the objective must be to quantify the number and type of factor inputs
needed to produce a given range of output. The result of this work will then be a series of tentative output targets corresponding to alternative assumptions about the use and availability of various factor inputs.

These targets must then be evaluated in the framework of the long-term perspective plan, and perhaps adjusted by approximations until the shorter-run and long-run figures are consistent. It is important at this point, moreover, for human resource planners to evaluate the relationship between the implied utilization of the labor force and the employment targets articulated at a previous stage of the planning program. In the main, comparisons between the projected labor force and the set of projections of human resource requirements are needed to ascertain an unemployment or underemployment gap. Target figures may have to be modified in light of the findings of this assessment.

Assuming that a tentative but feasible set of manpower projections can be made by the central level planners, the next step in preparing a plan must be to incorporate these guidelines into the tentative design of specific sectoral programs and projects. Organizationally, the human resource division of the Secretaria must coordinate this work with the sectoral planning units. If the diagnostic studies of the systems in each sector have been completed, this step involves primarily the translation of human resource input requirements into "output" targets
for each policy instrument in the human resource field. In somewhat different terms, this step involves selecting appropriate policy instruments to reach human resource targets and determining the activity levels of each of these instruments. Until the problem areas and input projections have been made, however, it is difficult to specify the exact number or type of such instruments in the abstract. The point is that the planners must select, from a range of possible and feasible programs, some specific set of policies that will modify the human resource stock over given periods of time in the fashion tentatively required by the central level planning program.

In the context of those instruments affecting the formation of the human resource stock, such a selection of instruments and translation of targets can be done on the basis of converting occupational requirements into educational equivalents. Data collected on the formal and informal educational experience of members of the current labor force should be used for this purpose. Adjustments to these coefficients to allow for upgrading or qualitative improvements in the skill level should be made on the basis of both international comparisons and intra-occupational differences of the Bolivian labor force. These figures should then be used as basic output targets for various informal education programs and for each level and track of the formal education system.
The selection of policy instruments in the health field will depend upon a prior assessment of priority health problems in Bolivia. These priorities may be ranked on the basis of the sectoral and geographical priorities established in the first approximation of the development plan as well as on the basis of those problems having the greatest impact on the productivity of certain sub-groups of the human resource stock. Data gathered on the morbidity and debility of the labor force should be useful for this purpose, especially if calculations of the working time or product lost as a result of certain priority problems can be made. The policies and programs that are most appropriate in terms of combating these priority problems must then be selected on the basis of the technical advice of the sectoral planning office.

Rough techniques such as these must also be used in the field of labor allocation and deployment. Indicators of the efficiency of the labor market such as the mobility of labor and the wage structure gathered from the establishment survey must be used as the basis for programming in this sector. Together with the first round projections of manpower requirements, these data should be able to suggest needed policy instruments and their approximate levels of over-all activity. Despite the difficulties inherent in relating human resource needs to the nature and scope of certain policy instruments, attempts to do so will likely be more successful than it appears at first blush.
Again, much depends upon the care with which the work is done by the planning agencies at both the sectoral and central levels.

The preceding steps constitute the formulation of a first approximation of the plan. After this point has been reached, it will be necessary to assess the costs and feasibility of the plan. In light of the technical constraints on the planning process in Bolivia, it is doubtful that planners will be able to weight the relative costs and benefits of the plan in the manner envisaged in Chapter II of this study. It should be possible, however, to assess the minimum cost combination of programs needed to achieve a particular human resource target, and to evaluate whether this cost seems to be warranted in light of the expected impact of the programs. For instance, because of the likely propensity to rely on the formal education system as the primary means to modify the skill structure, and because of the inefficiency of that system, it is very probable that the cost of the system will be prohibitively high. Sectoral planners will have to examine methods of reducing these inefficiencies to reduce the over-all cost of the program. At the same time, these planners must look for other educational programs that will accomplish the same objectives at a somewhat lower cost. If relatively small absolute numbers of skills are involved, the planners must also assess the costs of importing such personnel over the short run.
Should the costs of human resource programs still remain prohibitive, the central planners must be notified so that production targets and input requirements can be scaled down to meet the realities of the situation. These modifications will then require working through the implications for sectoral policies. The result of this work will be a second approximation plan. The plan will be modified in this fashion until a feasible program has been achieved.

Such a feasible program will ultimately establish a set of consistent targets and resource needs for a series of policy instruments. The targets for any given point in time should then be used as a basis upon which to prepare the annual budget and policy directives of the national government. As can be imagined, this will complete only the first phase of the human resource planning program in Bolivia. Efforts will have to be made, for instance, to collect information so that planners can evaluate the progress and impact of the program over time, and thus to revise policies as the need arises. More important, of course, is an effort to assure that the policies and suggested budgetary allocations are actually carried out. While this may be primarily a political or diplomatic function, planning personnel of the Secretaria should be involved in this process. In particular, they must learn at what points in the policy-making process there is resistance to change, and in so doing, learn how policy recommendations may be made more palatable.
The strategy for planning human resources suggested in this section is, in other words, only a strategy for instituting the process. It goes without saying that much more will have to be done before that process is brought to a successful conclusion.
CHAPTER VII

SUMMARY AND CONCLUSIONS

Summary Statement of Study

The primary purpose of this study has been to explore the manner in which a comprehensive human resource plan might be prepared in an underdeveloped country such as Bolivia. Predicated on the fact that recent planning efforts have not really come to grips with the problem of adapting the stock of human resources to the requirements for accelerated economic development, the study was designed to assess how consistent policies affecting the formation, maintenance, and allocation of the human resource stock may be prepared in relation to the general development program. Since very little work has been done in this field, the analysis included discussions of both theoretical and practical considerations in the design of human resource policy. Thus, the first part of the study attempted to set forth a general conceptual framework or model of the human resource planning process. The second part then focussed more specifically on human resource planning in Bolivia, and was designed to appraise the relevance and feasibility of planning in the manner initially envisaged in conceptual terms.
More particularly, the theoretical half of the study attempted to define the nature of human resource policy and to explore the tasks and techniques that would be needed to plan such policies in relation to the development planning operation. Human resource policy was defined to include programs in all of the areas having a substantial impact on the skill level, health, and deployment of the work force. The ultimate task of the human resource planner was defined as assisting policy-makers in determining the activity levels of each of the policy instruments in these areas that would be required to achieve the economic targets specified in the general development plan.

Since human resource planning was conceived to be integrated, on the one hand, with the development planning operation and, on the other, with a series of diverse sectoral programs, the conceptual framework was designed in terms of a dis-aggregated planning structure with activities at both the central and sectoral levels. At the central level, the specific task of the human resource planner was to participate in the preparation of a general set of targets for the use of national resources over given periods of time. Within this context, the study assessed the manner in which projections of human resource requirements might be made as an integral component of the over-all process of establishing development targets. It was pointed out that while such projections normally have been made sequentially from a given development plan or a fixed set of output targets,
feasible human resource policy demands that human resource needs be determined simultaneously with requirements for other factor inputs and output. The analysis suggested that certain types of linear programming models are conceptually satisfactory for this purpose, although they are unlikely to be operational in most developing countries. A set of successive approximation techniques using a feed-back mechanism between the central and sectoral planning agencies was then set forth as a reasonable substitute for such simultaneous solutions.

The remainder of the conceptual portion of the study explored the manner in which sectoral planning units may utilize projections of human resource requirements in the formulation of operational programs and policies. In the education sector, it was shown that a consistent set of activity targets could be deduced by converting occupational requirements into educational qualifications. An analysis of system relationships may then be used as a basis upon which to design a set of educational policies that will fulfill the exogenously determined output targets at minimum cost. Although the use of human resource guidelines was seen to be somewhat less systematic in designing programs in the health sector, the analysis did suggest that priority health problems and hence policies could be identified in light of such criteria. Similarly, the analysis suggested that the use of human resource criteria in the design of labor allocation policies was also less than systematic, although such
guidelines together with analyses of the effectiveness of the labor market were judged to be a sufficient base upon which to prepare a sectoral program.

The second part of the study examined the relevance and feasibility of the planning model in Bolivia. An assessment of the development problems and human resource position of this country suggested that the model is both relevant and appropriate. The reason is that low levels of skills, poor health conditions, and an inflexible supply of labor resources appear to have been responsible in large measure for the stagnant rate of growth in real output that has prevailed in recent years in Bolivia. This, in turn, implied that human resource planning must be conceived in broad terms and must embrace a wide range of policy instruments if it is to be effective. It also implied that human resource planning must be closely related to the overall development planning operation in the country.

An appraisal of the administrative and technical capacity to plan human resources in Bolivia suggested, however, that it would be extremely difficult to institute a planning program without prior modifications in the organization of the planning mechanism and a concentrated effort to expand the technical base for planning. The administrative capacity to plan human resources at the central level was judged to be limited because of the absence of any effective coordination between the central planning agency and the rest of the national governmental
structure. There is a similar lack of coordination among the numerous agencies and organizations operating within each of the human resource sectors. The technical capacity to plan was judged to be inadequate primarily because of the lack of accurate data and the shortage of competent planning personnel.

A strategy for planning human resources in Bolivia was then set forth in light of both the conceptual model delineated in the first part of the study and the constraints on the current planning mechanism. The strategy spelled out the kinds of changes that must be made in the organization for planning and the areas in which the technical planning base must be expanded and improved if a comprehensive human resource plan is to be prepared in this nation. On the assumption that such modifications would be forthcoming, a set of basic planning tasks and techniques were specified for the formulation of a first generation plan. In general terms, this called for the preparation of both long-term and shorter-run projections of human resource requirements by the central planners, and the incorporation of these criteria into the design of operational programs in education, health, and labor allocation by the sectoral planning units. The techniques to be used at each level were seen to be somewhat less sophisticated than those suggested in the conceptual model of the planning process. It was argued, nonetheless, that a balanced and feasible plan may be designed through several rounds of successive approximation which modify in some
consistent fashion the programs established at both the central and sectoral levels of the planning structure.

Concluding Remarks

The principal conclusions which have emerged from this study may be summarized as follows: First, the analysis has suggested that it is essential to define the nature of the human resource problem in the less developed regions more comprehensively than has heretofore been the case, and that it is necessary to consider human resource policy in equally broad terms. Although this has long been intuitively clear, the case findings for Bolivia document somewhat more concretely the need to consider the formation, maintenance, and allocation of the work force as sub-elements of a single problem in the design of development policy. It is difficult, of course, to specify the extent to which any of these elements may dominate in other developing countries, but the Bolivian situation suggests that defining the problem in more partial terms will likely lead to inappropriate policy and, perhaps, a slower rate of economic development than would otherwise be possible. Thus, human resource planning along the lines of, say, the Mediterranean Regional Project appears to be too narrow, and must be broadened if it is to become an effective force in the decision-making process.

Second, the study has demonstrated that it is possible to conceive of a comprehensive human resource planning activity;
and, indeed, that a feasible planning program can be designed in a country such as Bolivia. One significant point in this regard is that it is possible to distribute a number of relatively different planning activities between the central and sectoral levels of the planning structure and still achieve consistent policies which are related to the general development program. Because of this possibility as well as the broader definition of the human resource problem, it no longer seems particularly useful to build uni-sectoral planning models which attempt to optimize investment in a sector with respect to some indicator of the level or structure of economic activity. This is important because such uni-sectoral model-building appears to be the direction in which future research in the field is headed. The work currently being carried out by such specialists as Bowles and Adelman is an indicator of this trend.

The present study has suggested, however, that it is not necessary to build such complicated quantitative models. Rather, the study has shown that it is possible to generate a common set of criteria within the framework of the development program and then develop a series of sectoral models which can help planners explore the implications for sectoral policy in a systematic manner. Since these sectoral models will be restricted to similar types of variables and coefficients, they can be more detailed and, hence, of greater value than more aggregate constructs. Inter-temporal linear programming models
which explore only the internal conditions of the education system needed to reach an exogenously determined set of activity targets at minimum cost are an example of the type of sectoral model that should be built in the future.

By the same token, it is essential that central level planning models consider human resource inputs in much more detail. This follows from the conclusion of a previous Chapter that human resource planners should not take development plans as given, but rather should work jointly with development planners. As a result, there is a need for additional research on the techniques that might be used for such a purpose. An important implication of calling for such research is that a continued distinction between human resource planning and other types of development planning no longer seems to be particularly meaningful. Indeed, since this study has suggested that there is a much more comprehensive concept of development planning than has been commonly supposed, it should be the final study in this narrow field. Additional research, in other words, should be directed towards expanding the coverage of development planning per se, both in terms of human resources and other variables that heretofore have not been included in development planning operations. Planners, of course, may continue to specialize in the human resource field, but a basic conclusion of the present study is that they cannot afford to ignore the context or framework in which their work must be carried out.
Third, it is important to call attention to the fact that human resource planning of the type envisaged in this study will place significantly greater demands on planners than otherwise would be the case as well as requiring much more in the way of data collection and processing. The requirements for data, in particular, are almost staggering, since information must be obtained on a number of diverse factors and be relatively detailed. It is not possible, for instance, to use aggregate or macro-economic data in assessing the complementarities or substitutability among factor inputs and more detailed micro-studies at the enterprise level will be required to carry out the planning program. Nor is it possible to analyze system relationships, say, in education, without a series of supplementary research studies on the factors affecting those relationships.

This implies that governments in the developing countries should not expect to obtain usable results unless they are both willing and able to provide sufficient financial resources and competent planners to execute the planning program. It also implies that technical assistance activities, especially those funded by international organizations, cannot be effective unless they have sufficient resources and time to do the work. Indeed, the study strongly suggests that the day of the one or two month "task force report" approach to human resource planning and policy is no longer valid—if, of course, it ever was valid. Unless such support and patience is forthcoming,
however, it is extremely doubtful that any planning program purporting to deal with the human resource problem will enjoy a high degree of success.

Finally, and perhaps most importantly, this study has suggested that the recent interest in planning human resources has been polarized, and much more cohesive efforts must be made to bring our knowledge of the process of human resource development to bear on the actual design and execution of policies in this field. There has been, for instance, a small group of scholars working on the relationship between human resources and economic development, another group working on planning methodology and perhaps the design of actual plans, and a third group working on the execution and administration of plans. Clearly, these areas are interdependent, and work in each one of them can be used to reinforce the others. Yet, few scholars have been interested in assessing this wide range of problems in a joint fashion. Even the present study concentrated on the methodology for, and feasibility of, designing human resource policy, and thus only scratched the surface of a set of complicated but important problem areas. Broader studies in the planning field, in other words, seem to be required. It is hoped, of course, that the present study may contribute to these future studies by having raised an appropriate set of questions and having pointed to the direction that new research should take.
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