



Micromanpower Planning in the Public Sector



U.S. ENVIRONMENTAL PROTECTION AGENCY
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MICROMANPOWER PLANNING IN THE PUBLIC SECTOR

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PREFACE

This book attempts to establish a systematic method for doing the type of manpower planning that is often required of organizations within the public sector of our economy. Both the institutional and technical aspects of manpower planning are developed. The level of development has been determined by the nature of certain presumed constraints. It was assumed that those individuals most likely to use such a book as we have produced, in fulfilling their governmental assignments:

1. Will be substantially limited in the resources available to them
2. Will not be uniform in their backgrounds and will thus bring different skills and understandings, as well as preconceptions, to their jobs
3. Will not, in many instances, be full-time manpower planners but will have other responsibilities

Because of these assumptions, our approach is intended as a relatively simple one. It is hoped that the approach is straightforward and free of demands for the elaborate manipulation of data and use of sophisticated analytical techniques. The book is self-contained and moves from the general to the specific. Chapter 1 presents an overview of manpower planning, while chapter 2 reviews the typology and history of the field. This material is presented upon the assumption

that the public micromanpower planner, the planner doing planning for a particular public agency, needs a "feel" for this newly emerging discipline.

In chapters 3 through 8, we present institutional background material with which the micromanpower planner must become familiar if his planning is to be effective. We intend these chapters to be introductory rather than exhaustive, intending only to introduce the manpower planner to the most essential fields of understanding. Greater detail will need to be added as the manpower planner develops greater expertise. To aid in this endeavor we have appended a list of suggested readings to each chapter.

In chapter 3 we examine the economics of the labor market. We present the basic structure of the labor market within a market-oriented economic system, as well as some of the principles upon which labor markets operate. As the manpower planner will be operating within such a system, and will thereby be affected by it, he or she should understand its operation. In chapter 4 we review the human resource development system of the United States. It is this system that the micromanpower planner will use for meeting much of the manpower needs of the agency. In chapters 5 through 7, we provide in detail some of the specifics of that system -- manpower training, personnel administration, and human engineering. In chapter 8 we review the expanding role of labor unions and collective bargaining in the public sector and how they can relate to the functioning of the manpower planner.

With chapter 9 we begin a different section of the book. We move from the general and institutional framework to a more specific and

analytical one. In chapter 9 we review some principles of general planning theory. With chapter 10 another step is taken toward the specifics of manpower planning, providing the theoretical underpinnings of this genre of planning. In chapters 11 through 16, we develop the specifics of a system of micromanpower planning in the public sector. First is presented the outline of a data system. Without a well-conceived system for the collection and analysis of data, manpower planning would be little more than crystal ball gazing. Some instruction on how these data may be used to identify and analyze current and potential manpower problems is provided. As the problems discovered or anticipated will vary from agency to agency, no attempt will be made to show how those identified problems can be specifically resolved. This must be left to the ingenuity of the manpower planner, assisted by training and personnel management experts. In chapter 16 we outline a system of performance control which includes the monitoring and evaluating of programs, including the planning itself, with a continuous feedback mechanism so that steps can be taken to correct any deficiencies. In chapter 17 we discuss several issues related to the implementation of a manpower planning system within a public sector organization.

This book has been written by two economists -- one who specializes in labor problems and manpower economics and the other in public sector issues -- though many other individuals have contributed to its development. Members of the manpower development staff of the Office of Water Program Operations in the Environmental Protection Agency (OWPO-EPA) have provided invaluable assistance. This agency was given the

responsibility of providing for the increased need for manpower that was expected to occur as a result of EPA programs to expand and improve wastewater treatment facilities. They realized, before federal law formally encouraged it, that manpower planning must take place not only in Washington, but also in federal regional offices as well as at the state and local levels of government. A program was initiated that would develop an appreciation for, as well as the initial, though elementary, ability to engage in, manpower planning at all levels of government. Morton Ettelstein, of the manpower development and training staff of OWPO, was the director of these various activities and continues to be an important force for developing manpower planning within the environmental fields. He has been a source of guidance and criticism in the development of this volume and has served as a sounding post for our various ideas. He has consistently brought us from the rarefied academic air (with limited success, he has often asserted) to the "nuts and bolts" level of application.

In this volume we bring together two manuals used in OWPO-EPA-sponsored manpower workshops and add several chapters containing approaches and materials not previously included but pertinent to the micromanpower planning process. We generalize the manpower planning process so as to apply to other areas in which public manpower planning is undertaken. What we have presented is an elementary and preliminary excursion into public sector micromanpower planning.

INTRODUCTION: AN OVERVIEW OF
MANPOWER PLANNING

Manpower planning is a process the ultimate goal of which is to ensure that the right number and right kind of people are at the right place at the right time doing those things for which they are economically most useful (Vetter, 1964). Attaining this goal (or objective) requires the simultaneous satisfaction of its various components or subsidiary objectives. In order to satisfy these objectives the manpower planner must develop the capability to successfully engage in a variety of related tasks. He or she must have the ability to translate an organization's general objectives into its manpower implications, a capability for measuring current and forecasting future manpower requirements, an ability for analyzing present and future manpower conditions, the capacity to identify existing and incipient manpower problems, and the expertise to develop programs to eliminate or ameliorate problem areas while maintaining well-functioning existing operations.

Manpower planning is required at all times. It is not a process that is adopted only when the labor market mechanism fails. Organizations operating in well-functioning labor markets must also engage in manpower planning. The emphasis may differ among organizations according to the type of labor market conditions they usually experience,

but some form of planning will nevertheless exist. At one extreme, the decision to engage in no formal planning, other than hiring and firing as the need arises, is actually an informal plan to subject the organization completely to the functioning of the external labor market -- whether for good or ill. When confronted with a poorly functioning external labor market, the manpower planner will find that different emphases will often arise. Among these will be the greater attention given to the establishment of, or improvement in, an internal labor market. Such an emphasis would imply an increased allocation of the organization's resources for training programs and the formation of a viable career ladders system within the organization. These activities will further require that the organization determine more carefully what its current and future manpower and training needs are most likely to be.

Manpower planning for a specific organization is related to the organization's overall plans and objectives. The present and expected future activities of the organization require manpower for their completion. How efficiently such activities are pursued will depend in large measure upon the manpower employed. It is an important function of manpower planning to provide for the determination of the appropriate manpower requirements and to plan to meet them. This requires that the manpower implications of the organization's objectives be translated, wherever possible, into measurable or operational terms.

Changes in an organization's objectives and activities will in general involve not only changes in the level of required manpower

but also in its composition. The type of work to be done must be identified and translated into particular occupational structures. Manpower planners, though not necessarily doing this work themselves, must see that it is done. The outcome of these activities will be information on such matters as the size, occupational makeup, skill level, and the spatial and temporal deployment of the organization's manpower requirements.

Manpower planners will need to measure current employment (or staffing) and its various characteristics and estimate the composition of future employment needs. Among those characteristics with which they should be concerned, in addition to levels of current and expected future employment, are such items as quits, vacancies, retirements, and wage levels. Planners will need to determine whether current employment or staffing is satisfactory and thus equal to current manpower requirements. They must determine reasons and offer remedies for any deficiencies in employment. They will be required to determine what special provisions, if any, will be required to ensure that future employment will at least equal future manpower requirements.

A considerable amount of the manpower planners' time will be spent in determining what specific manpower problems their organizations are confronted with. How successful they are in this endeavor will depend upon the analytical skills they command. They will also need to develop, in cooperation with other members of the organization's staff, programs designed for the elimination or amelioration of specific manpower problems. If shortfalls between expected employment and forecasted manpower requirements exist, for example, they will need

to develop recruitment and retention programs to eliminate shortfalls. If the organization's work is inefficiently done, they may have to call for the introduction of new training programs or improved methods for using current staff.

The results of these various activities will be presented to those within the management of the organization to whom the manpower planners must report and to those who will use such information in the completion of their own work. On the one hand, the planners must report to management on how well they are performing their tasks and present an assessment of their own manpower needs; while on the other hand, they must provide written reports to those who are engaged in recruiting new employees and improving the skill levels of existing employees. A well-conceived manpower report will contain the following information:

1. An articulation of general organization objectives, accompanied by their translation into manpower implications
2. A display of all places where work is done within the organization
3. A list of job descriptions for all occupations within the organization
4. Measurements of current employment characteristics, including such measures as level of employment by occupation; level of manpower requirements; vacancies in budgeted employment; rates of such items as quits, transfers, and separations; and levels of wages
5. Forecasts of future employment characteristics

6. Analysis of manpower data for the identification of existing and potential manpower problems
7. The development of plans for the elimination or amelioration of these manpower problems
8. A numerical display of specific training needs
9. Description of how the manpower planning process has been changing (improving) over time

In brief, manpower planners will need to know the business of the organization for which they are planning, to translate the general objectives of their corporations into specific manpower objectives, measure current and forecast expected future employment characteristics, determine the presence or potential presence of and provide for the remedy of possible manpower problems, and develop an ongoing system that monitors the planning process and provides for its continuous improvement.

In addition to these in-house tasks, manpower planners must become familiar with, and develop a working arrangement with, various public and private institutions that can assist them in their various manpower efforts. This familiarity will enable manpower planners to enlist outside assistance wherever it will serve to the advantage of the organization for which manpower planning is being done. In addition, they can help in the development of other agencies and institutions so that assistance from these entities will be of the greatest possible value.

Illustrative of these agencies and institutions are the various elements of the educational and training establishment, both public

and private. The extent to which these can be relied upon to prepare potential employees, or assist in the upgrading of current employees, will have a great bearing upon the planner's effectiveness. Another especially important area consists of the employment agencies -- public and private. Their acquaintance with the various types of labor supply can be of inestimable assistance in the acquisition of needed manpower. A third area of importance to the manpower planner consists of labor unions and employee associations. While it is true that these are primarily interested in serving their particular clientele, frequently their interests merge with those of an organization doing manpower planning. Furthermore, cooperation is often a better approach than conflict.

The fourth area which the manpower planner should cultivate consists of the relevant industry associations. Manpower planning efforts can be assisted by an industrial association set up to handle problems characteristic of the industry as a whole. The fifth area consists of the rapidly growing professional field of manpower planning. Contact with the growing group of professional manpower planners can help strengthen the theoretical as well as "how to do it" capabilities of a manpower planner.

THE DEVELOPMENT OF MANPOWER PLANNING

Manpower planning, as a field requiring professional expertise, is a relatively new development. It is largely a product of the 1960s and '70s which has generated a new profession -- that of the manpower planner. This is not to say that elements of manpower planning have not existed for many decades. Education, an essential element of manpower planning, has of course been planned and implemented to some degree almost since the founding of the nation. Skills training, largely a product of the twentieth century, is nevertheless a half-century old. Personnel administration and human engineering have likewise been existent for most of this century. However, these efforts were largely uncoordinated and sometimes even counterproductive to meeting the needs of the society and the economy. In the 1960s, economic and social philosophers came to the realization that if the nation was to meet the needs delineated by the American people -- that of stable but continuous economic growth, providing jobs for our growing population and with adequate consideration to the quality of our environment -- the development of human resources would need coordinated planning. From this perceived need, manpower planning has emerged.

SOME FUNCTIONS OF MANPOWER PLANNING

Just as modern management practice demands planning in the use of natural resources, the development of a capital structure, market expansion, and positive labor relations, so also does it require the

planned use of its manpower inputs. The use of the term "manpower" may be a little misleading. As commonly used, it means the use of human resources and is not limited as to sex or as to skill or professional level. The use of the term "planning" infers the consideration of the future in today's activities. No manpower planner can plan in a historic or futuristic vacuum. Account must be taken of what has taken place in the past, what is presently taking place, and because the future is unknown, what is most likely, among several alternatives, to take place in the future. The manpower planner must evaluate past performance to know what has taken place, monitor ongoing programs to know what is taking place, and make forecasts of possible future conditions and events to estimate what is likely to take place. Once tentative judgments have been made as to what may take place in the future, the manpower planner can identify those events which may cause problems and offer alternative plans for resolving them. Even in the unlikely case of anticipating no "problems," the manpower planner should be constantly involved in improving the use of manpower.

UNIVERSAL EXPERIENCE IN MANPOWER PLANNING

No single concern has more generally permeated the full range of economic and social activities throughout the world over the past two or three decades than the concern for manpower as a human resource. There are many reasons for this concern. Government policies aimed at maintaining or achieving full or high levels of employment have become a political imperative in every industrial democracy. In an industrial society the majority is dependent upon their income from

productive activity, while in a democratic society the majority of citizens will demand that the government meet those needs they cannot meet themselves. Job creation is high on the list of such needs. In addition, because inflation is a major obstacle to the achievement of full employment and diminishes the purchasing power of incomes, nations pursuing the goal of controlling inflation must train and upgrade their workers and improve their labor markets to reduce the inflationary impact of government employment policy. As advanced societies meet more and more of their basic needs for goods, the emphasis of consumer demand shifts toward the more labor-intensive services. In the capital-goods sector, the technology becomes more developed and requires more advanced human inputs from trained minds and hands. Warfare tends to demand and absorb the best technical manpower. With more and more people living closer and closer together, served by more and more technology, the complexities of life demand more human effort in planning, control, and remediation. Meantime, those countries in search of modernity must pursue the same excellence in human resources, leaping over those years when concern with the development of capital and natural resources was dominant.

To show the universality of national manpower planning, a discussion of a few international examples will be enlightening. The nature and objectives of the economic and political environment. Manpower policies that are developed in such countries will reflect these differences.

Manpower planning in western and northern Europe is similar to that in the United States in having as its major objective the social

welfare of wage-earning families. Subsidiary, but important to this objective, is the reduction in inflationary pressure induced by a policy of maintaining full or nearly full employment. The immediate goal of such planning is to provide a job for all who desire it -- a goal made possible by the rise of the working class to political power. The need for adopting such a goal comes about in part because of maladjustments existing in the marketplace for which corrections must be made. The achieving of this goal is made easier by the small-size, population homogeneity, ideological commitment, and low birthrate of the countries involved.

The objective of manpower planning in the Soviet Union is the efficient use of a scarce economic resource -- manpower -- and is an integral part of their national economic plans. The U.S.S.R. still faces labor shortages because of the great population losses during World War II, yet its economic development plans require dispersal of population and manpower over a vast expanse of territory. Soviet policies provide incentives for workers to move to undesirable locations and to work at "productive" (goods-producing) rather than "unproductive" (service) jobs. Despite its reputation for compulsion, the Soviet Union seems to have given up most of the various forms of compulsion it once used and now relies primarily on monetary incentives in its manpower programming. Compulsion, however, remains as the ultimate tool of manpower policy and is used when needed.

Japanese manpower planning is dedicated to the maximum use of the labor force and is made necessary by the existence of rapid economic growth, a reduced birthrate (induced by a vigorous program of birth control), and a paternalistic employment system. Numerous policies and

programs have been instituted to increase the labor force through increased participation of women, older workers, and rural residents.

In contrast to these activities in developed countries, the developing agrarian nations find themselves in the quandary of too few educated and trained workers and too many uneducated and untrained citizens. Their manpower plans usually contain programs for the development of rudimentary school systems designed to increase literacy. They also have programs either to send their nationals abroad for certain education or training or to attract citizens from other countries to provide the needed initial cadre of entrepreneurs, managers, engineers, technicians, and teachers.

TYPOLGY OF MANPOWER PLANNING

Four types or levels of manpower planning have emerged within the United States, each with its own role, objectives and techniques:

(1) national macromanpower planning to determine the levels of economic growth necessary to achieve employment targets or to fill the human resource needs for meeting national goals, (2) national manpower program planning for administration of national programs designed to remedy the problems of special groups of persons, (3) area labor market manpower planning to identify contemporary and future manpower problems of individual area labor markets, and (4) micromanpower planning for the specialized needs of private business firms, employer associations, employee associations, and public agencies. Examples of each will better illustrate the role and techniques of the manpower planner in modern society.

Macromanpower Planning

An oversimplified version of national macromanpower planning would include: (1) forecasting the size of the labor force in the following years, (2) estimating the level of economic production -- gross national product (GNP) -- likely to occur without policy measure changes, (3) estimating the level of employment likely to be generated by that GNP, (4) deciding upon an employment target, and (5) devising policies, consistent with other economic and social goals, to reach that target.

To illustrate these five steps, we introduce a simple example. Let us assume that the size of the labor force (those employed plus those seeking employment) next year is to be 97,000,000 persons. Let us now suppose that the estimate of the GNP next year is \$1,500 billion and that this level of GNP will generate employment for 91,200,000 persons, which is 94 percent of the projected labor force. If it were now assumed that 95 percent employment of the labor force is the full or at least optimal employment level, implying employment for 92,200,000, an unemployment gap of 1,000,000 people would exist, and steps would then be suggested to eliminate this gap.

Macromanpower planners have several tools for reducing unemployment. One set of tools is "fiscal policy," the manipulation of taxes and government spending, either automatically or by discretion. The reduction of taxes will usually increase the money people have to spend, and if they so respond, will increase private purchases and production and therefore employment. The increase of government spending results in increased production and consequently increased employment. Either of these two actions, all others remaining constant,

will result in an increase in the national debt. The use of the first, a decrease in taxes, bolsters the private economy, while the increase of government spending increases the role of government -- at the national, state, or local level (depending on who does the spending).

The other major set of tools is "monetary policy." Most monetary policy is engaged in by the federal reserve system and consists of the manipulation of the money supply, through the credit system. To increase employment, the federal reserve officials can stimulate the creation of credit, which will give people more money to spend, stimulating production and therefore employment. This action results in an increase of private debt.

It is now generally conceded that the United States can attain any level of employment it wants. However, in accomplishing this, the American public insists on price stability and maximum personal freedom. While each of these goals -- full employment, price stability, and maximum personal freedom -- is laudatory, a growing proportion of economists has reached the conclusion that they cannot simultaneously be achieved -- at least not at our current stage of knowledge and practice. The problem is that as steps are taken to reduce unemployment, inflationary forces are induced, and as steps are taken to curb inflation, unemployment increases. An apparent solution is price and wage controls; but these limit personal freedom -- something unacceptable to Americans except perhaps in an all-out war or circumstances in which national survival is felt to be at stake.

While the primary tools used in reaching the target of full or optimal employment are such items as expenditures, taxes, and monetary variables, there is growing interest (though not as yet much skill) in using education, manpower training, public employment, and other labor market measures as anti-inflation devices to assist in reaching macromanpower planning goals. It is maintained by some manpower economists that by activities to increase the effectiveness of the labor market, by removing artificial barriers to employment, by increasing the extent of labor market information, and by increasing the mobility of workers, the "bottlenecks" creating inflationary pressure consequent to anti-unemployment measures will be broken. The big problem is that the imperfections of the labor market are particularly well entrenched. Their removal cannot take place overnight, but apparently only over substantial periods of time.

Another category of national macromanpower planning, much neglected, is that involving the macromanpower effects of changes in national policy not directly related to manpower, but having manpower implications. Examples of this are decisions to increase international trade, which may result in great changes in the demand for domestic labor. Another is the declaration or elimination of war or the imposition or elimination of compulsory military service with its sizable effects on the supply of civilian labor. Another example of a possible macromanpower problem would be the effect of an equal rights amendment, at least theoretically giving females equal access with men to the labor market. The decision to reach the moon had great manpower consequences,

just as the decision to downphase the space program had considerable macromanpower effects. Ideally, there should be manpower planners who can anticipate the manpower effects of such changes in national policy, suggesting alternative means of reducing the negative effects of such policies.

While macromanpower planning may seem far removed from the operations of other manpower planners, the ease or difficulty with which other manpower planners are able to accomplish their work will be affected by macromanpower successes or failures. It would seem, therefore, that other manpower planners must become familiar and conversant with what is taking place with manpower issues at the "macro" level. A start in providing material pursuant to this end is found in some of the remaining sections of this chapter and also in chapter 3.

National Manpower Program Planning

During the 1950s, manpower policies and programs in the United States concentrated on producing a supply of highly educated scientists and engineers devoted to keeping ahead of the Soviet Union in the arms and space races. Persistently rising levels of unemployment during the late 1950s and the explosive race issues of then and the early 1960s turned attention to new issues. It was found that not all classes of workers experienced the same levels of unemployment or employment. It was discovered that blacks and chicanos suffered unemployment rates approximately double that of their white counterparts. American Indians were even worse off. The youth were found

to have unemployment rates triple that of the population in general. Ghettos and rural backwater communities had unemployment rates several times that of city suburbs. Unskilled laborers had unemployment rates much higher than semiskilled or skilled workers, the same being true for the poorly educated as compared with the well educated. There were some groups who suffered severe competitive handicaps in getting and retaining jobs, as well as in maintaining equitable wage rates. Alleviating the competitive handicaps of those persons in or entering into the labor market, who were unable to obtain adequate employment and earnings, became the dominant objective of national manpower policies in the 1960s. In the 1970s with the general level of unemployment rising, concern began to be expressed for other groups, such as unemployed aerospace workers and returning veterans. The 1970s also produced a change in the focal point for much manpower program planning, decentralizing it down to the state and local levels but with a retention of some federal presence.

Emergence of the National Manpower Programs

A series of programs in the 1960s emerged in an attempt to meet these needs: the Manpower Development and Training Act (MDTA); the Economic Opportunity Act (EOA), with its Neighborhood Youth Corps, Job Corps, Operation Mainstream, and New Careers Program; Job Opportunities in the Business Sector (JOBS); the Work Incentive (WIN) program to rehabilitate welfare recipients; and the Concentrated Employment Program (CEP) which attempted to bring together all manpower programs in a concentrated area. These comprised the more important ones. The Emergency Employment Act (EEA) of 1971, also known as PEP

(Public Employment Program), which sought to employ the unemployed or underemployed (especially veterans) in public sector service jobs was in effect from 1971 through most of 1974, and continuing into 1975.

This variety of categorical programs -- all (except for the last mentioned) aimed at essentially the same disadvantaged target groups but having different administering agencies; funding procedures; eligibility requirements; levels of federal, state, and local authority; and mixes of services -- was confusing and hard to administer. National policy-making tended toward uniform program directives regardless of local situations. Categorical programs required enrollees to fit program requirements in order to receive available services, rather than having a package of services tailored to individual needs.

Policymakers have never been able to make up their minds whether the basic obstacles to adequate employment and income for so many were the result of individuals' lack of qualifications and motivations or institutionalized discrimination in the hiring process. For policy, the answer made all the difference. Some programs leaned one way and some the other. Most assumed that the individual, rather than the institutions, had to change. But increasingly we are becoming aware that there are institutional barriers requiring institutional reform, the removal of which will improve the ability of individuals to change.

Cooperative Area Manpower Planning System

The Cooperative Area Manpower Planning System (CAMPS) was created in an attempt to coordinate all of the agencies and programs. Representatives of each agency involved in funding and administering manpower programs in a state or major metropolitan area met, explored state or local employment problems, identified target groups, and

informed each other of their plans. This cooperation was, however, a case of equals working with equals, with no one having authority to reallocate funds across program lines if one program should seem better adapted to the current or local situation than another.

In each state, the employment service provided much of the CAMPS leadership, but most agencies involved in manpower programs were included. Each state was to draft a state plan for the delivery of manpower services. As the system expanded, the Office of Economic Opportunity, the Departments of Commerce, Housing and Urban Development, Agriculture, and Defense, along with the Civil Service Commission, became signators to the interagency guidelines setting up CAMPS in the spring of 1967. In 1971, with the increased concern for the environment, the Environmental Protection Agency was added as a signator.

The system included regional, state, and local CAMPS committees. The local committees were to draw up their plans, under federally issued guidelines, to be forwarded to the states and there consolidated in state plans to be forwarded for regional approval. Individual federal agencies maintained the power of final approval of their individual programs.

While CAMPS was far from perfectly effective, it established a mechanism for communication among agencies that provided manpower and manpower-related services, and it pointed to the need for more power through control of funding if it was to be an effective planning agency. The Labor Department continued to be the primary advocate and user of CAMPS, with most of the other agencies providing varying degrees of resistance or acceptance.

The Emergence of State and Area Manpower Planning Councils

Frustrated by the details of administering programs under the restrictions of federal guidelines, a few governors and mayors began to demand and play a stronger role in the planning and administering of manpower programs. Some were irritated by the fact that federal manpower funds tended to bypass them in going directly to either autonomous state educational and employment service agencies or to quasi-private community action agencies operating at the local level. Through legislation or executive order, a few governors and mayors began to intervene with their own staffs and organizations. Examples of such organizations are New York's Human Resources Administration, Utah's State Manpower Planning Council, and California's Department of Human Resource Development. Within whatever discretion was available under federal law, they wanted to shape manpower programs to fit state and local, political, and economic needs.

The Labor Department became increasingly aware of the objective need and political pressure to decentralize more manpower policy decision making to the regional, state, and local levels. It went as far as the law allowed toward decentralization. A concomitant of this was the decategorization of the scores of categorical manpower programs to give more flexibility in determining the mix of services. A variety of legislative proposals was made to effect this flexibility. The Department of Health, Education, and Welfare (with its Office of Education) was a major participant but less committed to decentralization and decategorization, retaining more control at the national level.

In the meantime states (and a limited number of local governments) were given federal funds through CAMPS for manpower planning

staffs. This contribution from CAMPS placed personnel on the staffs of large city mayors and of governors who had an interest in enlarging the roles of their principals -- and therefore themselves -- in manpower decisions, and constituted a cadre as many as a thousand non-federal planners (financed by federal funds) engaged in manpower programs for the disadvantaged. EEA or PEP funds were used to increase the number of local and state manpower planners. This was in addition to the manpower administrators already on state and local government payrolls. Most of these personnel had limited backgrounds and training in their new assignments. In addition, involvement of private industry through the National Alliance of Businessmen's Job Opportunities in the Business Sector (NAB-JOBS) as well as institutional MDTA and on-the-job training produced an uncertain number of manpower staff on private payrolls, adding to those already employed by private agencies administering Job Corps and similar programs. However, at that point, federal manpower staffs were still more numerous and more experienced, although most of them were better described as administrators rather than as planners.

President Nixon in 1971 and again in 1972 asked Congress for manpower revenue sharing in which blocks of manpower money would be made available to state, larger local units, and consortia of governments with few strings attached. Such monies, coupled with the limited manpower monies appropriated by state and local governments, could have enhanced the ability of those units to do manpower planning. There was, however, much concern over the ability of such units to do effective planning and to do the type of planning that would meet the national goals of emphasizing assistance to the disadvantaged.

These concerns became somewhat academic with the passage and signing of the Comprehensive Employment and Training Act (CETA) in 1973.

Interagency Cooperative Issuances No. 72-1 and No. 72-2

Meanwhile, in 1971 the National Manpower Coordinating Council (NMCC), faced with eventual decentralization and in a move toward revenue sharing, issued interagency Cooperative Issuance No. 72-2 in recognition of the "lack of impact of CAMPS on funding decisions." The issuance called for both structural and functional revision of CAMPS, allowing for increased initiative by state and local officials in the planning and initiating of manpower programs. Former state CAMPS committees became state planning councils and local CAMPS committees became manpower area planning councils. The primary tasks of these councils were:

1. To advise elected local officials, governors, and regional officers of locally conceived area and state manpower needs.
2. To assist local elected officials and governors in the development of plans to meet these needs, including priorities and recommendations for funding.

These plans were to include all manpower and manpower-related programs, irrespective of funding source. In the case of programs funded by the Manpower Administration and agreed upon by regional officials, these plans constituted action plans for funding to the maximum extent possible under existing law. With respect to agencies other than in the Labor Department, "plans" were merely recommendations.

State and area councils were supported by independent secretariat staffs. Area plans were submitted through the state manpower planning

council, with its comments to the regional manpower area planning council which had the opportunity to comment on the state plan.

Membership on the manpower councils was expanded to include:

1. Representation from the broad spectrum of community interests
2. Decision-making-level agency representation
3. Client group representatives chosen by the clients
4. Representation from the public, business, and organized labor

Area Labor Market Manpower Planning and CETA

The Comprehensive Employment and Training Act of 1973, with its emphasis on local and consortia manpower planning, has created a new type of manpower planning -- that for a given area labor market. While a labor market for certain specialized occupations may be international, national, or regional in geography, practically speaking, most labor markets are limited to being within reasonable commuting distances. This is especially true for the clients to be served by CETA money, for their financial resources and the types of jobs they hold do not permit them to commute too far. This labor market may be limited to a city or a group of closely related communities within a fifty- or sixty-mile radius. Because CETA and its immediate predecessors have been the primary stimulants to area labor market manpower planning, it will be well to look at this legislation in some detail.

In December of 1973, Congress and the Nixon Administration compromised on their differences, the result of which was CETA. This Act marked a milestone in federal-state-local relationships, for the

federal government gave up much of its detailed manpower planning and supervision to state and local prime sponsors.

Under this legislation a block of manpower money was provided to the Labor Department, only a small portion of which remains for the use of the department for programs deemed essentially national in their implications. These are primarily the Job Corps, Indian Youth, and migrant manpower programs, along with research and demonstration projects. The great bulk of the money is allocated by formula to state and local prime sponsors for their manpower programs for the disadvantaged, unemployed, and underemployed.

Prime Sponsors

Each city or other local unit of general government, such as a county, with a population of a hundred thousand or more, along with other strategically important geographical areas with exceptional problems, is an eligible prime sponsor and entitled to receive a CETA grant. To receive a grant, the unit must submit a plan of service to the regional offices of the Labor Department, where it is approved. Consortia of local governments may be established, linking up other contiguous local government units not eligible for prime sponsorship with eligible prime sponsors. Such consortia are encouraged by 5 percent incentive money. For those areas of a state not eligible as prime sponsors and not associating in consortia, the state is the prime sponsor. In addition, where all eligible local prime sponsors in a state elect to do so, they may designate the state as the prime sponsor, and the incentive money will go to the state.

When all eligible local prime sponsors elect to have the state act as prime sponsor, local area plans of service are merged at the state level in a state plan for submission to regional Labor Department officials for approval and funding. On the other hand, where eligible local prime sponsors or consortia elect to remain independent of the state, they formulate their plans, submitting them directly to the region and, concurrently, to the governor -- but only for his comment, not his approval.

CETA Planning Requirements

While the appropriate chief elected officials are responsible for the plans of service, these plans are to be drafted with the aid of professional staff and the advice of a manpower planning council that is broadly representative of the community. Regional Labor Department officials, who are empowered to approve plans of service, are instructed to allow maximum freedom to prime sponsors in developing their own mix of services. However, regional officers must determine that the plans meet the requirements of CETA and that:

1. The application is complete
2. Needs and priorities are documented
3. Planned expenditures are substantiated
4. Performance goals are reasonable
5. The population to be served is involved in the planning process
6. The method of delivery is supported as to availability and capability

7. Maximum effort to meet the previous year's goals was made
8. Administrative costs are reasonable
9. There are adequate internal administrative controls
10. Opportunity was provided for comment by all parties

To meet their responsibilities, regional officials are expected to monitor and evaluate prime sponsor manpower operations. However, it is anticipated that their emphasis will be one of technical assistance, rather than a policing activity.

As stated earlier the eligible clients or population to be served by CETA money consist of the unemployed, underemployed, and the disadvantaged. An unemployed person is one who is not working but is available to work. An underemployed person is one who either works involuntarily part time or who works full time but whose income is below the poverty level. A disadvantaged person is one who belongs to a family on welfare or whose income is below the poverty level.

Programs to upgrade personnel are possible so long as they are tied to those who are eligible to be involved in CETA financed programs. While prime sponsors are not required to maintain previously financed manpower programs, it is anticipated that most plans will emphasize:

1. Training programs for youth
2. Initial or entry-level training
3. Subsidized public and private employment
4. Programs for racial or ethnic minorities

Under MDTA, the Department of Health, Education, and Welfare (HEW) was a partner (if a junior one) in the administration of the

program. Under CETA, it is not a signator, the administration lying in the hands of the Labor Department. However, HEW receives some CETA money to enable it to coordinate its activities with the Labor Department and state and local prime sponsors. The details of HEW's involvement will be found in a subsequent chapter.

In January of 1975, CETA was amended, providing Title VI monies for a permanent public service employment program designed as a countercyclical device in which public service employment would expand in times of recession and decrease as unemployment diminished. Contrasted with the PEP program, funds were channeled through the existing CETA establishment; but similar to PEP, the monies were for the unemployed (thirty days or more) and the underemployed (those involuntarily employed part time and those employed at wages providing income below the poverty level). The determination of eligible clientele within those requirements was up to the prime sponsors. Under the guidelines, for the nation as a whole there was apparently considerable "skimming" in which the highest qualified of the unemployed or underemployed were hired, leaving the hard-core disadvantaged without jobs. This was probably to the advantage of the employing agencies, but it was severely criticized by those who maintained that public service jobs should be concentrated among the longer term, more disadvantaged unemployed.

MICROMANPOWER PLANNING

The major purpose of this manual is to meet the needs of micro-manpower planners in the public sector. In subsequent chapters material will be presented to give these individuals perspective in the

ramifications of their jobs. Such a perspective will be enhanced by an understanding of the role of micromanpower planning in the private sector. The remainder of this chapter will therefore be devoted primarily to a discussion of the basic principles and steps of micromanpower planning in general -- that type of manpower planning conducted to meet the manpower needs for a particular industry, company, or agency. It is from this general field of micromanpower planning that specific steps in micromanpower planning in the public sector will be derived.

Organizational or Micromanpower Planning in the Private Firm

Manpower planning in the business firm is a relatively new activity. In the past, most employees have needed only the most rudimentary training for their jobs, and such skills could be replaced with ease if new skills were needed. However, with unionization, seniority rules, benefit packages, and changes in business practices, there has developed a tendency toward the development of careers, reducing turnover and making for a greater interdependence between employers and employees. A higher proportion of employees are now skilled workers, technicians, engineers, scientists, and others with long training times in whom firms may have made major investments and who firms want to retain. Professional business management puts a premium on looking ahead to see that each supervisor, manager, and corporate officer is understudied and the right replacement is in the right place at the right time. Whereas the primary personnel concern was once human relations (to keep employees happy despite the necessity for discipline) or labor relations (keeping the peace),

manpower planning with its career implications is now rising in importance to both.

The primary motivation for business firms to be involved in manpower planning is its ability to contribute to profits. Thus if the costs of manpower planning and development are less than the potential benefits, planning will be done once the relationship of costs to benefits is known. Increasingly, larger firms include, as potential benefits, the public esteem that may come from demonstrating a social conscience in their manpower policies as well as the direct benefits that may be derived from cooperating with government in its attempt to achieve certain social goals. This is especially the case in the hiring of disadvantaged people. These inclusions enhance the prospects for manpower planning.

In its manpower planning, a firm must take four unique and important manpower characteristics into consideration:

1. To reach maximum productivity in higher skills, an individual must prepare by way of education and training for a long period of time.
2. The value of workers generally appreciates, rather than depreciates, from use for a substantial period of time.
3. An investment in manpower becomes the possession of the individual who is free to leave the employment of a firm or agency almost at will, though he or she may well remain in the industry.
4. Personal satisfaction plays a key role in a worker's productivity and stability.

Employers' manpower needs depend upon the product or service they sell, the technology used, and the profitability of the firm. The available manpower depends upon the population, the labor force

participation rate (the percentage of the population in the labor force), the human resource development system, and the demands of other employers.

To project manpower needs, therefore, entails projecting economic conditions, product or service demand, market share, wage costs, and prices. The sophistication required for such projections lies beyond the resources of all but the larger individual firms, although business or industrial associations or consultants may be of some value to small companies. The most effective manpower planning is found in rapidly growing companies in expanding industries, but it is concentrated primarily with planning for the higher levels or skills shortage positions.

This part of the manpower planning profession, although also new, has begun to develop its assorted professional practices. For instance, the usual steps to manpower planning in the firm consist of:

1. A projection of manpower requirements in different departments, divisions, occupations, and levels at various points in the future
2. An inventory of the numbers, ages, skills, and performance of current personnel
3. Implementation of a plan to develop current personnel appropriate to meet future needs and to supplement that personnel as required from outside sources

At a more detailed level, these steps require the manpower planner to:

1. Examine the historical data to determine the past relationships between the size and composition of the work force and sales, production, and inventories
2. Examine the historical data to determine retirements, deaths, quitting, and dismissal rates, promotions and transfers, and retraining periods and retrainability rates

3. Determine the relationship of staff functions to line employees, sales volume and production
4. Examine the rate of product or service development and its impact on the work force
5. Determine the rate of productivity increase in terms of the ratios of man-hours to output, capital equipment to output, and of man-hour productivity index to capital productivity index

Then, given forecasts regarding sales, capital outlays, and product development, the following steps are taken in defining the work to be done:

1. Make forecasts of turnover, promotion and transfer, retrainability and productivity increases (both from ongoing methods of improvement, work simplification, and so forth, and from major installations of automation, electronic data processing equipment, plant layout revisions, and so on).
2. Construct a model to forecast future manpower needs based on forecasted variables.
3. Use the model to make two-, five-, and ten-year projections.
4. With these projections, the company can compare its projected manpower supply to its projected needs and make plans to do something about its potential quantitative deficit or surplus.

Once the quantitative requirements for the future have been forecast, the firm or employer association must answer such pertinent qualitative questions relating to its employment needs as the following:

1. Can the voluntary separation rate be reduced, particularly among the most promising younger employees?
2. Can the replacement problem be met by opening up positions in middle management for younger men? What changes would this mean in retirement policy?
3. Do all management positions require the equivalent of a college education?

4. Are there men among the hourly and weekly work force with managerial potential?
5. What are the sources of manpower -- untrained and trained?
6. Can women be used for some of the supervisory jobs?
7. Can jobs be identified which develop younger employees at faster rates than other jobs?
8. Can capable people be obtained by transfer from other units of the firm or industry?
9. Should the firm begin to hire outsiders who will provide the talent and age requirements needed?
10. What are the qualitative requirements of the various jobs?
11. How might the qualitative requirements best be met?
12. What training programs are needed to fill needs?
13. What is the best situs for these training programs?
14. Are there any departments with problems of greater or lesser severity than the overall firm?
15. Does the firm really need, say, 15 percent of its labor force as engineers, when a third of the engineers are doing non-engineering work?
16. Can persons not considered to have promotion potential be developed into promotable candidates?
17. Can incentive factors (salaries, fringe benefits, promotions, job status, and so on) be revised to achieve greater effort from available manpower?
18. Is a high school diploma really necessary?
19. Are there identifiable career ladders?
20. What training programs are needed to make career ladders effective?

A firm with some foresight will have established criteria for either internal development and promotion or outside recruiting. Though internal development is usually preferred, there are times and jobs for

which the firm has no current available talent or lacks the time to develop the skills, knowledge, and judgment of existing personnel. When this occurs, the manpower planner must take steps to assure that there are responsive external human resource development institutions available within the community. This requires a knowledge of and working relationship with such institutions.

A primary conflict often exists between national and labor market manpower program planning on the one hand and micromanpower planning on the other in the efforts of manpower program planners to get the disadvantaged hired. Ever-increasing hiring standards stand in the way of employing the more poorly equipped workers. Employer reluctance to train, unless absolutely necessary, can be understood when it is realized that the trained worker is free to leave almost at will and may hire himself or herself to a competitor. In addition, training costs can be high. However, effective manpower planning should result in a higher retention rate, minimizing the losses from this source; and internal training programs may reduce the length and cost of the orientation period. The private sector, federally financed on-the-job training, and NAB-JOBS programs help to bridge this gap, with public money subsidizing the training of disadvantaged workers by private firms.

The location and authority of the manpower planner in the business firm is still unclear; but there seems to be a logical tendency to place the planner's function, along with budgeting, under those having ultimate responsibility for generating and measuring performance of an operating plan. With techniques so new, the pitfalls are many.

Errors in projections are common and widespread. The primary determinants of future employment are not generally clear. There are no generally accepted measures of competence, and personal judgments are often less than objective. Department heads and other supervisors often attempt to "hoard" good people by "hiding them" from the planner. Internal and external labor markets touch only at certain ports of entry and exit, making it difficult to foresee future interactions between supply and demand for manpower.

Conceptually, manpower planning in the firm is relatively easy once the need, position, and power of the manpower planning function is settled, preferably near the top of the management hierarchy. Line authority usually carries with it the power to be involved in manpower planning and to have the resultant plans implemented.

Industry-Specific or Micromanpower Planning in Employer Associations

Private firms usually operate in an industry composed of firms producing common or similar products or rendering similar services. They frequently experience common manpower problems such as skill shortages, high wages, heavy turnover, substantial unemployment due to technological change, labor union activity, and so on. Each firm is usually most jealous of the power and responsibility to resolve its own manpower problems, just as it "plays its cards rather close" so far as the other elements of its own operations are concerned.

However, some manpower problems are not amenable to solution by the singular action of the firm. For example, extreme skill shortages in the face of rising demand give great bargaining power to the workers,

whether represented by a union or not. The competitive bidding for scarce manpower resources increases wages faster than they would rise in the absence of such bidding. An individual firm is hesitant to engage in expensive training programs which may only result in having its trainees pirated away by firms without such programs. However, if all firms facing the same manpower shortage act collectively, they may reduce the upward pressure on wages. Such collective action can take place through employer associations. But to do so effectively requires manpower planning by a supra-firm organization, i.e., an employer association.

Micromanpower Planning in the Public Agency

Because this paper deals primarily with the subject of this section, we shall not attempt an extensive treatment of the subject here. However, to round out the typology, we shall make a brief presentation on micromanpower planning in the public sector.

Agency or organizational manpower planning in the public sector parallels that for the private firm. There are many similarities between manpower planning for public agencies and that for private firms. The forces of supply are similar; both government agencies and private businesses usually compete in the same external labor market for manpower and are therefore subject to similar market forces. However, the internal labor market differs between public and private employment. In the public sector the federal civil service and state merit systems exist, while in the private sector each company has its own personnel system. The motivation underlying manpower

planning also differs. Business firms are profit motivated, and manpower planning for them must carry its own weight; i.e., at least pay for itself.

If the anticipated benefits do not exceed the anticipated costs, at least in the minds of decision makers, it will usually be eliminated. In the public agency, profits are not involved. However, manpower planners must in some way justify their existence to decision makers and ultimately to the cognizant legislative bodies. Under tight budgets they are forced into cost reductions. Every agency establishes its own means of justification. Empire building is especially common; and in a well-entrenched bureaucracy, empires can be retained for extended periods of time. However, manpower planning in the public sector is so new that the problem is generally one of breaking into the bureaucracy -- being able to justify the fight for the resources necessary to do the planning.

Once manpower planning has been accepted and funded, the techniques for public sector manpower planning within an agency are similar to those of the private sector. Authority is usually present to obtain the data. The authority to monitor and evaluate is usually intrinsic within the power to administer. The problem is getting the resources to do the planning. Probably the most extensive agency manpower planning has been done by the Defense Department.

Industry-specific manpower planning in the public sector parallels that for employer associations, but with some notable exceptions. The major differences revolve around the question of power. Employer associations seldom have the power to do really professionally competent

manpower planning because they lack authority and independent resources. Industry-specific manpower planning in the public sector consists of several basically different kinds of power relationships. One relationship recognizes the complete political and fiscal sovereignty of state and local jurisdictions. In such relationships, the federal planners have no power -- legal or economic -- over state and local jurisdictions. This situation most closely approximates that of employer associations. In it, the federal planners must find the technique of obtaining the interested cooperation of equals in the planning process, requiring a real selling job and proved performance. State and local officials must be firmly convinced of the need for manpower planning before they will devote the necessary resources. In the absence of a compelling sales job, the federal manpower planners will have to subsidize state and local manpower planning efforts. The chances are small that in such a relationship a really adequate data system can be developed for there will be too many gaps.

At the other extreme are situations in which federal manpower planners have an entree through federal enforcement procedures. An example of this is in the case of air and water pollution. Federal law requires states and local governments to conform to certain standards. The federal government sweetens the compulsion with federal funds, but compulsion nevertheless is involved, even though it is with a velvet glove. The combination of political and economic power may be used to compel manpower planning. In this case, federal officials must be sold on the need for the function, and then a nationwide manpower planning effort for that industry can be developed. But once they are sold, state and local officers can usually be brought along.

Intermediate between these two extreme examples of federal and state power arrangements are those in which the federal government "buys" the cooperation of state and local agencies through purely economic clout rather than political power. For such an approach, state and local officials are generally rational in an economic sense. So long as the benefits -- monetary and nonmonetary -- are greater than the costs, they will be amenable to federal planning efforts. This means that the benefits to state and local jurisdictions of a given program or efforts must be supplemented by federal dollars, at least to the point where the benefits equal the costs. If costs exceed benefits, state and local officials will be less than enthusiastic about cooperation.

Regardless of which power situation is involved, the ideal techniques are very much the same. Certain data must be collected, collated, and analyzed. A system for implementation, unique to every industry, must be developed, monitored, and evaluated. The difference is that in manpower planning for an industry -- private or public -- it will be much harder to approach the ideal.

3.

THE ECONOMICS OF THE LABOR MARKET

Many of the tasks that the manpower planner in the public sector will perform will require that he become acquainted with the operation of the labor market in which he must operate. Such an acquaintance will include obtaining a theoretical and empirical understanding of the economic principles associated with such a market as well as the institutional forces affecting it. Among those tasks that the planner must perform are:

1. Forecasts of the future demands for specific manpower by the agency or industry as well as the relationship of those demands to the competing demands of other employers
2. Forecasts of the supply of labor of various kinds which will be available to meet the various demands
3. Plans for redressing any imbalance between the demand and supply indicated by the forecasts
4. Plans for the best use of labor by the agency or industry for which manpower planning is being done

Each of these tasks has implications for the other three. An improvement in the use of labor for example will tend to reduce the quantity demanded and may affect the occupational mix or relative demands for the various types of labor used. In turn the best use of labor will depend in part upon its availability. A better use of labor, by reducing demand and taking advantage of the particular nature of the labor supply, may help redress imbalances in supply and demand.

These tasks are also some of the major functions performed by labor economists for larger segments of the labor market. They also

become some of the building blocks of those economists who look at the interaction of product and labor markets, as well as the economy as a whole, for the purpose of understanding the economy and formulating government policies to improve the economic health of the nation -- the reduction of inflation, the reduction in unemployment, the increase of productivity, the use of natural resources, and so forth.

Because of the interaction of manpower planning with labor economics in general, it is well that the manpower planner have at least a rudimentary knowledge of the operation of markets and the economy.

A MARKET ECONOMY

Economic systems are developed for the purpose of deciding what goods and services are to be produced, how they will be produced, and how they will be allocated. Three general types of economic systems have been developed for making these decisions:

1. Traditional -- Economic decisions of what to produce, how to produce it, or how the production will be distributed are made on the basis of tradition.
2. Command or authoritarian -- Economic decisions are made either by a central or a diffused but coordinated authority.
3. Market -- Economic decisions are made by the economic forces of supply and demand.

Actually, no economy is purely traditional, authoritarian, or market. Most economies exhibit traces of all three elements, although one element is often dominant and is taken, perhaps loosely at times, as the basis of its description. The United States, as well as some other advanced industrialized countries in what is sometimes referred

to as the free world, has historically emphasized the market type of economy, though to differing degrees of emphasis. The more highly socialized countries, while they may be politically democratic, have a high degree of government or authoritarian control of their economies. Most lesser developed countries have emphasized tradition even though they may be in the throes of change. Communist countries emphasize authoritarian control.

Within a given economic system, there are subsystems and submarkets, each with its own balance of traditional, command, and market forces. For example, in the market for doctors, tradition may play a significant role, for doctors' sons who are more likely to become doctors than are the sons of similarly economically situated fathers in other occupations. Command or authoritarian elements are involved in this market as governmentally imposed or allowed restrictions are placed on the competitive healing professions or as the government finances medical education, and as national health insurance is instituted. Market forces are involved as nongovernment-imposed desire for healing services develops and as youth, who because of high incomes, obtain -- on their own or their father's resources -- a medical education.

In a market economy, economic decisions are made by the interaction of the forces of supply and demand in what is termed "markets." In such an economy, relative prices direct the course of economic activity. As prices of consumer goods increase, producers tend to increase production, searching for the increased profits generally made possible by the higher prices. As production increases, the

demand for the various factors of production increases, tending to increase factor prices. As the incomes to the factors increase, more units of those factors are offered for sale. For example, as wages increase, more workers will seek employment.

On the other hand, as prices of consumer goods increase, the quantity of the good demanded will tend to decrease. As the quantity of a demanded good decreases, production will tend to diminish, and as production declines, the demand for the factors of production will decline, reducing factor prices, which will discourage the offering of factors. To illustrate, as wages decline, fewer workers will offer their services. The opposite tendencies hold true for declining prices.

In a free market, one without government action, the forces of supply and demand operate to determine prices. If there is also an absence of monopolistic forces, supply and demand move freely in response to the uncoordinated actions of numerous suppliers and demanders and, in the absence of outside or noneconomic forces, fluctuate until the forces of supply and demand are in equilibrium; that is, until the quantity of a good demanded equals the quantity of the good offered for sale at a given price.

Economists refer to product markets in which decisions are made concerning products or goods; they also refer to labor markets in which decisions regarding labor are made. Of course these two general types of markets are interrelated. Decisions about products must carry with them decisions about labor. Even the most advanced, automated technology for the production of goods still requires some form of labor, even though it may be of a very high degree of skill.

Labor is actually one of the four factors of production usually identified by economists, which in various forms and uses make up production.

These factors are:

1. Labor or human resources (manpower)
2. Land or natural resources
3. Capital resources
4. Entrepreneurship or business organization

Each of these factors has its own peculiar markets and market forces and the various markets interact in the market economy already sketchily described.

OPERATION OF THE LABOR MARKET

The labor market operates on much the same basis as other markets, but in this case on the interaction of the demand for and the supply of labor. The labor market can be examined at two levels -- the "macro" or aggregate labor market and the "micro" or particular labor markets. These two labor market levels interact with each other. For example, when the macrolabor market is functioning at or near the level where all workers who wish to work are employed, employers, who are primarily interested in the microlabor markets, may have some difficulty replacing workers who are being separated or who are quitting. Such difficulty causes competition for workers in micromarkets and drives up wages. The more efficient the labor market information system, the educational training establishment, and the employment exchange services, in such a "tight" labor market, the less difficulty in meeting the needs of the microlabor markets and the less upward pressure on wages.

On the other hand, when there is a slack ("loose") "macro" demand for labor, with substantial unemployment of those workers wishing to work, employers, operating in the microlabor markets, have greater freedom in employing workers who are in competition with each other for the relatively scarce jobs. If the labor market were perfectly competitive, this would drive wages down in the microlabor markets, as workers competing with each other would be willing to accept lower wages or other perquisites in order to secure employment.

As shown subsequently, the interaction also works in the other way. That is, as the summation of demands for labor in the micro-markets increases, aggregate or macrodemand responds positively, and vice versa. And as the summation of supplies of workers in the various microlabor markets increases or decreases, the macrosupply varies.

THE AGGREGATE LABOR MARKET

The "macro" or aggregate labor market is the market in which the total demand for and supply of labor for the economy in general interact. It is within this labor market level that the national economic health is primarily determined: whether there be depression, recession, inflation, or environmental deterioration.

The Macrodemand for Labor

The "macro" or aggregate demand for labor of the economy as a whole is determined by the total production -- gross national product -- of the economy, which in turn is determined by total spending (government, consumer, and business investment). If productivity and other

elements are constant, the greater the total spending, the larger will be GNP, production, or aggregate demand, and the greater will be the demand for labor. A healthy, vigorous, growing economy or GNP demands more labor. On the other hand, when spending and consequently the aggregate demand or GNP declines, the macrodemand for labor also decreases and the unemployment of labor increases. As the specific labor demands of primary concern to the micromanpower planner are a part of the overall demand for labor, they are affected by such decreases.

When unemployment is widespread, even in a market-oriented economy, political forces require action of the government to reduce that unemployment. In a democracy few people are willing to accept the personally negative effects of unemployment. They demand government action. Such action consists of activities which will increase spending; consequently the aggregate or macrodemand for the factors of production, including that for labor, will generally increase. Unfortunately some of the speeding up of the economy and the consequent increase in demand for labor may also induce inflation. Especially is this true when unemployment is low -- below 5 percent. When unemployment is low and aggregate demand is high, not only is there generally an inflation of prices but also there is created an upward pressure on wages, especially in areas with skill shortages. Increased wages may in turn force increased prices.

It might be concluded from the foregoing that when aggregate demand is low and unemployment high, there will be a downward pressure on wages. This conclusion was once essentially correct, before the 1930s. When unemployment increased, wages declined. However, beginning in the 1930s, numerous market institutional changes were introduced which made wages resistant to downward pressures and introduced downward rigidity. One

of the principal institutional changes was the increase in union power, with its wave effects on even the nonunionized sector. Where unions are strong, any attempt by employers to lower wages is met by strong resistance in the form of costly strikes if they are deemed necessary. Another significant institutional change is the introduction of unemployment compensation. Most workers who become unemployed due to decreased production are entitled to government unemployment compensation designed to tide them over until they can become employed again, or at least for a given period. Even many private employers have termination pay or guaranteed income designed to do the same thing such as supplementary unemployment benefits. So long as unemployed workers receive such compensation, they apply less downward pressure on wages than if they were out looking for work and competing for scarce jobs, thus driving wages downward.

We must hasten to add a caveat. One must not assume from the previous discussion that the primary or only cause of price inflation is increased wages. While increasing costs may be translated into increased consumer prices, there are many costs: rents, interest, salaries, taxes, and even profits. These constitute costs that enter into total costs and therefore prices. The theory that increased costs generate inflation is usually termed "cost push."

Perhaps an even more important institutional change is the acceptance by the government and monetary authorities of the need to maintain a high-employment economy through fiscal and monetary actions. Such guarantees encourage what is often referred to as a "ratcheting" effect on wages and prices, producing upward but not downward flexibility.

There are those economists who maintain that increased costs only follow the increased prices generated by excessive spending, which results

primarily from actions of the fiscal and monetary authorities. The theory relating to this cause-effect relationship is referred to as "demand pull." It may be that some inflations are primarily induced by cost-push pressures, while others are produced by demand-pull forces.

The Macrosupply of Labor

The "macro" or aggregate supply of labor is ultimately determined by the size of the population. The greater the population, the greater the number of people available to work. However, not all people work. There are those who are not part of the labor force, the labor force being defined as consisting of those who have jobs or are looking for work. The aged usually exclude themselves from the labor force, although what constitutes "aged" varies. Retirement programs help reduce the age of retirement. Children and youth up to sixteen years are also generally excluded from the labor force by legal minimum age requirements, even though some may actually participate in it. Persons who are in such institutions as hospitals and prisons are excluded. Those in the Armed Forces are excluded from the civilian labor force. While married women (especially those with children) historically had little participation in the labor force, this picture has been rapidly changing.

The measurement of the rate of participation of people in the labor force is called the "labor force participation rate." Table 3-1 shows some of the interrelationships of population and labor force participation, which differs according to sex, race, and age. Table 3-2 illustrates some of these differences.

TABLE 3-1

Civilian Labor Force Participation Rates of
Selected Population Groups

(1973; in thousands)

Category	Total		Women	
	Number	Percent	Number	Percent
Sixteen years of age or older	148,263		77,242	
Sixteen years of age in civilian labor force	88,714		35,510	
Labor force participation rate for sixteen years of age and older		59.8%		44.7%

SOURCE: Manpower Report of the President, 1974 (Washington, D.C.: U.S. Government Printing Office, 1974).

TABLE 3-2

Selected Labor Force Participation Rates for Civilian,
Noninstitutionalized, Sixteen Years of Age and Older

(1973)

Category	White Males	White Females	Other Races	
			Male	Female
Total	79.5%	44.1%	73.8%	49.1%
Age:				
16-17	52.7			
18-19	72.3			
20-24	85.8			
25-34	96.3			
35-44	96.8			
45-54	93.5			
55-64	79.0			
65 and older	22.8			

SOURCE: Manpower Report of the President, 1974 (Washington, D.C.: U.S. Government Printing Office, 1974).

Not only do the labor force participation rates differ by sex, race, and age, they differ by time. Below is a list of participation rates of white women in the civilian labor force for selected years between 1948 and 1973, showing the steady increase and taken from the same source as Tables 3-1 and 3-2.

<u>Year</u>	<u>Participation Rate for White Women</u>
1948	31.3%
1950	32.6
1952	33.6
1954	33.3
1956	35.7
1958	35.8
1960	36.5
1962	36.7
1964	37.5
1966	39.2
1968	40.7
1970	42.6
1973	44.1

The participation rate of white males has declined over the same period. The labor force participation rate for blacks and others show similar movements.

The rates also change as to season, the rate increasing in June and declining in September, rising again in December and declining in January. The rates likewise change with general economic movements, increasing in times of rising employment as jobs open up, encouraging

the marginal or secondary workers -- women, aged, youth, disadvantaged -- to seek employment, and decline as unemployment increases, discouraging the marginal workers who often leave the labor force in frustration.

Some Economic Problems in the Macrolabor Market

As already inferred, two major economic problems result from imbalance in the aggregate or macrolabor market -- inflation and unemployment. If macrodemand for labor is constant while population or labor force participation rates increase, unemployment increases. Unemployment also increases if macrodemand declines, while the participation rate remains constant. On the other hand if macrodemand increases while population or participation rates remain constant, once unemployment has been reduced to about 5 percent, inflation pressures tend to be introduced.

A new economic problem has become increasingly recognized over the past decade, not due so much to imbalance but due to increases in both supply and demand. As the population increases, the demand for goods likewise must increase to take care of the expanding population. Increases in the demand for goods are translated not only into increases in the demand for labor but also into increases in the demand for our limited resources. This increase in demand results in shortages of raw materials, increasing their prices, as well as negatively affecting the quality of the biospheric environment in which we live -- polluting air, water, and land.

This brief presentation of some of the characteristics and problems facing the macrolabor market is sufficient to show that the micromanpower planner does not function in a vacuum. He is a part of a much larger scene of which he must be aware and take into consideration in his particularized or micromanpower planning.

MICROLABOR MARKETS

The labor market level most intimately affecting the micromanpower planner is the particular labor market within which the planner operates. Actually, however, there is not a single labor market but a number of labor markets, each occupation with which the micromanpower planner deals having its own particular labor market.

Each occupational grouping constitutes its own labor market in which the forces of supply and demand for that particular occupation come together or interact. Each labor market varies not only in occupation but in geography. For example, the market for low-level, unskilled, low-paying jobs is usually limited to easy commuting distance. Poorly paid workers cannot afford to travel very far. They are also limited in their knowledge of what is taking place outside their immediate and surrounding communities. However, if conditions become intolerable (as happened in the "dust bowl" of the 1930s) or when widespread and promising opportunities occur (as during war time), mass migrations out of oppressive labor markets do occur -- the market at least temporarily expands; but once the pressure is released, it contracts again. The labor market for highly specialized and short-supply professionals is usually regional, national, or even international in scope. These people generally know what is taking place in a very wide geographical area and are mobile enough to make the necessary moves. The micromanpower planner must know in what kind of a market or markets he or she is operating.

The various microlabor markets operate in similar ways, being subject to much the same types of forces. It helps to understand the economic principles operating within all, or almost all, particular labor markets.

The Macroeffects of the Microlabor Market

Just as the functioning of the macrolabor market affects the microlabor markets, so do the latter affect the former. To illustrate, as already indicated, in the United States there has been a constant pressure within micromarkets to "economize" on the use of labor, especially the low-skill labor, machines and automation taking its place. Millions of persons, for a myriad of reasons, have low-level skills. Thus with technological progress, millions of persons are left behind, unable to secure jobs. The result is a vast "reserve army" of unemployed, low-skill people, many of whom eventually leave the labor market and subsist on welfare. These persons become economic drags, feeding off the economy but contributing nothing by way of production. They also often constitute social and political dynamite. The growth of this reserve army constitutes the primary reason for the national manpower programs of the 1960s and '70s. Should some means be found to help these people gain access to jobs, they would stimulate the economy by increasing production. Their labor force involvement would also affect the macrosupply of manpower.

The Microdemand for Labor

The specific demand for a particular kind of labor is defined as the quantities of a particular labor that will be offered at alternative wages at a given time and place. This relationship can be shown in both tabular and graphic forms. The following list presents a hypothetical demand schedule for a particular kind of labor, while Figure 3.1 presents that same demand in graphical form.

<u>Alternative Wage Rates</u>	<u>Quantities Demanded of Labor A</u>
\$2.00	160
2.50	150
3.00	140
3.50	130
4.00	120
4.50	110
5.00	100

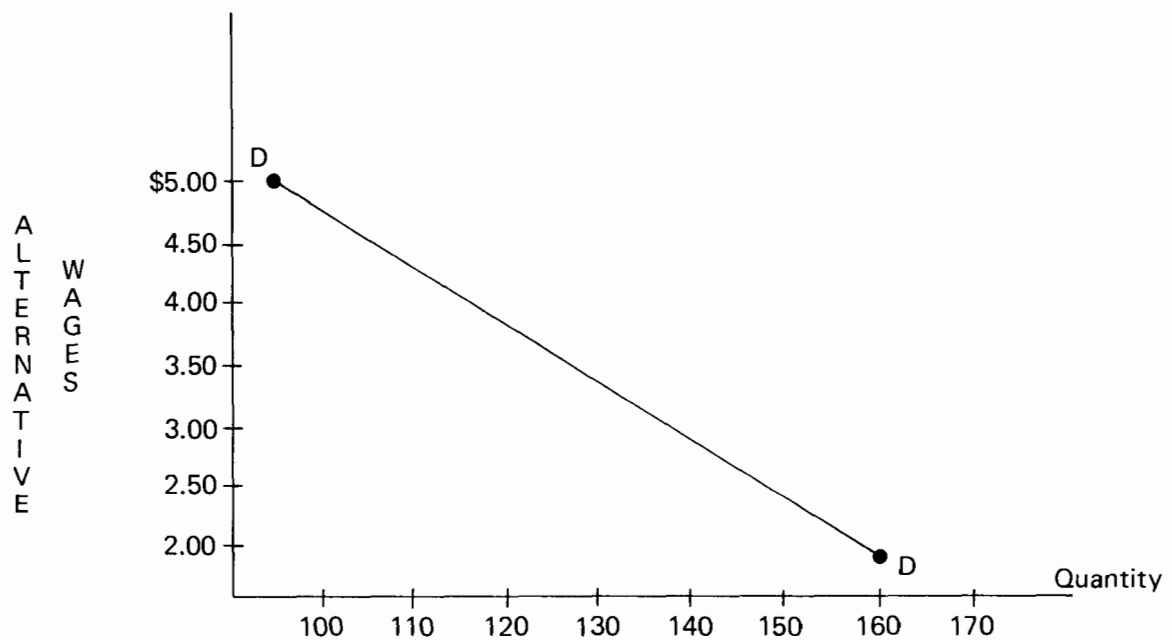


FIGURE 3.1. Hypothetical Demand Curve

It will be noted that as the alternative wage rate increases, the quantity demanded decreases and that as the alternative wage rates decrease, the quantity demanded increases. This inverse relationship between wages and quantity is not happenstance. It is used purposely because that is how demand generally acts. As of any given moment in time, the employer will tend to reduce employment at alternatively higher wage rates and increase employment at alternatively lower wage rates. There may be exceptions, but this is generally how they act.

What is it that determines the microdemand for labor? There are several determinants, the most important are as follows: First, there is the need for a particular kind of labor. This need is determined by the kind of a product or service that an agency or industry produces, as well as the technology. If the product is clean water, the need will be for workers having the skills needed to produce clean water. If the technology is highly mechanized, requiring little hand labor but much engineering skill, the demand will be not for unskilled labor but for at least engineering aides or technicians. The greater the need, the higher wages will tend to be. The less the need, the lower wages will be. If nonessential government services become too costly, the people will react by reducing their desire or felt need, making substitutes. Therefore at alternatively higher wages, there is a pressure for reduction in numbers, and at lower wages more can be hired.

The demand for labor is both direct and derived. The demand for that labor which directly satisfies human wants may be termed "direct." However, much of the demand for labor is "derived," being derived from

the demand for consumer goods and services. As the demand for the consumer goods and services increases or decreases, so moves the demand for the labor used in its production.

The second determinant is the money available to pay wages. In an extremely poor community the figure would be very low, while in a rich community the figure might be considerably higher. If federal funds are available, the figure would probably be higher than if they were not present. The availability of federal funds varies with the political winds. As more money becomes available, the higher wages can be; the less the availability of money, the lower the wage will tend to be. There is usually a constant pressure to reduce budgets -- therefore the downward pressure on numbers as wages increase.

Third, there is the principle of diminishing marginal productivity. With a fixed quantity of capital, as additional units of manpower are applied, after a given point each successive added unit contributes less product or service than the previous unit. Therefore after the point of diminishing marginal productivity has been reached, employers are willing to hire more workers only at lower wages.

To forecast the demand for a particular kind of labor requires that the micromanpower planner understand the changing technology of the agency or industry, at least to the point of being able to forecast the need for various types of labor. The planner must also be able to forecast the availability of funds, a task fraught with danger. So subject is this type of forecasting (in some jurisdictions) to the vagaries of politics that attempting to forecast a given figure is impractical.

Probably the best approach in these cases is to forecast or identify a range of possible levels of expenditure for a particular function. Where expenditures show stability, forecasts can be made with greater certainty.

Not only must the manpower planner be able to forecast the need for manpower and availability of funds for the agency or industry for which he or she is planning, a general understanding must also be had of the overall need for a particular type of manpower. If the type of manpower in question is so highly specialized that only a given agency or industry has need for it, then that becomes the market. The market for a particular kind of manpower is generally much broader than a particular agency or industry; therefore the demand for a particular kind of labor is composed of the demands of all of the employers of that particular kind of labor in that particular labor market. Consequently the micromanpower planner must understand the aggregated demand for a particular kind of labor.

The Microsupply of Labor

The microsupply of labor is defined as the quantities of a particular kind of labor that will be offered at alternative wage rates as of a given time and place. Supply, like demand, is shown in both tabular and graphical forms, as seen in the following list and in Figure 3.2.

<u>Wage Rates</u>	<u>Quantities Offered</u>
\$2.00	100
2.50	110
3.00	120
3.50	130
4.00	140
4.50	150
5.00	160

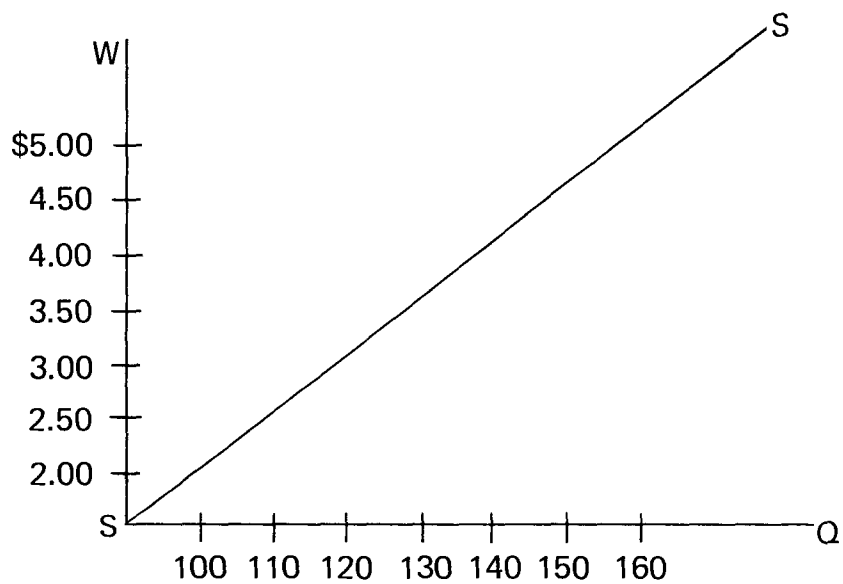


FIGURE 3.2. Hypothetical Supply of Labor

It can be seen that the relationship between the wage rate and quantity differs for supply from that for demand. It is just the opposite. In the case of supply, at alternatively higher rates, the quantity of labor offered increases; as the wage rate declines, the quantity declines.

Supply depends in some measure on the potential quantity of labor, which in turn depends upon the size of the population available for that particular kind of labor. The greater the size of the pertinent population, the greater the potential quantity of labor.

Supply also depends upon the cost and anticipated cost of developing the kind of labor needed. Some costs are socially assumed or subsidized -- much of the education, some health, and so on -- while other costs are assumed by purchasers of labor and others by the persons performing a particular kind of labor.

Education and training are not free to persons receiving them, even if all costs of tuition are assumed by society or employers. The individual must still forego other wage-earning opportunities, must forego leisure, expose himself or herself to psychic costs, and so forth. In order to get individuals to assume the costs of developing skills needed in the marketplace, and offer their services, they must be assured of sufficient income to compensate for these costs. Therefore in general, the greater the wage, the greater will be the quantity of labor offered for sale.

There are certain conditions in which the above described situation does not prevail. As of a given point in time, the standard of living of people is a constant. Should the wage be increased beyond the point necessary to achieve that standard of living, the quantity of labor offered for sale may actually decline with increased wages, the incumbent workers preferring leisure. In time, however, standards of living increase and additional quantities of labor are made available, attracted

by the high wages. In addition, security on the job as well as other perquisites may sometimes substitute for wage increases.

It should be pointed out that the quantity of a particular kind of skilled labor is limited at any given time. With an increase in wage the quantity supplied will tend to increase. However, the more highly skilled the labor, the longer it will take to increase the quantity. The absence of appropriate training programs will also lengthen the time necessary to prepare adequate numbers. In the meantime the wage level will have increased as a result of the shortage.

THE INTERACTION OF SUPPLY AND DEMAND

To this point we have demonstrated two separate economic forces -- supply of and demand for a particular kind of labor, at a given time in a given labor market. These two forces are each affected by their own determinants and operate separately. They also interact in the marketplace through the market mechanism. The following list and Figure 3.3 illustrate this interaction.

<u>Wage</u>	<u>Quantity</u>	
	<u>Offered</u>	<u>Demanded</u>
\$2.00	100	160
2.50	110	150
3.00	120	140
3.50	130	130
4.00	140	120
4.50	150	110
5.00	160	100

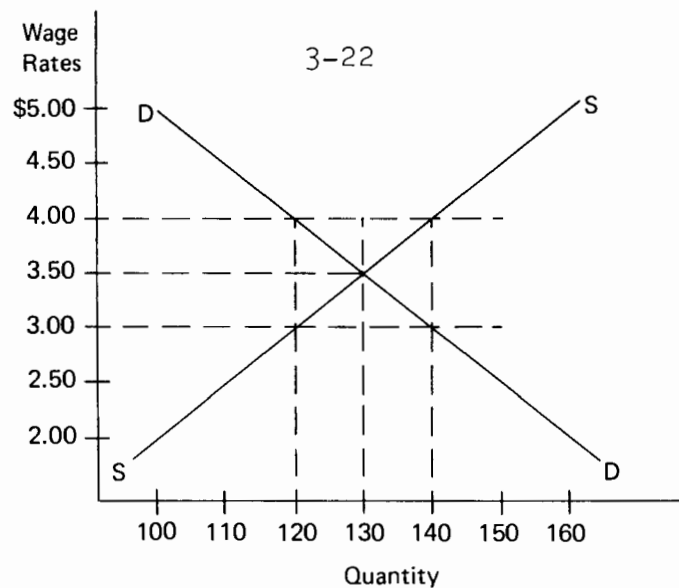


FIGURE 3.3 Interaction of Supply and Demand

It may be seen that when the wage is \$3.50, the quantity offered for sale equals the quantity demanded, namely 130 units of labor. Economists refer to \$3.50 as the equilibrium wage, 130 units as the equilibrium quantity, and the point where the supply and demand curves intersect as the point of equilibrium. Should demand and supply schedules be actual measurements of reality, equilibrium would be the point toward which the market forces would tend to push the wage rate.

Should the actual wage rate exceed the equilibrium rate, say at \$4.00, there would be more labor offered than demanded -- the quantity offered being 140, the quantity demanded being 120. There would be a labor surplus tending to push wages downward. On the other hand should the actual wage be below the equilibrium wage, say at \$3.00, the quantity of labor offered (120) would be below the quantity demanded (140). There would be a labor shortage pushing wages upward. Therefore the actual wage rate would be adjusted down or up until it equilibrates demand and supply.

The ease with which the market forces move depends on:

1. The absence of monopoly (single seller) and monopsony (single buyer) power, which represent the power to control -- either by the suppliers or the demanders of labor, respectively
2. The knowledge of demanders and suppliers
3. The mobility of demanders and suppliers
4. The presence or absence of government intervention

If there is no monopoly or monopsony power, no government, and if there is perfect mobility and knowledge, there would be a perfect, free market. As these conditions are not met, "imperfections" are introduced which interfere with the operation of such a free and perfect market.

In a free market, the wage rate would move freely. As supply increases, as shown in A of Figure 3.4, the wage rate would decrease. Should supply decrease as shown in B of the figure, the wage would increase.

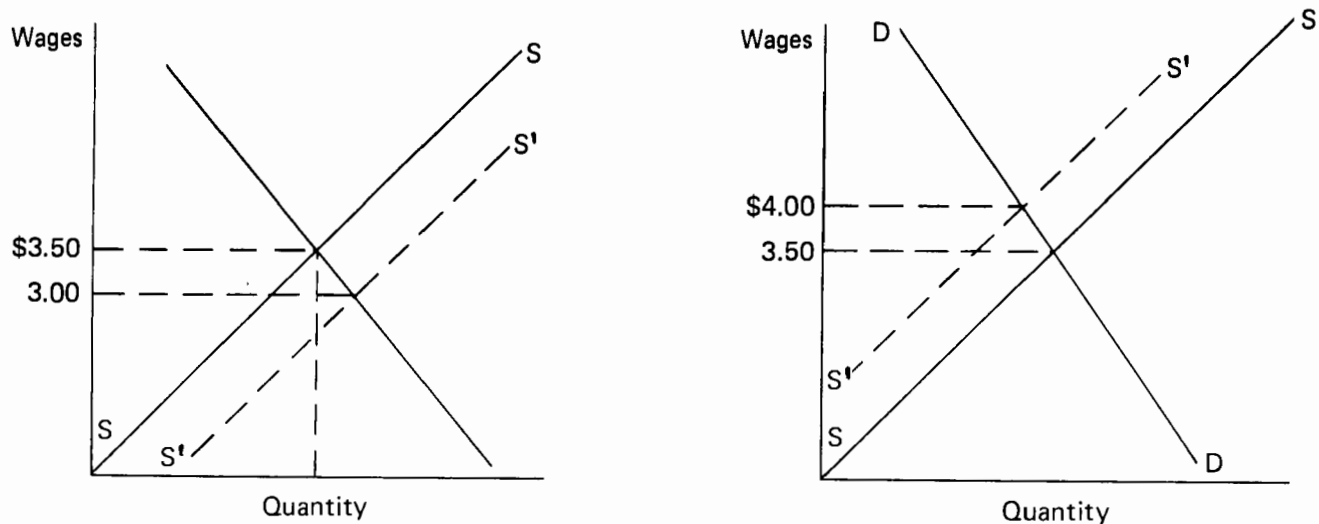


FIGURE 3.4. Increase and Decrease of Supply in a Free Market

On the other hand, should the demand for labor increase, as shown in A of Figure 3.5, the wage rate would increase, while the rate would decrease should demand fall as shown in B of the figure. It may therefore be seen that the equilibrium wage rate, the rate toward which the actual wage rate tends, will increase either as a result of an increase in demand or a decrease in supply; it will decrease with a decrease in demand or an increase in supply. Demand can be decreased by

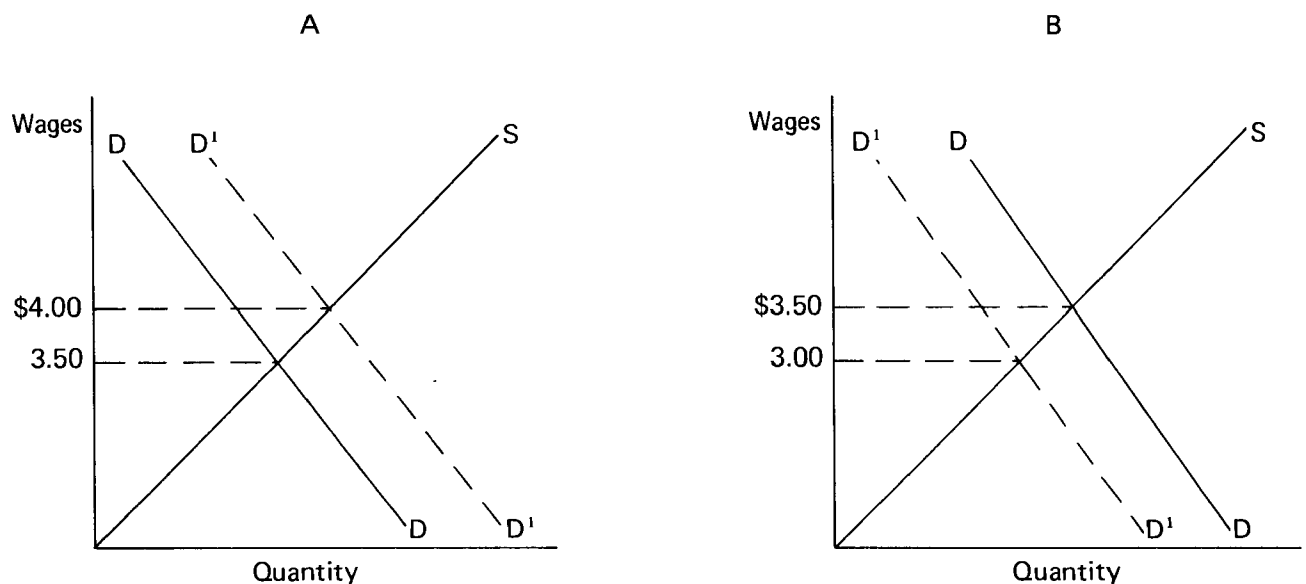


FIGURE 3.5. Increase and Decrease of Demand in a Free Market

decreasing the money available to be spent on a particular kind of labor or decreasing the desire or need for the labor. Supply can be increased by increasing population, increasing the labor force participation rate of the appropriate groups of workers, or by decreasing the costs to the individual workers of acquiring the needed skills, as well as the cost of functioning in the position. The "costs of functioning" in a position are not only direct financial costs --

transportation, clothing, food, and the like -- but also psychic costs -- job dissatisfaction, low morale, bad supervision, and so on.

FORECASTING AND MEETING CHANGES IN SUPPLY OR DEMAND

As already indicated, the manpower planner is in the business not only of describing and understanding present demand and supply, but also in forecasting them, hoping to identify potential problems for which corrective action can be taken. For example, let us assume that DD and SS in Figure 3.6 represent current demand and supply. Let us also assume that the manpower planner forecasts that because of the increase in the need for a particular kind of labor (assuming that money is available), the demand for labor will be at D'D' as shown in the figure. In addition, let us assume that supply is constant, that it remains at SS. Should that happen, the equilibrium wage would become \$4.00. That is, if the necessary labor to meet the increased need is to be acquired, the wage would have to rise to \$4.00. On the other hand, if action could be taken to increase the supply of labor to S'S', the equilibrium wage would remain constant at \$3.50.

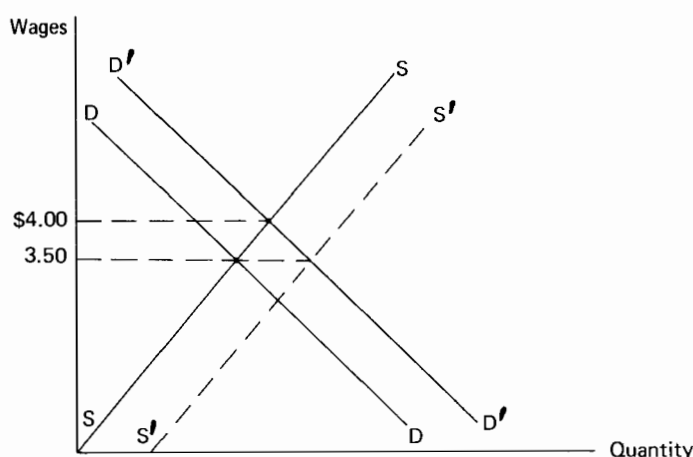


FIGURE 3.6. Changes of Demand and Supply

A number of approaches can be taken to meet increased demand. One would be to increase supply, which could be accomplished by increasing training made available to workers or by improving working conditions. Of course, an increase in the wage itself will call forth additional labor. The manpower planner, in deciding on alternative courses of action to propose to decision makers must take all possibilities into account.

Another possibility for meeting an increased demand is to change the technology. For example, the technology in use may require highly trained, scarce engineering technicians. It is often possible to alter the technology to allow the same work to be performed by persons of lesser skill who will therefore work at lower wages and are in greater supply. If such action is taken, the projected increase in demand for the hard-to-get manpower would be reduced.

There are several forces underlying the kind of technology developed in the United States, as compared with most countries. Historically this country has experienced labor shortages and relatively high wages. In attempts to "economize," employers have, among other things, developed labor-saving technology. Once such technology is in place, it becomes difficult to return to former labor-intensive methods, self-interest seeming to lie in the direction of continuing to develop labor-saving devices requiring higher levels of education and training.

Improvements in the use of labor constitute another form of technological innovation, one that involves changes in the organization of the work force rather than equipment. This form may make use of such disciplines as industrial psychology, sociology, and personnel management, as well as engineering. Among the diverse measures that it may embrace

are changes in such things as job content, the channels of communication, the chain of command, supervisory practices, the structure of wage differentials, the method of wage payment, fringe benefits, and employee selection procedures.

THE INTERNAL LABOR MARKET

The foregoing analysis has been a description of how a knowledge of labor economics can contribute to manpower planning. It is essentially a description of how external market forces operate to allocate labor among the various employers and occupations, and how a given employer may affect these forces to his own benefit. It does not, however, embrace all of the phenomena that a manpower planner must consider -- namely those of his internal labor market.

The term "internal labor market" refers to the fact that in the typical firm or agency, a number of jobs tend to be filled by promotion or transfer from within rather than by new hires. The compensation paid such jobs and the other satisfactions attached to them are less subject to market forces than is true for port-of-entry jobs (i.e., the jobs that are normally filled from external sources). In other words, employers may adopt any of a number of promotion policies and wage structures relative to their internal jobs without much affecting their ability to attract workers for their entry-level jobs. Of course, this discretion is not unlimited. Prospective employees will distinguish among employers according to what the opportunities are for promotion and wage increases. Yet to the degree that employers do have discretion, they will have to make decisions regarding their promotional policies and wage structures

on such considerations as effect on employee morale, union attitude, and conformity with the employees' or the employer's sense of equity, rather than out of concern for the supply of labor that will be forthcoming from the market.

Both labor economists and manpower planners will be interested in promotion policies and internal wage structures as they affect labor costs and supply schedules. Beyond these concerns, however, the manpower planner will in addition have to anticipate that turnover, promotions, and transfers will occur and hence be prepared with training programs and other arrangements to improve the process.

Labor Turnover

Turnover feeds both demand and supply. On the demand side it gives rise to replacement demand. On the supply side the number of workers available at a given wage rate is inflated by it because some workers are always in the process of changing employers. In other words, the economist's supply and demand schedules are the net of turnover.

This may be illustrated in the following way. Assume a wage rate W at which employer E is willing to hire Q amount of labor (Figure 3.7). Assume further that at this wage rate, Q amount of labor is willing to work for E and has been employed by him. Demand and supply are in balance. Assume that soon one employee will retire. At the same time a new graduate or dropout from high school will be entering the market and will be willing to work for E at wage rate W . From the economist's point of view, so long as Q is the amount of labor willing to work for E and that E is willing to hire, the wage rate remaining at W , there has been no change in the supply and demand schedules. The numbers of "retirees" and of new graduates is immaterial, so long as they are equal.

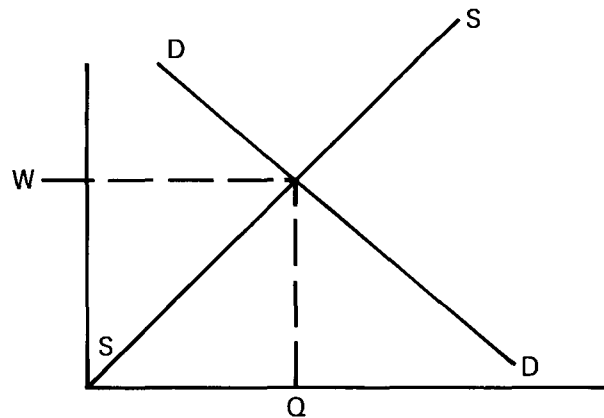


FIGURE 3.7. The Net Economic Effect of Offsetting Internal Adjustments

Yet from the manpower planner's point of view, the fact that an employee will soon retire will increase replacement demand by one, so that plans must be made to assure that a high school graduate or drop-out will find his or her way to employer E. Furthermore, the larger the number of prospective retirees, the larger the problem. More is involved than simply assuring that the right number of new graduates is attracted to E (a matter of recruitment); plans must also be made to give them the proper training. Finally, the chances are good that the new hires will not occupy the same jobs that were vacated by the retirees. Instead, they will probably fill entry-level jobs made vacant by a series of promotions whereby senior employees fill the vacancies left by the retirees. Needless to say, the foregoing discussion would not have changed much had it been illustrated with vacancies created by death, quits, or discharges.

Certification

The supply of and demand for labor in some agencies and industries are likely to be affected by two developments currently in progress in

many areas: (1) requirements for certification and (2) unionization. The drive to require certification will, if successful, probably affect both the supply of and demand for workers.

The long-run effect of certification (in the sense of extending beyond a transitional period during which the industry will be faced with the necessity of replacing noncertified with certified persons) will be to decrease supply by increasing the cost of becoming a worker. That is, the same number of operators can be hired only at a higher wage or fewer workers hired at the same rate. This is illustrated in Figure 3.8.

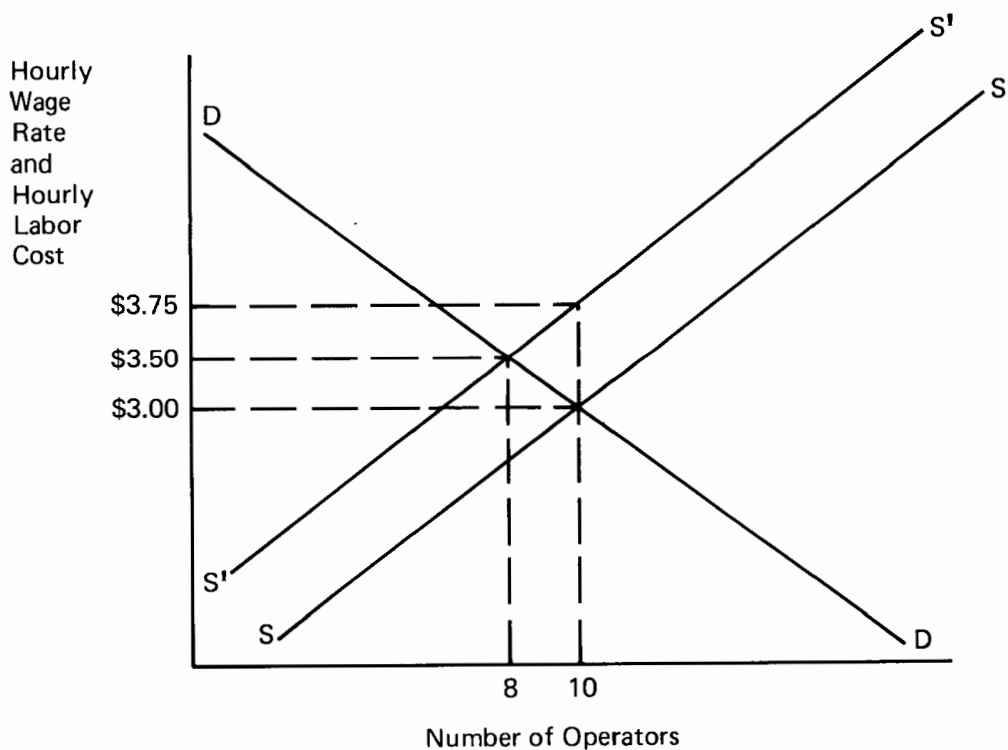


FIGURE 3.8. Decrease in Supply Because of Certification

Let us assume that in a given city, the local wastewater treatment plant, with existing demand (DD) and supply (SS) prior to the certification requirement had been able to hire ten operators at an hourly wage rate of \$3.00. Suppose further that ten operators were both its budgeted and recommended employment. Now, as a result of the certification requirement, a training program must be instituted to provide operators to fill the jobs created by turnover or plant expansion. Let us assume that this program, when prorated over man-hours of employment, costs \$0.75 per man-hour. The effect would be to shift the supply schedule from SS to S'S', with the vertical distance between them being equal to \$0.75. The hourly cost of employing ten operators has risen to \$3.75. It makes no difference from this point of view whether the city continues to pay a wage of \$3.00 and absorbs the \$0.75, or whether the city raises the wage to \$3.75, requiring the operators to absorb the entire cost of training.

The probable outcome is that the number of budgeted positions will be reduced to eight, at an hourly labor cost of \$3.50. One arrangement that would be compatible with this solution would be for the city to absorb \$0.50 of the hourly training cost, while leaving the wage rate at \$3.00. Such a solution would of course create a budgetary shortfall of two positions, down to eight from ten employees.

There are only two ways, illustrated in Figure 3.9, in which the original level of employment of ten operators can be restored. Either the city council will have to be persuaded to become more liberal toward financing the plant, increasing demand to D'D', or the job will have to be made more attractive to labor in a way that does not raise the hourly

labor cost, increasing supply back to SS. In other words, either the demand curve or the supply curve will have to shift to the right, as in the figure. If it is the supply curve that increases, it means that the ten operators will be willing to pay the entire training cost out of their \$3.00 per hour wage, or that they will be willing to work for a wage of \$2.25, with the city picking up the training tab.

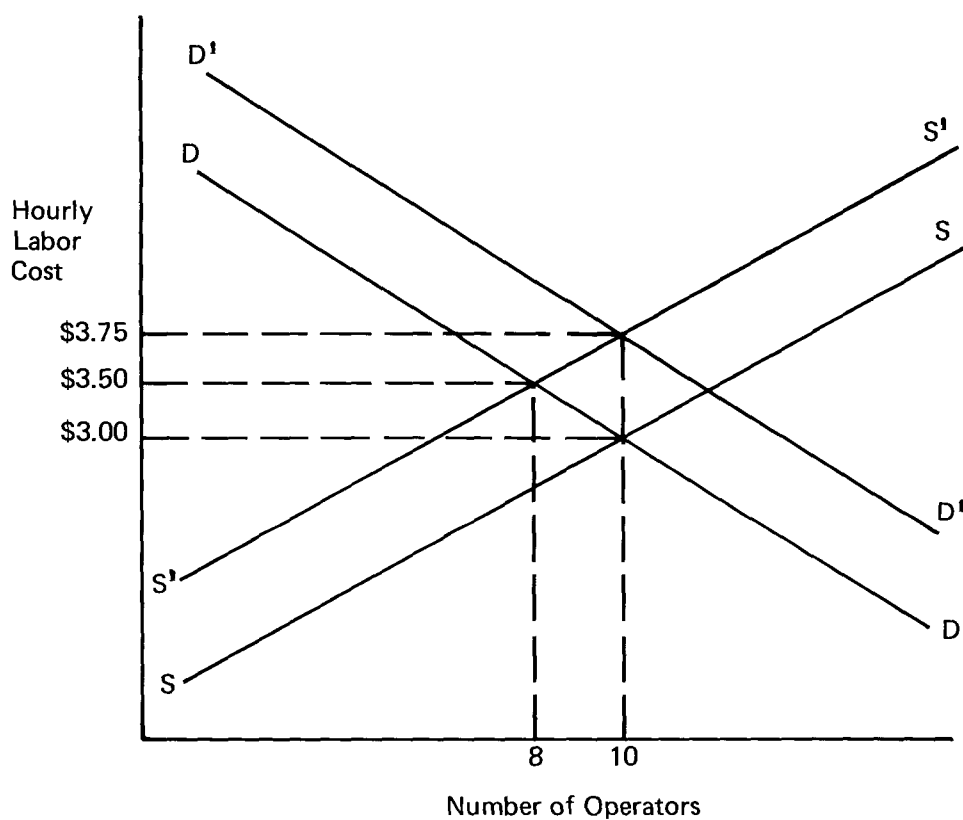


FIGURE 3.9. Increasing Demand or Decreasing Supply to Maintain Recommended Level of Employment

The Effect of Negotiated Wages

One of the things a union typically seeks is to obtain higher wages or "wage packets" for its members than they would otherwise receive. "Wages" here include both the hourly rates and the entire package of fringe benefits (which may embrace such diverse items as paid holidays, vacations, sick leave, medical insurance, separation pay, a pension plan, and so forth). If the union is successful, management will agree not to employ any workers below the wage that has been negotiated. Such an arrangement will cause the supply curve to take on a different shape.

In Figure 3.10, let us assume that prior to unionization, an agency in a given city was employing ten workers at an hourly wage of \$3.00. Let us further assume that both budgeted and recommended employment were equal to ten operators. The supply curve is SS, indicating the number of operators that can be attracted to the plant at various wages. Now assume that through collective bargaining a wage of \$3.50 is negotiated. The supply curve is now S'S'. The demand curve reveals that if the city council's attitude toward funding the plant has remained unchanged, only eight positions will now be budgeted. On the other hand, the supply curve reveals that as many as twelve operators would have been available at the negotiated rate of pay. Unless the city council can be induced to adopt a more liberal funding policy toward the plant (portrayed by a shift in the demand curve to the right to D'D'), a budgetary shortfall of two positions will develop.

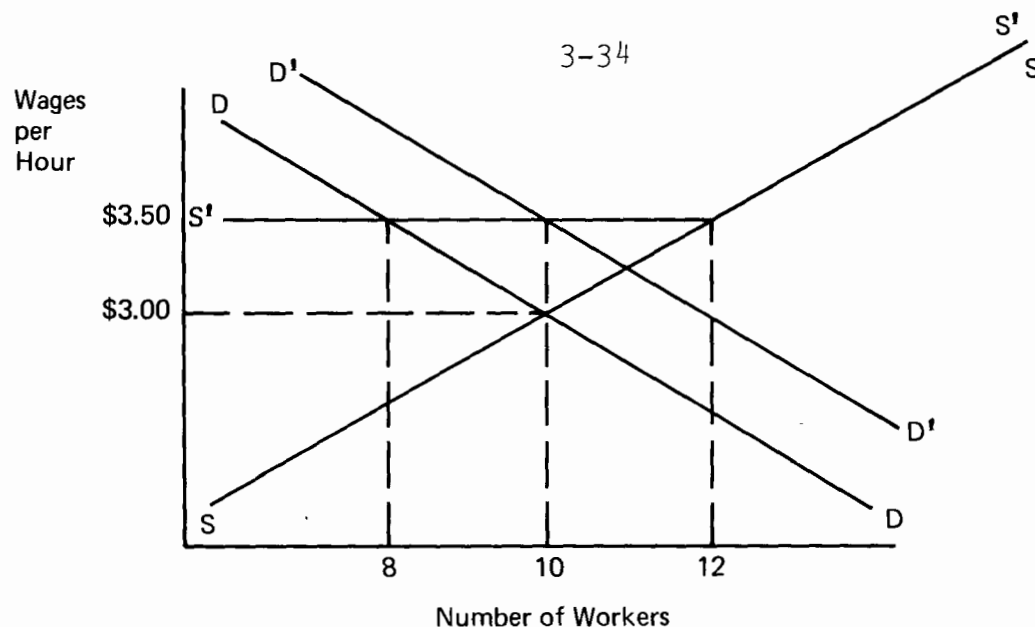


FIGURE 3.10. Meeting an Increased
Negotiated Wage Through
and Increased Demand

SUMMARY

In this chapter we have reviewed some elementary but important aspects of labor economics. We have emphasized these aspects of labor economics that particularly impinge upon activities for which the manpower planner will be responsible. We readily acknowledge that for those readers who have not previously studied economics, the material in this chapter will not be easy to understand. Its importance in manpower planning is of such magnitude, however, that its deletion would seriously handicap planners in correctly doing their work. Many of the factors that affect the work the planners must do, as well as the efficacy of completed work, have economic content. One is only to mention inflation, unemployment, government manpower training programs, wages, and taxes to recognize the prevailing influence of economic factors. We hope that manpower planners will dedicate themselves to mastering these basic principles and that they will in fact take it upon themselves to extend their field of study beyond the material contained in this chapter.

HUMAN RESOURCE DEVELOPMENT INSTITUTIONS

Solving national, state, and local problems will require a major manpower effort. This is a commonplace fact of the age in which we live -- the age of manpower, of education, of human resources. Whatever the current issue, be it law and order, community health, national defense, reduction of poverty, or the protection of our environment, the critical resource is trained manpower: physical and social scientists, engineers and technicians, and those workers with social as well as manipulative skills.

The results of a study conducted by the National Planning Association (NPA) will illustrate the challenge of acquiring the necessary manpower to achieve certain goals. Considering a series of national goals identified in 1960 by a national commission established by President Eisenhower, NPA asked, "If we seriously set out to achieve these goals, would we have enough manpower to do them all?" The answer was an unqualified "No!" If we want rising living standards -- including both private and public goods and services; national defense; better health care; improved education; adequate recreational facilities; cultural amenities; resource conservation and development; housing; a clean, attractive, and healthy environment; and all the rest -- we cannot have them all at once. We must therefore establish priorities among these goals and organize our resources efficiently to achieve as many of them as possible. To this end we must plan the development of human resources to enable them to make the greatest possible contribution to the achievement of these national goals.

ROLE OF THE MICROMANPOWER PLANNER IN
HUMAN RESOURCE DEVELOPMENT

The micromanpower planner is charged with the primary responsibility of satisfying the manpower needs of the organization within which he operates. In meeting this responsibility, the manpower planner must identify the number and kind of workers that are needed and at which particular time and place they will be needed. (The methodology used in identifying such needs will be developed subsequently.) The micromanpower planner must then plan to meet these identified needs through the development of human resources. Developing the needed human resources will require that the micromanpower planner: (1) be familiar with the existing human resource development institutions, (2) determine the extent to which these institutions can provide the needed manpower, and (3) work with these institutions to maximize their contributions to human resource development. Any deficiency in the ability of existing institutions to meet human resource needs will require that the manpower planner become involved either in the adjustment of existing institutions or in the creation of new institutions. It is with the human resource development institutional framework of the United States that we shall be concerned in this chapter.

While the micromanpower planner's primary function is to engage in those activities that will ensure that his organization's manpower needs be satisfied, the psychology of today's labor force and the human-oriented training of the professional manpower planner require that his activities go beyond merely meeting the identifiable

institutional needs. Today's workers demand the opportunity to develop to the maximum of their potential as human beings. This means the opportunity: (1) to become educated to the extent capable, desired, and needed to compete in a modern world; (2) to become trained with an occupational skill needed by the society within which one lives; and (3) to have the opportunity to put that knowledge and skill to effective use and in so doing, provide for one's personal needs. The micromanpower planner must understand and accept these personal, people-oriented needs and seek a mutual accommodation with the needs of his or her agency or industry. The exciting thing about manpower planning is that personal human needs can usually be met at the same time that the institutional needs are satisfied. The extent to which the manpower planner is successful in accommodating these needs will determine his or her ultimate success as a professional.

If these needs are to be met, it is required that in addition to a vigorous and growing economy which will provide job opportunities, there be:

1. An education system providing sufficient education and vocational training to enable all citizens to develop their human potentials to the maximum, thus enabling them to compete in the labor market
2. An employment system providing the educated and trained labor force with the opportunity to take advantage of employment opportunities which will best use their talents

THE EDUCATION SYSTEM

The American education system began early in the history of the United States. The founding fathers saw the need for the

encouragement of the educational process. Under the Land Ordinance of 1785, 1/36 of the land in new territories was set aside for support of educational activities, with most states adding a like amount for a total of 1/18 of the land to benefit the common schools. This Act was followed by the Morrill Act of 1862, which granted land as an endowment for state colleges dedicated to education in the agricultural and mechanical arts. Most of these schools later added education in business and industry and played a key role through their extension services in the development of the most productive agricultural system in the world.

By the turn of the century, a major schism had developed in the ranks of education. One group, the generalists, maintained that the major purpose of high school was to prepare students for college and that undergraduate work was to emphasize a liberal education in culture and theory. Little or no attention was given to preparing people for a "job." On the other hand, the "vocationalists" looked upon people as human economic resources and maintained the need to prepare them throughout the educational process with skills needed in the labor market. John Dewey, who saw the benefits to be derived from the preparation of worker-citizens and the danger of a bifurcated education system, tried but could not heal the breach. The generalists prevailed to the neglect of vocational education. It was generally felt that a general education was enough -- "Let industry do its own training."

To aid in meeting the demands for skilled manpower in World War I, Congress passed the Smith-Hughes Act of 1917 which provided

federal grants on a matching basis to states for vocational education. Throughout the following years, the federal government remained the prime sponsor of vocational education. The original list of vocational programs allowed under Smith-Hughes -- agricultural, trade, industry, and home economics -- was later expanded to include distributive education and secretarial training. On the state level, however, the generalists prevailed, with the resulting neglect by the state and local school districts of vocational education. While traditional high schools and state colleges secured new buildings and the best students, vocational education inherited the castoffs, in terms of buildings, students, and all too frequently, teachers. It became too often the neglected stepchild.

In 1963, following many years of intensive debate, in response to the manpower revolution of that decade, the Vocational Education Act was passed (subsequently amended). This act constituted one of the most significant developments in the evolution of a system for human resource development. The restrictions of the old vocational education legislation were removed. For the first time, vocational education was to be people (human) rather than program oriented. The Act emphasized assistance to the individual in preparing for employment and keeping up to date with the knowledge and skills needed by the job market. Programs could cut across all occupations except those requiring at least a bachelor's degree. They could involve people of all ages and preparation levels. Research and experimentation were provided. Area vocational schools were also encouraged. And most importantly, the federal funds available were significantly

increased. The result has been more attractive physical plants, younger and more competent staffs, and, consequently, a range of student quality from the least able to the most capable. The physically, socially, and economically handicapped (disadvantaged) are singled out for special attention. Vocational education has become a full-fledged and fully accepted part of the academic community, cutting across the wide range of community interests.

Perhaps a return to John Dewey's philosophy of education calling for worker-citizens is becoming possible. An education system which concentrates on developing the manipulative as well as the intellectual skills, which gives to all students the real option to select and prepare for a career which may emphasize one or the other, might better meet our needs. To give our students that real choice, training for manipulative skills should be as honored and supported as training in intellectual skills. Manipulative training should contain sufficient content to provide the opportunity for change to the other approach. By the same token, the student who first selects the more intellectual approach should have as a real option the transfer to a manipulative-oriented program. To make such a transfer possible requires the removal of psychological and other barriers now existing. The concept of career education as seen later can aid in this process.

General School System

Historically, the American education system has begun with the five- or six-year-olds, either in kindergarten or the first grade. Increasingly, however, educational opportunities are being given to three- and four-year-old preschoolers in private or quasi-private

nursery schools. The federal Headstart program provides funds for preschool programs, primarily for children from disadvantaged homes. As mothers with preschool age children enter or reenter the labor market, the need for preschool educational programs increases.

Grades 1 through 8 concentrate their attention on developing reading, writing, speaking and computational skills as well as an understanding of the world in which we live. However, manipulative skills are generally neglected after kindergarten. While the emphasis in grades 9 through 12 is usually on the same order as the earlier grades, some schools include vocational courses which begin to develop manipulative vocational skills as well as some appreciation of vocational opportunities after high school. These programs still suffer somewhat from the traditional view that only the troublemakers and less capable students find their way into such programs, though there is some evidence that this attitude may be breaking down. One of the major problems facing the manpower planner is that individuals just finishing high school, or those who have dropped out, are seldom prepared for much more than laborer kinds of entry-level jobs which seem to be diminishing. The dropout, because of his frequent lack of abilities obtained from a general education (e.g., reading, writing, speaking, computation, and general understanding), is frequently limited in his ability to be promoted without additional education. The high school graduate, who has taken full advantage of the educational program, usually has the general skills needed to make advancements on the job. However, he frequently lacks practical knowledge and manipulative skills, which many entry-level jobs require. The

high school diploma and the graduation equivalency diploma (GED), generally speaking, unless only given for social reasons, can be assumed to give a student sufficient basic education to handle lower entry-level jobs.

The continued development of the "career education" concept as seen later should eventually merge the academic or traditional education with vocational education, both being important in developing and maintaining a career.

Vocational Schools

An important arm of the education system is vocational schools, public and private, that accept individuals often regardless of educational credentials and train them in a particular vocation. These schools pay little attention to so-called general education -- the humanities, fine arts, sciences, and social sciences. The training, though generally narrow, provides students with the skills to obtain employment in narrow occupational fields such as barbering, secretarial, plumbing, heating, electrical, computer technology, and so forth. Theoretical underpinnings are often neglected in favor of the practical. From the viewpoint of the individual, the chief disadvantage of such schools is that a particular skill may become obsolete, of little or no economic value; and unless the individual has continued with his "education," he may be at a disadvantage in a changing labor market. This disadvantage is overcome by looking at the training in the vocational school not as something that is final, but only as a step in "career education." From the viewpoint of manpower planning, such graduates can be used in operator- or craftsman-type jobs; but without

additional, more generalized education, they are usually limited, or at least thought to be limited, in their ability to advance.

Two-Year Colleges

Identified as the most rapidly growing sector of the American education system, the two-year college helps to bridge the gap created by the nature of the development of most four-year colleges. There are generally three kinds of two-year colleges: technical, community, and junior. Some feel that this continued growth is the result of their technical and vocational orientation.

The technical colleges concentrate primarily on programs to train people in vocational and manipulative skills, but with an increasing amount of general and theoretical background. They grant certificates for completion of certain short-term courses and frequently grant associate degrees for the completion of two-year programs. Many try to integrate their work with the university so that their credits are transferrable. Operators, technicians, and skilled workers are often products of these schools.

Community colleges emphasize education service to the whole community and are frequently much like technical colleges in what they emphasize and in the programs they offer. Increasingly, these colleges are "open schools," admitting all applicants and then helping them move from their present educational levels to wherever they wish to move. Much impetus was given to this trend by the inclusion of manpower training skills centers at community colleges under the old Manpower Development and Training Act (MDTA) program.

Junior colleges may have much the same characteristics as technical and community colleges. The more traditional junior colleges do, however, constitute a stepping stone to the four-year college and university -- either for those who wish to improve upon their high school preparation or for those who wish a less expensive first two years in their post-high school educational program. Associate degrees are usually granted by junior colleges, and sometimes there are limited vocational programs available.

Four-Year Colleges

The more traditional post-high school college has been the four-year college or university offering bachelors' degrees. Such institutions are usually characterized as providing what is called a "liberal education," though some schools also offer vocational programs. A person may major in the humanities, fine arts, sciences, or social sciences. These students are seldom prepared for a job as such, though their more general and theoretical training may prepare them for learning one of a wide variety of primarily white-collar occupations.

Many employers look to these graduates as potential managers who require a more generalized background than is provided in technical and vocational schools. The graduates of science programs can often assume, with a minimum amount of additional training, a technology-type job. A substantial number of graduates of four-year colleges continue on to graduate school. The mid-1970s saw a decline in the enrollment growth of four-year colleges.

Post-Graduate Universities

Long considered the ultimate in education are the post-graduate universities which include the programs and philosophies of the

four-year colleges but in addition offer graduate programs with masters' and doctorate degrees. They frequently include such professional programs as law, engineering, dentistry, business, medicine, and the like. The graduates of these schools are usually classified as professionals and scientists -- at the top of the educational spectrum. As with four-year colleges, graduate schools began to have their enrollment problems in 1973.

Continuing Education

High schools, two-year colleges, four-year colleges, and universities frequently have continuing or adult education programs and short courses designed for adults who are not enrolled as full-time students and frequently do not intend to get a degree but merely want to continue their educations as circumstances permit. Such programs offer real opportunities for upgrading the abilities of full-time employees. They are usually quite flexible in the courses they offer, and there are seldom any entrance requirements. They are generally held at night, although vocational and technical schools and community colleges also cater to this type of student in daytime offerings. Adult basic education is often available, financed by federal funds, enabling adults with deficiencies in English, mathematics, and other basic education to learn or relearn these subjects. It is frequently possible to obtain a GED which is generally acceptable as the equivalent of a high school diploma. Such education frequently establishes a base permitting people previously condemned to dead-end, low-paying jobs to develop the skills needed for occupational and economic upgrading. English as a second language is often offered for students with language problems.

Cooperative Education

While most daytime educational programs have little or no on-the-job training components, some schools have developed cooperative educational programs which build into the educational process the opportunity to work for remuneration under educational direction and often for credit. These programs enable students to earn while they learn, and for some they provide a superior form of motivation for the learning process as they are assisted in relating their theoretical training to an actual job.

Employer-Sponsored Education and Training Programs

Many of the larger employers offer education and training programs for their employees. These are of two primary types: external and internal. Some employers pay for the tuition and books and grant free time or any combination of these for employees to enroll in courses and programs, usually directly related to their present jobs or in preparation for advancement. Large firms also frequently have internal training programs in which they either bring in instructors under employer auspices or develop their own cadre of instructors for the purpose of upgrading and updating their staffs. Internal programs have the advantage of giving the employer greater control over what the employees learn, and the training can be tied directly to their unique operations. There is less transferability of knowledge and greater direct, more immediate benefits to the employer. One of the problems may be employee receptivity.

Correspondence and Programmed Learning Courses

Correspondence courses are often available to employees, with employers sometimes financing these courses if they are closely enough related to the employees' work. Somewhat related to the traditional correspondence course is the self-instruction or programmed learning course. Such a course may be tailor-made to a particular employer's operation, with a minimum amount of instructor activity and a maximum amount of self-teaching. Such programs are especially helpful for orientation and at lower levels of competence, though of less value at the more sophisticated levels. The same kinds of programs are also available in more general types of learning such as accounting, simple mathematics, grammar, and so on.

From the social point of view, employer education and training programs have the deficiency of being generally limited to those of demonstrated superiority to the neglect of those who have had inferior opportunities. The National Alliance of Businessmen's Job Opportunities in the Business Sector (NAB-JOBS) program helps to bridge this gap through federal financing of training for disadvantaged people.

Apprenticeship Programs

In some of the more highly skilled trades or crafts, formal apprenticeship programs are available. Usually under the joint sponsorship of management and the labor union, with relevant jurisdiction in a carefully structured and controlled program of mostly on-the-job training, an apprentice working with an experienced journeyman is trained carefully in each phase of the trade or skill. These programs last usually from two to five years, at the end of which

time the apprentice becomes a journeyman. There is sometimes conflict between labor unions which promote these programs and vocational schools which attempt to shorten the period of training required for a skilled craftworker through formal classroom and on-the-job training. From the social point of view, these programs have in the past worked to the disadvantage of racial minority groups that have been systematically excluded from such programs. Equal employment laws and regulations enforced on management and unions alike, as well as a change in attitudes by many, should in time eliminate this form of discrimination, especially where federal funds are used and laws enforced.

State and Local Roles in Education

At the state level, the highest authority in education is usually vested in a single board which provides policy direction to specialized segments of the education system. The state board for elementary and secondary education will usually provide for the establishment of local administrative units called school districts. One of the unique characteristics of American education is the extent to which schools are administered by local authorities operating independently under local boards. The theory supporting this practice argues that local control will permit education to reflect and be responsive to the will of the local electorate and taxpayer. In very few cases will local school districts be concerned with manpower planning as an on-going activity. Most school districts will look to the state department of education for guidance in this area. The few exceptions to this general procedure are the large metropolitan school districts or specialized regional vocational education districts.

Within most state education systems there is (either as a separate board or under the general board) an authority to administer the state's higher education, post-secondary system. There is also a vocational education office charged with the responsibility for promoting vocational education through the school system of the state. There is sometimes conflict over the location of responsibility for the administration of post-secondary vocational education. Many vocational educators and their promoters do not feel comfortable (in fact, feel discriminated against) when controlled by university- and college-oriented boards and have moved in the direction of separate boards.

Purpose of Education -- A Career

The purpose of education differs, depending upon the framework of reference. From the point of view of the individual, it is a means of providing for his needs -- physical, mental, psychological, social, political, and spiritual. From the viewpoint of society, it is to develop an enlightened citizenry capable of self-government and self-support. From the viewpoint of the employer, it is to prepare productive workers. Examining this latter function in greater detail, we find that general education should prepare a person to make adjustment to entry-level jobs in the minimum amount of time and with the minimum amount of expense to the employer. The employer does not want to have to teach new employees how to read, write, and speak English, or how to do simple arithmetic.

There are those who maintain that there is not necessarily a dichotomy between the philosophies of the generalists and the

vocationalists. They recognize that the ultimate purpose of the education system must include both citizenship and vocational ability. Essential to this double-headed objective is general education and vocational training directed toward the development of "careers" by the citizenry. This means that children must be taught to read, write, and compute, but in addition they must be taught manipulative skills and positive work attitudes.

Most employers expect that their employees will have been developed to a given point in these attributes, with the employer providing orientation into his particular operation, along with the training necessary for upgrading of their own employees, with some continued assistance at the more theoretical and general levels by the education system. This upgrade education and training provides workers with the opportunity, should they so desire, for higher level jobs providing them with upward mobility, retreading, and morale building. The employer benefits by the provision of workers with the ability to take advantage of the latest technology, enabling the firm to become or remain competitive or to become more efficient if in a noncompetitive position.

One of the most promising developments within the educational establishment in making effective Dewey's concept of the worker-citizen is what is called "career education." Promoted by the U.S. Office of Education, the concept is relatively simple: Educational establishments are being nudged in the direction of educating students for careers rather than educating them for college or for a job. To accomplish such an education requires that students obtain a wide

acquaintance with the "world of work." Such an acquaintance should be developed throughout a student's school life and should permeate the entire curriculum. While very general at the elementary level the secondary student makes a tentative selection of a career area, each career area encompassing all levels of skill and conceptualization. This selection is followed by the development of the skills needed in that career field, enabling the student to secure a job upon exit from school, whether by dropout or graduation. Whichever the form of exit, the system would encourage reentry for the development of additional skills and concepts as needed for continued career development. This concept envisions education as a means to an end -- a career -- rather than solely as an end in itself. It constitutes a real investment in human capital.

The concept of "career education" eliminates the supposed dichotomy between generalists and vocationalists and merges the interests of the employees with those of the employers. Conceptually it involves low-level, entry-level jobs within a career field, providing the opportunity for school dropouts and low-skill people to perform within the limits of their current capacity. But it also provides "career ladders" with clearly defined routes of progress and clearly defined requirements and aids for that progress. Continued progress in a "career ladder" may involve more formal vocational or general education, requiring night classes (in house or out of house), or it may require a leave for full-time educational or training activities for a given period, with reentry into the labor force. Continued progress up the ladder may involve repeats of this exit-entry process.

The same system that provides for upgrading for the career ladder will also provide the support necessary for retraining in a lateral move to a new career ladder should the one prove inadequate or transient. All of this requires great flexibility on the part of workers, employers, and the educational establishment. But the outcome should bring people closer to Dewey's concept of worker-citizens.

FEDERAL ROLE IN EDUCATION

While historically education has been considered as primarily the function of local and state government, with the private sector fundamentally concerned with colleges and universities, the federal government has come to play a significant role. The Office of Education in the Department of Health, Education, and Welfare, has been given prime responsibility for aiding in the development of an education system which will promote national goals as formulated by Congress, the Supreme Court, the President, and the federal educational bureaucracy. USOE has established and staffed regional offices which work closely with state and local agencies as well as monitor the progress of federal contracts and grants to various education and research agencies. In addition, USOE, assisted by its regional offices, collects, analyzes, and disseminates data needed within the educational establishment.

Within USOE is the Bureau of Adult, Vocational, and Library Programs which is directing its primary efforts toward two groups: (1) the high school dropouts and the graduates, both of whom are in need of specialized training for immediate employment, and (2) people in the labor force who need retraining to keep up with technological

change. Within the regional offices of HEW a manpower coordinator (discussed later) has been appointed to coordinate the regional manpower efforts of the disparate functions of the agency.

At the national level, USOE while a part of HEW, has had a great deal of autonomy. For a decade it had joint manpower responsibilities with the Department of Labor, being a signator to manpower development projects with responsibility to approve such along with the Labor Department, and with primary responsibility for overseeing the educational and training aspects of manpower development projects.

One of the USOE's greatest contributions was the development of skills centers, designed for the encouragement of disadvantaged people to obtain the educational and vocational skills necessary to compete in the marketplace. Typically disadvantaged people have a much shorter range of goals. To them the future is not far off. The skills centers recognized this characteristic and helped their clients to set short-range goals, easily met, but which would lead to greater and more adequate involvement in the world of work. While HEW had ultimate responsibility, it was USOE that had the working responsibility. HEW officials were little involved, even in meetings at the national level.

The Department finally came to recognize that it had manpower responsibilities that went far beyond those of USOE. Divisions or offices within HEW with substantial manpower responsibilities and implications were: vocational education, vocational rehabilitation, adult basic education, remedial education, health, and child care. These manpower elements needed some focus, some coordination at the national level, as well as the regional level.

The outcome of this recognition was the creation of the Office of Manpower with an assistant secretary who is charged to develop a strategic approach whereby the effectiveness of HEW manpower services and service delivery could be improved. With the decentralization of the Labor Department's manpower activities, especially with the passage of the Comprehensive Employment and Training Act (CETA) in 1973, HEW began to move in the direction of decentralization of at least its manpower functions to the regional level, with regional manpower coordination staffs functioning directly under the HEW regional directors. The regional HEW manpower coordinator was given the following responsibilities:

1. Coordinate the HEW manpower elements of all major HEW program areas
2. Work with regional Labor Department personnel on the implementation of its regional responsibilities under CETA
3. Develop a regional information flow, tying in with HEW and the Labor Department but in support of local and state prime sponsors
4. Provide technical assistance to prime sponsors, when requested, and to state education agencies relative to their CETA responsibilities
5. Develop overall review processes of CETA projects with HEW involvement
6. Participate with the Labor Department in training prime sponsor staffs for operation under CETA

In theory there should be a close coordination between CETA and various elements of the HEW manpower-related programs in the development of the manpower potential of disadvantaged persons. Under previous legislation, especially MDTA, there were formal ties required by law. Under CETA, any continued ties were at the option of the local and state CETA structures. As might be expected, the records of these ties since December of 1973 has been spotty. There is nationwide evidence that the desired coordination is lacking and that local public educational institutions and programs are being neglected by CETA prime sponsors. One of the more serious problems is that prime sponsors follow political boundaries that do not necessarily conform to labor market areas, whereas, effective manpower planning other than micromanpower planning is ideally done for a labor market area. When two or more political jurisdictions are involved in a labor market, coordination of manpower planning is most difficult.

THE EMPLOYMENT SERVICE SYSTEM AND THE
U.S. DEPARTMENT OF LABOR

It is a mistake to assume that the preparation of an individual through the education system automatically assures that he or she will become a part of the labor force. The next step in entering the labor force after obtaining an education, while usually not as time-consuming, nevertheless is not automatic, nor is it easy. Individuals must convince an employer that there is a need for their services. As for private employment agencies -- their interest and involvement goes little beyond placement. It was the development of

the public employment service system that provided the second major element of a human resource development establishment.

Its Evolution

Until the 1930s, job hunting and placement were haphazard. Most people were hired off the streets or through friends, though some firms had developed fairly sophisticated personnel departments to screen job applicants. Private employment offices existed for certain kinds of jobs but were frequently characterized by exploitation of job seekers. During World War I, a nationwide public employment service was organized to meet the labor demands of that period. However, during the 1920s it was allowed to atrophy almost to a point of extinction. Under the authority of the Wagner-Peyser Act of 1933, the beginnings of a new national employment system were laid, with state employment services to be financed on a matching basis from general funds. In 1935, the Social Security Act was passed, establishing the basic system of today. States had the opportunity of establishing employment services to be financed 100 percent from federal funds coming from a federal unemployment compensation tax on employers. All states eventually took advantage of the opportunity and established state employment service agencies.

During the remainder of the prewar years, these state services were mainly concerned with screening welfare and work-relief participants through the application of "ready, willing, and able-to-work" tests. The system was federalized shortly after the outbreak of World War II, being placed under the War Manpower Commission and given the primary responsibility to allocate scarce manpower. Following the war, the Employment Act of 1946 was passed, declaring that:

It is the continuing policy and responsibility of the federal government to use all practicable means consistent with its need and obligations and other essential considerations of national policy with the assistance and cooperation of industry, agriculture, labor, and state and local governments, to coordinate and utilize all its plans, functions, and resources for the purpose of creating and maintaining, in a manner calculated to foster and promote free competitive enterprise and the general welfare, conditions under which there will be afforded useful employment opportunities, including self-employment, for those able, willing, and seeking to work, and to promote maximum employment, production, and purchasing power.

Despite this legislative injunction, the service was allowed to atrophy again, its primary function being an "unemployment agency" responsible for handling unemployment compensation claims and matching a few job orders with the larger number of available workers.

In 1958, Secretary of Labor James P. Mitchell gave a speech in which he criticized the service for failing to act adequately as a placement agency. This criticism released several forces which began to develop the service into what was designated by some authorities as a "community manpower service center," with its major function "human resource development." In some states, it has virtually become such; while in others, it remains as the "unemployment office."

Organization and Functional Operations of the Employment Service

Beginning in 1962, in response to the "manpower revolution" of that decade, the employment service began to take on expanded responsibility as a manpower agency concerned with all aspects of manpower. Each employment center was to become a community manpower center, operating within a state and a nationwide network. To achieve its goal of a more efficient labor market involved not only in the

employer's interest but also in that of the clients, the employment service was required to become associated with employers, unions, schools, and community development efforts. With the plethora of manpower programs of the 1960s, its involvement would have to expand to include the myriad of federal manpower programs as well as programs providing ancillary services. No longer was the employment service to merely wait for jobs to be listed with it. It was to seek new job orders and to seek and place clients.

To accomplish its goals, the employment service has had the traditional tools of testing, counseling, referrals, and payment of unemployment compensation. Beginning with the "war on poverty," it was expected to assist clients not meeting employer standards by working with vocational educators to establish training courses in fields they had determined was "reasonable expectation of employment." In addition, it was expected to recruit and screen unemployed and underemployed persons for those training programs, training to be followed by placement efforts and even follow-up activities to assure that placement really took.

Another tool is "relocation." The employment service has had limited funds to use in assisting clients to relocate, moving from areas of high unemployment to areas of manpower shortages or low unemployment. When coupled with education and training, it has the potential power to improve the functioning of the labor market. Unfortunately, the employment service funds have been too limited to contribute significantly to the solution of unemployment through relocation.

For a time, the employment service was so concerned with its antipoverty client orientation that it ran the danger of losing the confidence of the employers who became wary of its referrals. Recently, however, the service has moved to a more balanced position, that of providing the best possible service to all elements of the community, and employers are increasingly using its services. Federal agencies and contractors are required by law to list job openings with the employment service.

Some of the activities of the now defunct Office of Economic Opportunity (OEO), especially the community action agencies, in setting up competitive service centers which reached out to the youth and the poor, induced the employment service to add to its services Youth Opportunity Centers (near central city ghettos) and other "out-reach" activities, seeking potential clients hesitant to come into its centers. This included mobile employment service offices to better serve the various communities not provided with a permanent office. Also added were minority consultants to whom racial minorities could better relate. While OEO and the Youth Opportunity Centers are moribund, their concepts and lessons live on in CETA projects.

In 1968, the employment service was given responsibility to provide manpower services to Concentrated Employment Programs (CEP), to train and place welfare recipients in the Work Incentive (WIN) program, to recruit disadvantaged people for Job Opportunities in the Business Sector (NAB-JOBS), and to lead in the establishment of the old Cooperative Area Manpower Planning System (CAMPS). With the winding down and end of military involvement they were given special

responsibilities in aiding veterans back into the labor market. CEP and CAMPS, too, are dead as programs, but experience with them better prepared employment service personnel to be involved in the development of manpower.

Considerable internal turmoil was involved in these changes and additions, resulting in the elimination of the Bureau of Employment Service and the creation and regionalization of the U.S. Training and Employment Service of the Manpower Administration. State employment services were to relate to the federal government through the regional manpower administrators and thence to the Manpower Administration. Considerable changing of funding and philosophy was required. The transition was made more difficult, though not impossible, by the fact that state offices operated under both state and federal laws. Although federal financing tends to give federal authorities some power over state activities, the fact that the system must operate under state government systems and state legislatures often makes it more difficult for federal officials to implement their ideas. The conflict is not only between state and federal officials, however, for in the past several years sharp disagreements have occurred at the federal level between "old line" employment service personnel dedicated to the idea that the service should serve simply as a labor exchange and those pressing the community manpower service concept. The involvement of employment service activities within the line authority of the Manpower Administration of the Labor Department was onerous to some, but it enhanced the role of state employment service agencies as manpower service agencies.

Two developments enhancing the role of employment services as labor exchanges have been Job Banks and the job matching systems. A few systems were encouraged for experimental and possible replication purposes, to develop full job matching, through a completely computerized system. In at least one of these systems, all job openings communicated by employers, along with job requirements, are placed into the computer. A job client can then go into any local office, make application, and have it entered into the computer. All offices are interconnected with the system. Within a few moments (if available) several existing job openings meeting the client's qualifications are printed out and given to the job seeker. On the other hand the employer, by entering a job order request into the computer, can get a printout of eligible job applicants. The mechanization of job matching releases personnel for more effective job counseling and outreach activity. Once this system gets in place throughout the United States, it is conceivable that a job applicant in California will have ready access to job information in New York.

In the meantime, most other states have established Job Banks in which job openings communicated to the employment service are placed into the computer with a periodic computer printout, usually once a week. These computer printouts are then available to the various offices for their use with job applicants. This system is usually looked upon as a first step toward complete job matching. However, there are those who criticize the partial, piecemeal implementation as a waste of resources.

While on the state level, the employment service for several years served as the primary agent for planning the Labor Department's manpower programs, this function was changed with the development of the state and local manpower planning councils that under CETA serve as the manpower planning arm of the governor and local elected public officials. However, the employment service will probably still play a powerful role in manpower planning. In local areas it will probably continue as a prime deliverer of programs for human resource development because of its pervasive presence through widely dispersed community-based employment offices.

NATIONAL MANPOWER PROGRAMS

In addition to the manpower revolution of the 1960s and its demands for changes in the human resource development system, a third dimension was added which was to make its mark upon the other elements -- the educational establishment and the employment service. Until the 1960s those two elements constituted the whole. But in the minds of some, they were not responsive enough to the needs of this new era of rapid change which had left behind 15 to 20 percent of the population -- the poor of the nation. As already indicated, the result was the creation of national manpower programs with the purpose of optimizing the manpower contributions of the nation's population. Because of past neglect, special attention was focused on those sectors of the population experiencing the greatest difficulty in becoming an effective part of the labor force.

Manpower Development and Training

The development of human resources requires a linking of the employment service with the educational establishment. A key mechanism

for accomplishing this was the enactment and administration of the Manpower Development and Training Act in 1962. Conceived as a temporary program to train persons unemployed as a result of a technological change, extended to the youth and later adapted as a part of the "war on poverty," it showed its staying power and flexibility by assuming a leadership role in human resource development. While it was responsible for vocational-type training for the adult population in general, its major -- though not full -- emphasis was on the disadvantaged portions of the population.

Under MDTA, administrative responsibility was shared by the Secretaries of HEW and of Labor acting through the state employment services, and it established the need for training by identifying people eligible for and requiring training and the occupations in which there was "reasonable expectation of employment." Within HEW, the division of manpower development and training of the U.S. Office of Education was responsible for administering manpower institutional training programs at the state level, representatives of the state employment service and the division of vocational and technical education making possible a variety of major innovations in human resource development; for example:

1. Innovative techniques and material for those lacking adequate communicative and computative skills.
2. Use of adult basic education to upgrade the general educational level of trainees.
3. Bilingual basic education and skills training for those who must learn English as a second language.

4. On-site testing to determine educational areas which need strengthening, as well as to determine occupational abilities and interests.
5. On-site counseling to assist students to meet successfully their new challenges, and especially to help in making occupational choices.
6. Open admissions, admitting all persons referred by agencies, regardless of educational background.
7. Open-entry/open-exit institutional training using modular units, admitting students at any point in the course and allowing them to exit at any time.
8. Development of occupational clusters, permitting greater flexibility on the part of the trainees in the selection of an occupation.
9. Association of skills centers with colleges, encouraging disadvantaged students to enroll in allowable courses with regular college students. The acquisition of a GED became possible, and such students were encouraged to continue for a college degree.

As already pointed out, perhaps one of the most important contributions to the range of institutions was the skills center and its emphasis of institutional training for disadvantaged persons. The institutional changes it wrought will probably continue to be a resource of considerable value to the manpower planner.

In addition to the institutional programs and courses located at various educational institutions and at independent skills centers,

on-the-job training programs were established with employers in which employers are reimbursed for training costs through the state employment service. During slack labor market periods, employer response was less than enthusiastic. However, during tight labor markets, employer enthusiasm increased considerably. In addition to institutional and on-the-job training projects there was an individual referral program. Where institutional training was needed but there was insufficient demand to warrant the establishment of special classes at an institution, individuals could be referred for training to existing programs. While MDTA ended in 1974, many of the lessons learned in its twelve years are available to state and local prime sponsors as they develop locally responsive manpower plans under CETA.

Vocational Rehabilitation

An additional resource which is of some importance to the manpower planner is the state-federal program of vocational rehabilitation, not only in its preparation of people for employment but also in the example of success it provides in human rehabilitation. This program is an employment-oriented activity whose goal is employability. Although it offers both skills development and job creation, its special significance is the process by which access to employability services and employment is achieved.

While not directed at the disadvantaged, the vocational rehabilitation program each year places in competitive employment between three hundred thousand and four hundred thousand persons. By reason of physical and mental disability many of these may also be economically disadvantaged. It is one of a small number of very effective

programs. The high success rate is built in because the process begins with careful evaluation of the potential employability of the client. When employability is determined, the state rehabilitation agency has, within a single program, the authority to fund nearly any activity related to employment for any eligible client. Essentially any service that contributes to achieving the individual's employment objective is acceptable, including: (1) comprehensive evaluation, both psychological and medical, (2) medical, surgical, and hospital care and related therapy to remove or reduce disabilities, (3) prosthetic devices, (4) counseling and guidance for vocational adjustments, (5) training, (6) service in comprehensive or specialized rehabilitation facilities, (7) maintenance and transportation, (8) tools, equipment, and licenses needed for work or in establishing a small business, and (9) placement and follow-up. Eligibility, too, is broad, having expanded from the physically to the mentally handicapped, and more recently to those with other substantial handicaps to employment. However, clients must have reasonable expectations of employability, and therefore only the ones capable are selected for rehabilitation -- what is often referred to as "skimming."

The key element of the program is a personal relationship between a client and a trained counselor, authorized to purchase whatever medical, educational, or other services are needed to successfully place the client in satisfactory employment. After evaluation to ascertain potential employability and to determine handicaps and strengths, the counselor and client jointly work out an employment plan, merging the client's interests and realistic possibilities for

employment. The program is usually locally administered by a state social services or educational department, or as a separate entity. A few states have created departments of human resources which encompass the rehabilitation function.

It is of considerable importance for the manpower planner to establish close ties with the state vocational rehabilitation agency and its local offices. Interest in training and placing vocationally handicapped people may well serve many of the manpower needs of public agencies.

Public Employment Programs

Long advocated by manpower experts, an important and growing part of national manpower programming is programs offering jobs with local and state governments, either temporary or permanent, to the unemployed and disadvantaged, to be financed by federal funds.

Public Service Careers was aimed at opening entry-level public jobs to the disadvantaged by revising the nature of tasks performed to eliminate unnecessary barriers to employment. In addition, efforts were made to eliminate arbitrary merit or civil service requirements which effectively barred the disadvantaged from public service. Funds were provided for training of program enrollees and some supportive services. While this program is now dead, its basic concept can be incorporated into CETA manpower plans.

The Emergency Employment Act of 1971, with its Public Employment Program, provided an addition to the arsenal of manpower resources. Public service employment funds were allocated to cities, counties, and states to pay up to 90 percent of the wages and benefits for new

public service jobs in areas of crucial public concern. Persons hired with these funds were to be the unemployed or underemployed. Special preference was given to unemployed Vietnam veterans, graduates of manpower programs, and high-technology and professional manpower. Unfortunately, minimal funds were provided for training purposes under this Act. However, they could be linked with other programs providing training. The program required that individuals be moved eventually to permanent-type jobs in either the public or private sector. So long as there is substantial unemployment, public employment will probably continue, but it is now administered through the local and state prime sponsors operating under CETA.

The Work Incentive Program

The Work Incentive program was authorized by a 1968 amendment to the Social Security Act, its framers aiming at the movement of welfare recipients into productive employment -- from "welfare" to "workfare." After several years of experimentation, aimed primarily at families in the Aid to Families with Dependent Children (AFDC) program, in July of 1972, most adults receiving payments under this program were required to register for WIN and, where such was available, either accept appropriate employment or training. Those exempted from enrollment were the sick, the incapacitated, elderly people caring for sick or incapacitated persons, and mothers or other relatives with the responsibility of caring for children under six year of age. However, such persons can voluntarily register in WIN.

The emphasis of the program is placement on jobs, with employment service personnel charged with the responsibility of developing

either public or private jobs, as well as training opportunities for WIN clients. When appropriated funds are available, WIN clients are given occupational training in schools as well as apprenticeship, and formalized on-the-job training. The minimal or lack of education and the unmotivated background of many of these people make many employers shy away from them. However, superior programs with good training throughout the country have shown that it is possible to motivate and train economically disadvantaged people for many entry-level jobs. Once they become a real part of the labor force, they can become effective employees. One of the advantages of using them is that their expected beginning earnings are relatively low. If effective use can be made of them, costs may therefore be comparatively low. However, as with most everyone, their "stayability" will depend to a great extent on the development of an appropriate human development program within the agency with the opportunity for growth and improvement. The WIN program has not yet been integrated into the CETA efforts, although there is a rationale for doing so, and it is frequently coordinated through the involvement of employment service officials in CETA efforts.

VOCATIONAL COUNSELING

While not a human resource development institution in the same sense as educational, employment services, and manpower programs, vocational counseling is nevertheless an important feature of those institutions, and it is itself an institution in the sense that it is an established pattern of human activity intended to improve the

quality of vocational choices. Of the approximately sixty thousand full-time counselors, two-thirds are located in the elementary, secondary, and two-year schools throughout the country. State employment services and rehabilitation agencies employ about 20 percent, and the remainder are found in miscellaneous human service agencies and with private employers.

While the overwhelming majority of counseling is performed in the public schools, only half of the nation's high schools have any formal vocational counseling. In the past, this counseling has been directed toward preparing high school students to enter the university. This bias comes primarily from the fact that professionally recognized counselors are products of the universities. Vocational education is usually outside their range of experience and is therefore generally neglected. While some 80 percent of the high school graduates do not complete college, high school counselors spend two-thirds of their time on college-directed counseling.

With the rise of manpower programs, especially the Neighborhood Youth Corps, and the increasing respectability of vocational and technical education coming with the 1960s, the picture has begun to change. The change has also been accelerated by the decreased rate of growth of the universities in the 1970s, accompanied by the continued rapid growth of the two-year, post-secondary schools' emphasizing vocational education and training. The change has been further accentuated by the professional mingling of traditionally oriented school counselors with the counselors attached to the employment service's rehabilitation agencies, and by manpower training programs.

The approach of the latter is probably weighted toward vocational guidance because of the shorter time required to acquire a vocation than a profession.

One of the greatest problems facing vocational counseling is the fact that so little is known about the process of vocational choice. It is known that it is generally not a question of making a decision, but how to affect those decisions is less than clear. Nevertheless, the availability of wise, effective counselors at crucial points of decision making can probably be of some assistance. Probably the greatest assistance can be in helping the one making the choice become aware of the vocational opportunities, the demands or requirements of those vocations, and -- equally important -- the strengths and weaknesses of the individuals.

As career ladders are developed, some form of guidance is needed to assist individuals in making wise choices as to the careers they will choose, how far up the chosen ladder they will attempt to climb, and how best to achieve their career goals. Therefore, micromanpower planners may well wish to "plan" the inclusion of some vocational counseling expertise within the manpower development program with which they are concerned.

A MODEL FOR COOPERATIVE HUMAN RESOURCE DEVELOPMENT

An important function of the manpower planner is that of providing a bridge between the area he represents and other professional fields. When employed by a state agency or in a particular industry, be it health care, transportation, or improving environmental quality, the

micromanpower planner has a dual responsibility. On the one hand he must understand the technical operations and needs of his own agency or industry in order to adequately interpret it to other agencies and professions. He must also become familiar with the human resource agencies his organization might use in meeting its manpower requirements. The more expert manpower planners can be in assessing their industries' manpower needs, the greater will be the opportunity for precision and confidence in their translation of these needs into terms and concepts useful to educational administrators, curriculum developers, and training institutions. As a bridge builder, manpower planners can provide an administrative paradigm for human resource development through cooperative planning.

This team approach can also be fostered by regional federal officials at the state and local levels by setting up situations which bring appropriate state and local representatives together to jointly plan development of the needed human resources. The state agency representatives would include the state supervisor for manpower programs in the state employment office, the manpower specialist for vocational education in the state office of education, and the agency or industry person most concerned with proper staffing and similar areas of manpower need. It will also be to the advantage of the micromanpower planner to be involved in the manpower planning and coordinating activities of the state and local manpower planning councils. The simple model illustrated in Figure 4.1 shows the relationship of those agencies that should be involved in micromanpower planning.

The chief advantage to be derived from this "team approach" to planning can be seen in the potential for each agency to profit from the experience and information pool of the other agencies. The Labor Department and the state employment services possess considerable expertise in measuring demand in the labor market and making job and salary evaluation, while the vocational education staff is familiar with the resources and capability of regional, state, and local training institutions. The micromanpower planner representing a government agency or industry is in an ideal position to facilitate communication and program planning between his or her own agency or industry and the federal and state units most concerned with employment and training, and the manpower planning councils can help relate micromanpower planning to the overall planning and activities of the state and local areas.

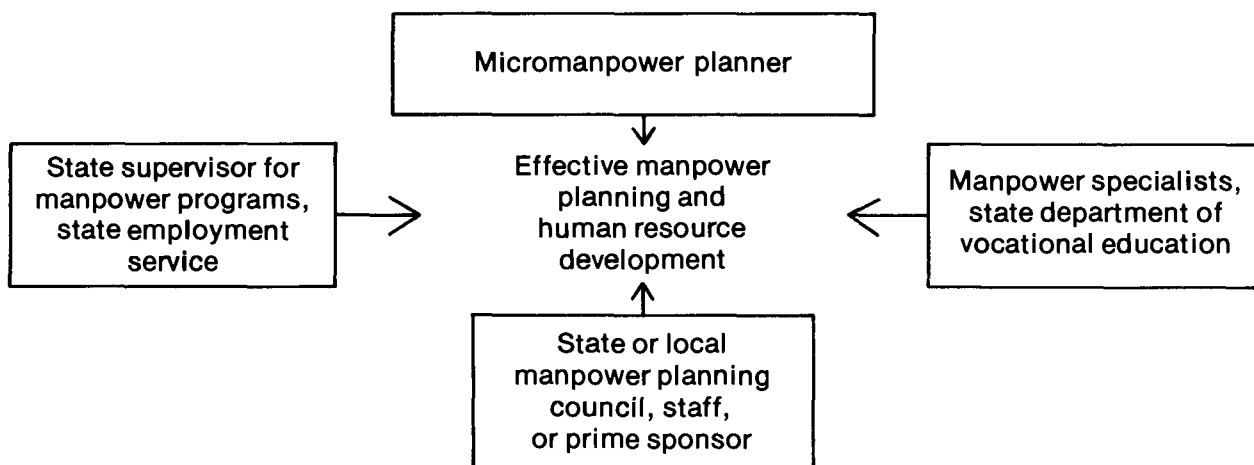


FIGURE 4.1. Model of Cooperative Human Resource Development

In 1974 and '75 CETA legislation was implemented -- although imperfectly -- at the state and local levels. It was patterned after successful programs already in use in California, Utah, and New York, where team efforts through manpower planning councils had been implemented. State and local manpower planning councils brought together representatives of the employment service, vocational rehabilitation, general and vocational educators, elected public officials, and representatives of labor, agriculture, the disadvantaged, and others, establishing in many areas effective manpower planning, essentially establishing the beginnings of a decentralized human resource development institution.

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MANPOWER TRAINING IN THE PUBLIC SECTOR

The micromanpower planner in the public sector is hired to plan to meet the manpower needs of the agency hiring him or her. Once the manpower needs are determined, plans must be laid for meeting these needs. It is often possible to meet these needs through the hiring process, but this is not always possible. Another approach is to establish a training effort within the agency or by the industry. While the manpower planner as such need not be involved in the details of the training activities, he or she should know enough to work with the training officer in the development and evaluation of a training plan and program.

THE HISTORY OF PUBLIC SECTOR TRAINING EFFORTS

Until 1958 the training efforts of federal as well as state and local governments were minimal, with the exception of the Department of Defense and the State Department.

The Federal Level

The dearth of training efforts resulted at the federal level from the neglect of Congress to specifically provide for training, either in house or out of house. The General Accounting Office (GAO) looked negatively on any out-of-house training financed by federal dollars, disallowing any expenditure for salaries or tuitions for training outside the federal establishment. Even in-house training was looked at with a jaundiced eye by GAO which ruled that only a "reasonable" amount of training tied directly to the current duties of employees could be administered by federal departments

and agencies. The safest course, and the most often selected, for federal officials was to neglect training.

In 1958, probably stimulated by the success of the second Russian Sputnik, Congress passed the Government Employees Training Act which actually required federal agencies to provide both in-house and out-of-house training, specifically allowing for salary, tuition, subsistence, and travel in connection with training in private as well as government institutions. The civil service was charged with the responsibility of implementing the law and succeeded in the establishment of its own training programs, as well as interagency agreements allowing federal employees to participate in the growing number of training programs in other federal agencies.

Under a Presidential Executive Order of 1967 the Civil Service Commission established the Bureau of Training and Regional Training Centers and the following year the Federal Executive Institute, providing in-residence training for high-level government executives. Similar centers were also established for middle management.

A boost to federal training programs has been given with the increased pressure to eliminate de facto discrimination against cultural or ethnic minorities by providing lower level employees with the training necessary for upward movement. While the training is for all federal employees, a disproportionately large proportion of ethnic minority government workers had been trapped at the lowest levels of government service because of the lack of adequate preparation. At the federal level, at least, training has become an integral function of almost all federal agencies.

The State and Local Levels

In 1971, under a provision of the Intergovernmental Personnel Act of the previous year, federal training programs were opened to state and local employees. The Act authorized grants to state and local governments for the establishment of their own programs. The provision of government service fellowship grants to local and state government executives gives them opportunities for graduate study they might not otherwise have had. The program providing for intergovernmental exchange of employees also provides training opportunities not previously available. The Labor Department's Public Service Careers programs provided state and local governments with federal assistance in the development of career ladders for their employees, giving them the opportunity for sufficient training to provide them with the possibility of upward movement. The Public Employment Program of 1971 provided a minimum of training money for the state and local employees whose employment was subsidized by federal funds. The opportunity to hold a job that was provided for the unemployed and underemployed when given to people who had little work experience was itself a type of training. With federal assistance, and probably some of their own momentum, state and local governments are increasingly realizing the importance of training in their operations.

A TRAINING RESPONSE

As already shown a number of times, the micromanpower planner in the public sector has the responsibility for developing organizational plans which will assure the organizations of the right

kind of manpower, at the right time, and in the needed numbers. Once the manpower needs have been determined, a response must be developed for meeting these manpower needs. There are at least three types of responses possible. These are discussed in the following paragraphs.

The Passive Response

Reliance could be placed on the supply and demand forces of the labor market. The chief drawback to sole reliance on the market is that its response is sometimes slow -- perhaps too slow to avoid serious problems of shortages of needed manpower.

The Closed System Response

Not trusting the vagaries of the marketplace, the manpower planner could establish a system for introducing the low-level raw manpower produced by the socio-politico-economic system and then developing, completely in house, the kinds of manpower needed, establishing a completely closed system of training. This could be extremely expensive and could result in considerable effort that is duplicative of the public education sector. Another problem is that closed systems are no longer possible. While it is perhaps possible to control the intake of manpower, in a free democratic society it is not possible to control the outflow, and leakages of manpower could end in floods.

The Activist Response

The activist manpower planner will: (1) identify the manpower needs over a planning horizon, (2) project the capacity of the public economic education system to meet those needs, identifying areas of shortage, (3) intervene in the system, seeking to influence it in

the needed direction, (4) use the public system to the maximum extent possible, and (5) plan for the establishment of an in-house training effort to meet the remaining needs.

It is with the establishment of an activist role that this chapter will primarily deal. It will be assumed that the types and numbers of manpower needed have been determined within a planning horizon. It will also be assumed that some human engineering has been done, at least enough to identify the types of training needed. In addition, the present and potential capacity of the public economic-education system to meet these needs has been determined, or at least evaluated, leaving the residual training needs.

The responsiveness of the system to adjustments in the wage level -- both in terms of calling forth needed workers as well as making its own wage adjustments -- must be evaluated. In the short run an increase in wages or perquisites may induce workers to leave other employers. In the longer run, if there is a shortage of workers, other employers may respond by increasing their wages and so on, leaving the agency no better off. If there is an overall shortage, in the longest run, the general increase in wages for a given occupation may produce an increase in the number of workers of a particular occupational group. However, in the meantime the employers are saddled with what could be exorbitantly high wages. While the pre-1930 economy may have experienced a downward adjustment in wages in response to an oversupply, that response is no longer likely.

A training response can alleviate some of these pressures. If the shortage is local and minimal, an employer can develop his own training program. If the shortage is more general and extensive, any in-house training program can be soon bled of its product, its trained manpower being "pirated" away. In these cases, a more generalized or cooperative type of training effort is needed on the part of the industry or at least a substantial portion of the employers of that particular kind of manpower.

The manpower planner, in outlining the alternative responses to perceived manpower problems to decisions makers, must also assist in evaluating or giving priority to those alternatives. What should be the basis of such evaluation? The historical approach of the training officer has been that training is "good," therefore training is the appropriate response to all manpower problems. The economist or economically oriented decision maker would advocate that after identifying all alternatives to the solution, the most "economical" solution should be selected. Here the training specialist and the economics-oriented manpower planner must work hand in hand -- the training specialist to identify the types of approaches to learning possible, the manpower planner to help determine the economic, political, and social viability.

The Effect of Organizational Objectives on Training

One of the most popular approaches to the science-art of management is "management by objectives," whether it be in the private or the public sector. Where this approach to management is used, each of the functional areas must subscribe to that same philosophy, including training.

Assuming "management by objectives," Figure 5.1 illustrates the effect of organizational objectives on the training of an organization. The objectives of the organization will determine the objectives of the major functions -- production, finance, public relations, and distribution -- as well as have some direct effect on the training objectives which may or may not be considered a major function. The training objectives in turn are influenced by the objectives of each of the other major functional areas. However, training is only one of several types of manpower response to meet the objectives of the major functional areas. Among the other responses are two closely related to training -- labor relations and personnel administration. These two manpower responses, with their concomitant objectives, help determine the training objectives of the system, as well as directly influence the achievement of organizational objectives. These three -- labor relations, personnel, and training -- help to determine the training methodology, if it selects educationally viable methods, will also affect behavior. And behavioral change in turn affects the accomplishment of organizational objectives.

Steps in Training by Objectives

A philosophy of "training by objectives" would entail the following steps:

1. Identification of the training objectives. Before any training plan is put into practice, what it hopes to

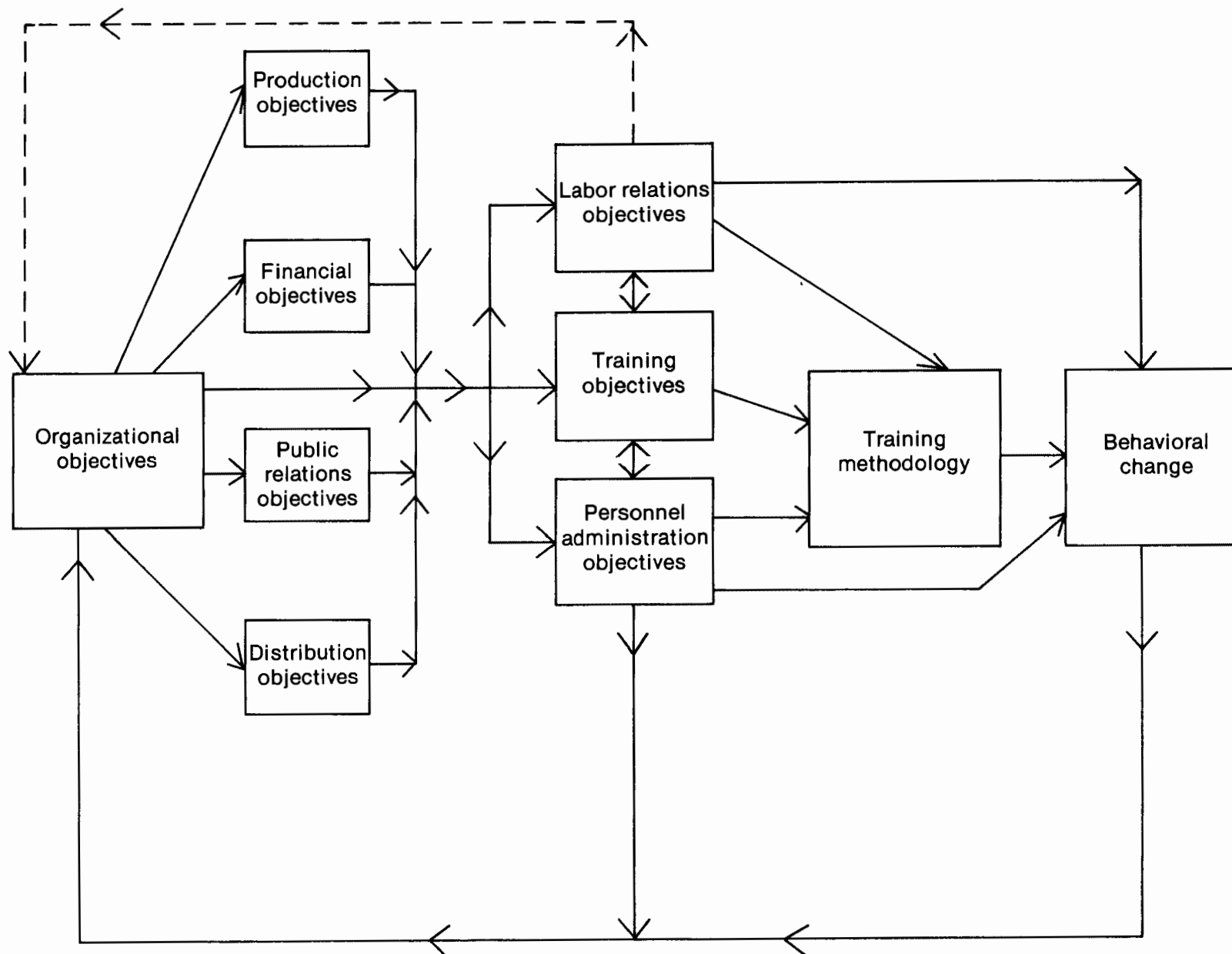


FIGURE 5.1. Management by Objectives Model

accomplish (its objectives) must be determined. Generally these objectives should be stated in terms of measurable behavior, not philosophy or attitude, because these are not measurable. Attitudes are meaningless unless accompanied by performance or behavior.

2. Once the training objectives have been determined they must be made measurable. That is, to test performance the end product must be measurable; otherwise there can be no effective test of accomplishment.
3. The present position relative to the accomplishment of those objectives must be determined in the same objective, measurable terms as the objectives themselves.
- 4.. A training plan, directed toward moving manpower from the present performance level to the desired or planned level, must be developed.
5. As the plan is put into effect, it must be systematically monitored to see that it is moving manpower toward the objective. The result of the monitoring must be constantly fed back into the training program so that necessary adjustments can be made.
6. It is possible that a serious mistake was made in formulating the training response, though this should rarely happen. If it does, the dropping of the plan should be considered. This should only be done as a last resort, alteration or radical surgery being the preferable course because of the morale effect of discontinuity.

7. Once a training program has run its course, an evaluation should take place in which the progress toward the achievement of objectives is measured. If it is a total failure, a completely new approach may be in order. The best of analytical and evaluative skills is essential in this step.

The Viability of Training Responses

If training is to be conducted by the establishment of objectives, training decisions must be viable. Figure 5.2 illustrates the considerations for training decisions. There are four major possible considerations of the training officer in determining training viability: economic, educational, political, and social. The top level administrative officer will make the determination of the relative importance of these considerations, but all will determine the viability or probable effect of training decisions to some degree.

The economic consideration takes effect through two filtering or testing mechanisms or principles, whether formal or informal. The first is cost-benefit analysis which asks, "Will the training program pay for itself?" If it does, it is economically viable, although it may be rejected because of other considerations. If it is not economically viable but because of other considerations is still needed, the training decisions would be filtered through cost-effective analysis, with the selection of the most cost-effective alternative or alternatives.

The most, if not only, effective testing device for educational viability is, "Will it change behavior as desired?" If it will not change behavior, it is not educationally viable according to our definition.

Political viability is tested by whether the training decision maker can retain his or her power in the making of a training decision. (This assumes that retention of power is important.) If it results in the individual's separation, in most cases it is not politically viable, though the training officer may receive some satisfaction in knowing that he or she was "right." Of course, if the training officer had intended to leave the organization, then retention of power would not be an effective test of political considerations except in a negative way.

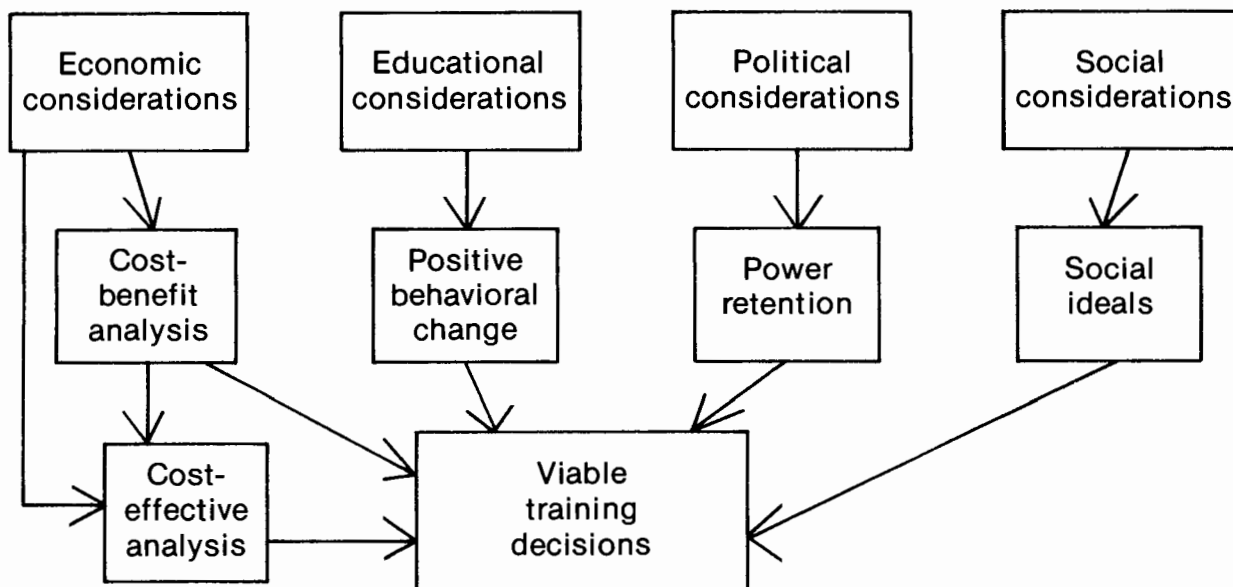


FIGURE 5.2. Role of Considerations in Training Decisions

Finally, social viability is tested by whether social ideals are met. In a democratic society, these would be democratic ideals; in an egalitarian society, they would be egalitarian; in an oligarchy, they would be oligarchic, and so forth.

Cost-Benefit Analysis

Cost-benefit analysis asks the question, "Will the program pay for itself?" That is, will the benefits equal or outweigh the costs. The approach of the economist would be that unless the program pays for itself, it is not economically viable. The use of such analysis requires that the manpower planner be most careful in identifying all major benefits and costs ascribable to a given program. Otherwise it becomes simply a tool of preconceived rationalization. Conceptually the inclusion of major benefits and costs may sound easy, but in practice it becomes difficult. In the following outline, some of the major costs and benefits associated with training are listed. Individual manpower planners may add to or subtract from the list as their particular training programs are considered.

<u>Costs</u>	<u>Benefits</u>
To employers:	
Instructors	Cost reduction
Facilities	Service improvements
Hardware -- equipment	Time reduction
Software -- books, supplies	Production improvement
Tuition	Morale improvement
Administration	Improved safety
Transportation	Reduced turnover
Lost time of trainees	

<u>Costs</u>	<u>Benefits</u>
To trainees:	
Foregone leisure	Personal satisfaction
Psychic	Improved mobility
Out of pocket	Improved income
	Improved mental health
	Improved safety
To society:	
Tax reductions	Improved physical and mental health
Lost production of trainees	Improved production of trainees
	Increased taxes

While all costs and benefits should be considered, the employer is of course primarily interested in the costs of and benefits to the organization. This analytical technique assumes the evaluation of costs and benefits in a common unit of measurement, usually dollars, which greatly simplifies the calculus and makes the striking of a balance easier. After such an evaluation, the dollar evaluation of costs and benefits is added up and a balance struck. If the benefits equal or exceed the costs, the activity is economically viable, paying for itself. Should costs override benefits, the activity is not economically viable.

An economically unviable activity may, because of its political or social implication, have political or social viability, and as a matter of practicality the noneconomic benefits may be of overriding importance. It is important, however, that the manpower planner be constantly prepared to forcefully point out the economic viability (or lack of it) of training programs to decision makers.

So long as a training program is economically viable, there is no economic reason it should not be used. It costs nothing, and if the benefits exceed the costs, it contributes something extra to the operation. It is important, however, in assigning costs and benefits of alternative training programs, that double counting be eliminated. Each program would need to be assigned its proportionate share of joint costs and benefits.

It should be clear from the foregoing that the quantitative determination of all costs and benefits is a difficult task. Unless great care is taken, some costs or benefits may be left out or double-counted. Unless the manpower planner is prepared to exercise the necessary precaution, it might be best to avoid the use of cost-benefit analysis, relying on the cost effectiveness approach.

Cost Effectiveness

If there are a number of educational programs that meet the criteria of paying for themselves, or if there are a number of educationally viable programs which do not meet this criteria but because of other considerations must be considered for implementation, the manpower planner must then determine which program or programs to use. An analytical tool for assisting in making this selection is the determination of the cost effectiveness of the alternative methods.

The use of this tool would be the determination of the benefits received per unit of cost. If a given program can produce the same educational results as another, it makes sense to select the

program that costs the least. While this test is not always easy to apply, it does make sense for even the nonprofit organization to get the "biggest bang" possible per dollar of expenditure. The approach of the economist would be to select or at least to recommend the selection of that approach. There may still be a net economic cost, but it will be minimized.

Levels of Training Needs

The training program function must recognize at least five levels of training, each with its own peculiar needs and appropriate training methods:

1. Orientation -- One of the most trying periods in the worklife of a human being consists of the first few days or weeks of employment with a particular employer. The most common approach to orientation is the "sink or swim" approach in which workers are allowed to flounder in an uncertain sea. More and more, management realizes that there are always costs involved in the first few weeks of employment and that these costs can be minimized through an orientation program which identifies the structure, the basic rules, the objectives and functions, and so on of the organization. Good orientation will increase the likelihood of a new employee's remaining with an employer, reducing other employment costs. Today's worker wants to know what is going on and how he or she relates to the whole. Orientation helps achieve this and is something every employee needs. Films, visits, and self-instruction can be truly effective if done well.

2. Entry-level training -- Every organization has basic functions or operations that constitute its fundamental activities, whether it be running a piece of machinery, working with the public, engaging in certain clerical activities, laboratory work, and so forth. Regardless of the level of development an employee brings to a job, the basic operations must be learned as they apply to a particular employer. Once the new employee has been oriented, training in the basic functions is necessary. The methodology used will be determined by the nature of these basic functions. Highly routinized operations can often be reduced to programmed self-instruction. Some standard operations such as secretarial work and accounting lend themselves to this type of entry-level training. There are canned programs available where general methods and principles are involved. Or if there are sufficient numbers of apprentices and the work in an organization is unique, consulting firms can be employed to assist in the development of tailor-made self-instruction programs. Some of these programs use sophisticated hardware, including computers, but they may also be relatively simple "pencil and paper" kinds of training programs. Hands-on experience is of course essential. But the quality of the "trainer" and training materials will play the key role in the quality of the training.

3. Upgrade and update training -- Once an employee has mastered the basics of an operation through entry-level types of training programs, a mastery of the operations is in order. Every facet of the operations must be mastered to the point of minimizing the need for supervision, to the point that the worker can be relied upon to function effectively without detailed monitoring. However, checkpoints must be established to assure that there has been such mastery, if organizational objectives are to be met. There must be continuous feedback with the goal of self-improvement. In addition, as technology changes established employees must be updated through a training effort.
4. Supervision -- No organization can operate without supervisors -- first-line management. Each organization creates its own philosophy for the development of supervisors. Some rise from the ranks, others are introduced from outside the operating ranks. Irrespective of their source, the function of supervision differs from operation, and the training must be different. Supervisors must have a general understanding of every operation supervised, with sufficient depth that the workers know that the supervisor knows what he or she is talking about. And yet the supervisor must not get so mired down in the details of operation that he or she fails to see the entire picture. The art of communication is essential -- listening, speaking, reading, writing, computing, and a host of other

forms. Special training programs may be needed for particular supervisors who are deficient in one or another aspect. The supervisor must also see the relationship of the department to the overall organizational goals. No supervisor can function adequately in the dark as to these goals. The supervisor must also develop certain human relations expertise -- must learn how to work with people. The introduction or possible introduction of a labor union will have a material effect on training needs, for it is the first-line supervisor who will have the day-to-day contact with union shop stewards and grievance committees.

5. Middle and top management -- While supervisors are managers, theirs is a much different type of activity, with differing training needs from middle and top management. It is with middle and top management that the future direction of an organization is determined. This level of management must deal with many individuals outside the organization itself: government officials, union leaders, legislators, news-media, public pressure groups, and the like. Missteps at this level can be irreparable and their consequences costly. The capacity to comprehend what is taking place in the world surrounding an organization, effectively relating organizational objectives to those outside forces and happenings is the sign of effective top management. Special training programs to develop and enhance the requisite skills to be effective at this level are essential.

ALTERNATIVE TRAINING METHODOLOGIES

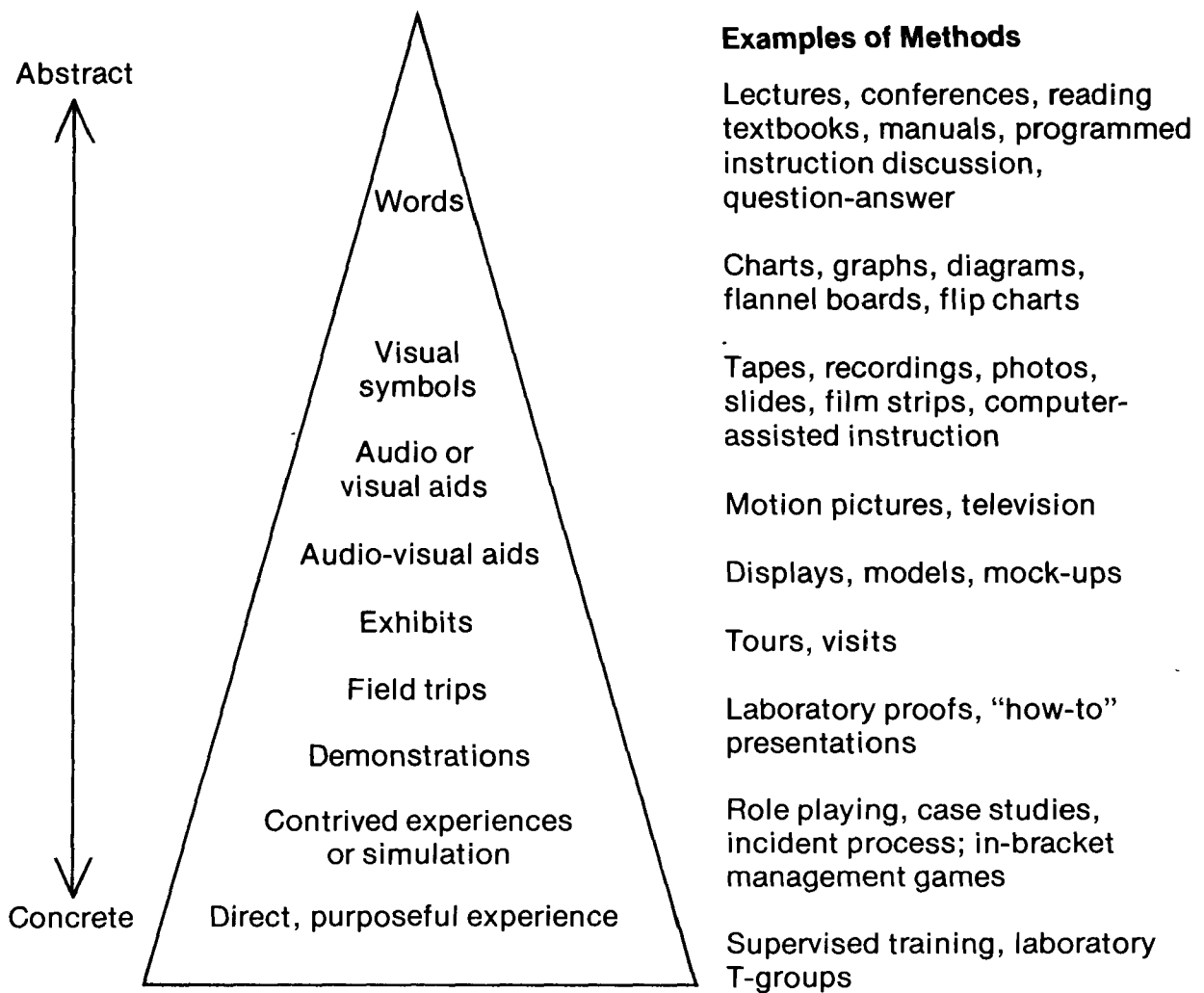
This section presents a brief description of most of the major alternative training methodologies available. For any given type of training response not all methods would be educationally viable -- would produce positive behavioral change. It is possible that for any given type of training only one method is viable, but it is more likely that two or more methods would be educationally viable. If this be true, then other considerations -- economic, political, and social -- would come into play. Each training method then must be examined in view of all considerations as they apply to a particular training objective. Every training objective will have its own method or alternative methods as well as hardware and software.

Figure 5.3 summarizes many of the training methods and hardware available, arranging them from the most abstract at the apex of the pyramid to the most concrete at the base.

Training Sources

In addition to the training institutions discussed in the previous chapter, the following sources of training may be considered.

1. Apprenticeship -- This kind of training can be formal or informal. Many craft unions in collaboration with management maintain formal apprenticeship programs in which the knowledge, skills, and experience of a journeyman are passed on to a qualified apprentice on the job. To obtain the best training, trainer-journeymen must feel secure in their position and be rewarded for their efforts.



SOURCE: Thomas H. Patten, Manpower Planning and the Development of Human Resources (Wiley Interscience, New York), p. 142.

FIGURE 5.3. The Pyramid of Learning

2. Vestibule -- This consists of training in the use of actual equipment material and methods, but without the pressures of production and with competent, experienced trainers. It is usually removed from the shop. It can be very expensive, unless substantial numbers of trainees are involved, thus reducing cost per trainee.
3. On-the-job -- This kind of training is one of the oldest and most used techniques and is composed simply of placing the trainees on the job. Preferably they will have a trainer assigned who is technically and attitudinally qualified to teach. A structured, systemized program is usually more effective than an unplanned, uncoordinated, haphazard effort.
4. In-house -- These training programs are conducted by the employer, using instructors from within the organization. This technique has the advantage of using instructors who know the organization well. However, it also results in in-breeding, with little outside stimulus to change. In some cases this may be a negative feature. It may also be limited in pedagogical technique unless trainers are trained to teach.
5. Consultants -- Outside consultants may be called in to supplement in-house training efforts. This provides stimulation, the introduction of new ideas, and new challenges and yet still leaves the organization in control of the training.

6. Out-of-house -- This training can call on the most highly competent instructors because the training effort is not limited to the organizational personnel. New ideas and techniques are more likely to be introduced, but unfamiliarity of instructors with organization characteristics may be a handicap.

Training Methods

The following methods may be considered:

1. Lecture -- Where the trainees have little knowledge and the maximum amount of information must be given in a relatively short time, where a knowledgeable and effective lecturer is available, and where cost is a consideration, the lecture method is generally recognized as an effective and inexpensive teaching method.
2. Question and answer -- The use of the question and answer period in tandem with the lectures provides the lecturer with some feedback which may be of value. It also helps to reinforce learning and clear up hazy areas in the lecture.
3. Lecture-discussion -- Where trainees have had written material to supplement and introduce the subject matter lectured on, or where the participants are reasonably knowledgeable, small discussion groups following a lecture are very effective in reinforcing the subject matter. Attitudinal change is probably more likely to take place if small group discussions follow lectures, should that be an objective.

4. Conference-discussion -- Where trainees are somewhat knowledgeable but common approaches to problems need to be worked out, conference-discussions are very effective, if good conference leaders are used. A conference leader or facilitator aids in the discussion, keeps it directed toward a goal, insures sufficient depth in discussion, and helps to summarize what has taken place. Resource experts may be used to supply needed information or expertise.
5. Panel discussion -- This technique involves the use of a group of experts each of whom give brief statements on a given interrelated subject. These are then open to challenges and questions from the panel members. Participants can be pushed to the greatest depths in their knowledge because they are questioned by experts.
6. Panel and floor discussion -- A variant of the panel discussion is to eventually open the panel to questions from the floor, allowing for interaction between the trainees and the panel members. Sometimes even experts fail to see a new approach, a new angle that can be produced by the layperson. Like discussions in connection with lectures, the learning process is reinforced and obscure points may be cleared up.
7. Sensitivity -- One of the more controversial teaching methods is sensitivity training in which groups of trainees, principally management personnel, are brought together for

an experience in interpersonal relationships. The major criticisms are that there is no predetermined direction and the results are uncertain. It is hoped that participants will be sensitized to the feelings of others as well as their own feelings and needs, but this is not an assured outcome.

8. Programmed self-instruction -- For highly standardized skills and understanding which may be logically analyzed and systemized, this method is particularly appropriate. The goal is to develop a training course which takes the trainee from an elementary level to successively higher levels of understanding and skill in a logical, systematic way -- the individual trainees proceeding at their own speed, essentially on their own. It involves frequent self-evaluation, the trainees deciding when they are prepared to move to the next stage. When combined with some resource persons to answer questions, its effectiveness is enhanced.
9. Understudy -- This training method involves a "one-on-one" arrangement in which a given job incumbent is given an understudy, with the responsibility to train him or her to take over that job should circumstances demand it. Only where the incumbent is retiring or being promoted will this be effective. Workers tend not to want to train someone to take their place if they might possibly be hurt.

10. Role-playing -- In role-playing, discussants don't talk about doing something, they actually do it -- reacting to a given set of circumstances by acting the role of a given actor -- supervisor, grievant, personnel manager -- in a spontaneous way. It may be combined with the case method.
11. Management games -- One of the oldest yet newest training methods is management games. Military strategists have used it for centuries. Business managers now use it in the development of management skills. In it, management teams are organized for the purpose of developing operating and policy decisions in a training atmosphere. The games may be mathematical or nonmathematical. They may or may not involve the use of the computer or other sophisticated hardware. If well constructed, management games can get management personnel involved in a way no other technique can accomplish.
12. Brainstorming -- In this technique, a problem is presented to the trainee groups asking for possible solutions. The trainees are expected to offer, without comment from anyone else, anything that pops into their consciousness. Only after the group has offered all possible solutions are they explored as to their feasibility. The principle is to get the thinking and articulating flowing as freely as possible, avoiding comments that might shut some of them off -- then evaluating.

13. Cooperative -- Some schools and workplaces have found it to their advantage to cooperate with each other in combining academic with production activities, trainees spending part of their time working and part in related or at least pertinent academic effort. Trainees can earn while they learn.
14. Hands-on training -- This involves using the actual equipment which provides the maximum in realism.
15. Mock-up -- This training, made especially popular during World War II, uses a mock-up or simulated model that attempts to duplicate, but in a less expensive way, the hands-on experience. If realistic, it can be very effective.
16. Case studies -- A special type of conference discussion is the case study in which a well-prepared, realistic case is presented to the trainee group -- in film or written form -- eliciting group discussion of the principles and practices illustrated -- but with no assurance of a definitive solution.
17. Correspondence -- A number of correspondence programs are available to teach some basic skills and knowledge. They may be traditional -- regular college or high school courses, but taught by correspondence -- or they may be specially developed self-instructional programs.
18. Reading -- Certain types of understandings can most economically be taught by a reading program which exposes trainees to a wide range of ideas and philosophies.

19. Listening -- One of the greatest handicaps to good supervision and good learning is the inability to "listen constructively." The ability to listen can be enhanced through training.
20. Disadvantaged -- The increased attention to the economically disadvantaged in the 1960s produced a new methodology especially for people who have not had meaningful job opportunities. HEW's Area Manpower Institutes for the Development of Staff trains supervisors and teachers to work with people who are unmotivated, who have extremely short-range goals, and who lack many basic skills and acceptable work habits.
21. English as a second language -- When a person has not developed the use of the English language sufficiently, it becomes difficult to learn when traditional training methods are used. Techniques for teaching people for whom English is a second language are being developed. They include the use of extensive nonverbal symbols and simplified vocabulary. The goal is to improve their mastery of the English language, but it is done in a way eventually to encourage not discourage the trainee. When done in a work atmosphere, it can be particularly effective.

The above list may be exhausting but it is not exhaustive. It can be extended ad infinitum through many variations. However, it is probably exhaustive enough to the manpower planner to illustrate

the need to rely on a well-qualified training specialist in the evaluation and selection of methodology and sources, but with the manpower planner maintaining a hand, at least in asking questions as to the viability of selection.

PUBLIC PERSONNEL ADMINISTRATION

With the increasing complexity and importance of the public sector of the American economy, the efficient use of public service manpower becomes even more important. One of the more serious complaints about government, whether warranted or not, is the quality of civil servants. With these criticisms, and with the increasing importance of the body of public service employees, it is essential that the highest quality of public workers be obtained, developed, and retained. However, the need for the highest quality of civil servants sometimes runs contrary to political reality. Politicians are dependent upon loyal and dedicated followers to win elections, and they continue to use political appointees whenever possible. All too frequently this "spoils system" has meant a low rather than a high quality of public service and has given rise to reform movements. Such reforms have occurred at all levels of government.

THE FEDERAL SYSTEM

The spoils system at the national level was at its peak between 1829 and 1883. Until the presidency of Andrew Jackson, the fledgling administrations, while far from devoid of political patronage, paid considerable attention to the quality of civil servants. State and local governments probably paid far less attention to such questions because of the shortage of qualified people and the relatively simple, nontechnical nature of most public service activities. Under Jackson, the federal government shifted

to an unabashed dedication to the common man and the democratization of public service. Jackson was determined to open public service to all persons regardless of education and social class. He maintained that the simple nature of such service permitted almost anyone to develop the necessary qualifications.

While opinions vary as to his intentions -- some maintain that the development of such a system was for the purpose of obtaining and maintaining political power, while others maintain that Jackson really believed in opening public service to the people of all classes -- the result was the establishment in the nation as a whole of a "spoils system" that had found currency in local and state government since the turn of the century. While Abraham Lincoln may have abhorred the spoils system, he nevertheless reached new heights in its use, finding it politically expedient to do so to retain the power he needed to accomplish the things he felt needed to be done.

Under U. S. Grant, the abuse of the spoils system, through the development of graft and corruption in public office, became so apparent that the American people became concerned. Civil service reformers began to cry out for a correction. By 1872 both major political parties included reform in their party platforms, with campaign oratory calling for a merit system in the federal employ. In the final months of the Grant Administration, Congress authorized and funded the formation of a Civil Service Commission. Grant appointed the first Commission which developed rules and competitive examinations for several federal departments. However, in spite of

campaign promises, Congress failed to fund again the Commission, and it became defunct for another decade.

In 1883 Congress again passed a civil service bill -- the Pendleton Act -- which the President signed into law on January 16, 1883. Modeled somewhat after the British system, the act provided for: (1) competitive examinations, (2) security in office, removal for political purposes being expressly forbidden, and (3) prohibition of the use of public servants for political services, including campaigns, the intent being to guarantee political neutrality. However, the British feature of a system essentially closed to all but a highly educated class was rejected, allowing entry into the federal service (at any grade) of people with experience that could be used as a substitute for education.

While a merit system was permanently introduced into the federal government in 1883 only 10 percent of the federal payroll was covered. Presidents still felt the need for patronage to keep recalcitrant Congressmen in line. Nevertheless, both self-interest and idealism seemed to be working hand in hand. Among the last acts of each President was the inclusion of large numbers of additional positions in the civil service system, protecting the incumbents from being swept out of office by the other party. The persons appointed had to qualify under the new administration, but by noncompetitive examination -- which consisted of a review of the records of service, making retention relatively certain; thus civil service coverage was gradually extended through each succeeding administration.

Under Franklin D. Roosevelt, the merit system and a professionalized civil service became firmly rooted, with some 85 percent of all federal employees coming under the system by 1943. While the postal service employees, in the transformation of that service into an independent agency of the Executive branch of government in 1970, were removed from the civil service system, they have their own merit system in which political influence is forbidden. The last significant area of federal patronage, the appointments of postmasters and rural letter carriers, had been eliminated the year before by the Executive Order of President Nixon, finally placing such positions under the merit system.

The federal civil service system is the largest in the country, with over 5,300 employees situated in Washington, D.C. and ten regional offices as well as about 65 subsidiary board of inquiry offices throughout the country. Each federal department has its own personnel department to deal with the U.S. civil service. The heads of these offices form the interagency advisory group for the formulation of policy and the maintenance of communication with each other.

The Commission develops and administers examinations. For lower level jobs, this consists of mostly short-answer, machine-graded examinations; for higher level positions, it consists primarily of an examination of past education and experience as well as oral reviews. Examinations are announced in U.S. Post Offices, newspapers, college placement centers, and on radio and television when critical shortages develop. The civil service is actively

engaged in recruiting, seeking applicants from all sections of the country and from all subcultures. In addition to advertisement, representatives visit more than a thousand educational institutions each year looking for likely candidates.

Examinations are used to establish a list of eligibles for entrance-level jobs, the top three being recommended on request from a federal department, from which selections are made. Positions may be filled by promotions or reinstatements. New appointments are career-conditional, and such employees may be dismissed at any time during the first year. After three years the employee achieves full career status, gaining rights for promotion, reassignment, transfer, appeal, and reinstatement as well as protection in the event of staff reduction.

In addition to the administration of examinations, the system is responsible for facilitating equal pay for equal work by developing detailed job specifications, assigning each job to various classifications, and assigning a range of pay to each classification. Many of these are applicable across agency lines. The system also oversees promotions based primarily on examinations, of one form or another, designed, it is hoped, to make merit the basis for advancement.

An appeals procedure was established in the 1960s in which federal employees may appeal adverse personnel decisions on firing, demotions, staff reductions and furloughs, either first to the agency or to the Commission. Should the first appeal be made to the agency, the employee may then appeal to the Commission.

In 1958, a progressive step was taken in the federal civil service with the passage of the Government Employees' Training Act which gave responsibility to the Civil Service Commission for executive development, and in response, numerous training programs were initiated, mostly for professional-type jobs. In 1968, the Civil Service Commission conducted its first Federal Executive Institute, designed to become a permanent institution.

In 1968, the Commission established the executive assignment system which included 25,000 higher level government executives. The purpose of the system is to mechanize, so far as possible, through a computer printout the compilation of a referral list of the most promising candidates for particular positions. Considerable man-time is still required to complete the selection of employees, although it may well be the wave of the future, making possible the mechanical review of vast numbers of records and reducing as it does personal bias in the selection process.

While nondiscrimination has in theory been a part of the civil service system for several decades, de facto discrimination nevertheless existed in many departments. Beginning in the 1960s the civil service began to shift to positive action programs, effectively opening federal employment to minority groups previously discriminated against. Illustrative of the progress is the improving status of blacks. In 1972, approximately 14 percent of the federal employment were black, compared with 11 percent for the population as a whole.

In 1974 a significant step toward the development of organizational manpower planning throughout the federal civil service was taken. In September the Civil Service Commission issued to all agency and independent establishment (working under Commission regulations) heads, for their comment, a bulletin setting forth the tentative policy statement requiring manpower planning for all such agencies and establishments. Once the return comments of these heads are received, a permanent policy will be issued. The details of this tentative policy statement, which will likely be adopted in great detail, will be presented later in this chapter. Should the policy statement be implemented, there will be a radical improvement in manpower planning within the federal establishment. And such a development will likely filter down at least to state and local operations using federal funding. When this happens, industry-specific manpower planning in the public sector will become a reality.

STATE AND LOCAL PERSONNEL SYSTEMS

The movement toward state and local merit systems actually began about 1883, the same time as a permanent federal system was established. It began in New York which had been one of the most "advanced" states in the use of a spoils system, as well as in the use of such a system for the purpose of graft. By that year public pressure became so great that politicians found it to their political advantage to establish a personnel system based on merit. Thus state merit systems had their start though a ponderous one. By 1973, 35 states had comprehensive merit systems, having increased from 23

states in 1958. All states, receiving as they do federal grants of one kind or another, have at least a partial merit system covering those agencies receiving federal funds. The major manpower-related agencies receiving federal grants are the employment services, unemployment compensation, public health, state educational establishments, manpower programs, and urban renewal.

At the local level, about 75 percent of the city employees are covered by merit systems. These are primarily in the larger metropolitan areas. The county governments have been the last stronghold of political patronage, with only about 10 percent of the employees of this level of government presently covered by the merit systems. Not only is "Commissioner Jones' nephew" still being hired but county employees are still being "taxed" for "contributions to flower funds" which are used for political purposes. And while the Supreme Court in 1973 upheld the validity of the Hatch Act, prohibiting partisan political activities by state employees paid from federal funds, as well as upholding the right of states to limit such activities for others, not all such activities have ended.

Nevertheless, in general, many states and local governments are working toward more sound personnel systems. Examples of change and improvements in administration were seen in 1973 when South Dakota established a statewide personnel act which also clarified the relationship of the state personnel system to labor unions. Illinois, a center for retention of political patronage, placed an additional 5,500 employees under its merit system. New Jersey and

Maryland received federal grants to improve their personnel systems as well as to extend assistance for such to local governments. In Minnesota, a state personnel department was established, having transferred to it the powers, duties, and responsibilities of its civil service commission. In New Jersey, the length of time for hearing appeals from personnel decisions was reduced from eighteen months to twelve months, with its eventual goal being three months. And in Indiana, an appeals commission was established to hear complaints of regular employees as to changes of status or the quality of working conditions.

Improvement, at least changes, in the selection procedures were also evidenced in 1973 in Alaska which provided for the possible certification of persons ranked below the top three. In Michigan, the possibility of basing the number of names certified on the basis of test score reliability was being investigated. In Arizona and North Carolina, model affirmative action plans were developed. In California, the formal requirement of a high school graduation for certain jobs in which such was not job related was dropped, and where such is still required, high school equivalency is accepted. In Illinois, an improved system of executive promotions is being developed. In Massachusetts, a court denied the state the right to give veteran preference only to state residents and the state is now administering bilingual examinations. New Mexico reports substantial improvement in its efforts to hire the disadvantaged.

Table 6-1 presents a picture of the merit coverage, organization, and selected personnel practices of the various state personnel agencies as of August 1973.

Table 6-1 STATE PERSONNEL AGENCIES
Coverage, Organization and Selected Policies* -- August 1973

State or other jurisdiction	Coverage (a)	Number of employees covered	Board members			Work week for office workers		No. paid vacation days	Sick leave (working days)		Paid hols- days	Group insurance (including premium percentage or dollar amounts paid by States)			Statewide employee organizations		State or other jurisdiction
			No.	How appld.	Term (years)	Days	Hrs.		After 1 yr.	Cumula- tive		Hos- pitali- zation†	Medical or surgical†	Life†	Non- affili- ated with AFL- CIO	Affili- ated with AFL- CIO	
Alabama																	Alabama
State Personnel Department.....	General	23,678	3	G(b)	6	5	40	13(c)	13	no limit	13	100	..	..	X	..	State Personnel Department
Merit System(e)	County health	650	3	G	6	5	40	13(c)	13	no limit	13	100	..	..	X	..	Merit System(e)
Alaska																	Alaska
State Division of Personnel.....	General	6,520	3	G(b)	6	5	37.5	15(c)	15	no limit	11	100	..	X	X	..	State Division of Personnel
Arizona																	Arizona
State Personnel Commission	General	15,563	5	G(b)	5	5	40	12(c)	12	no limit	12	X	\$15/mo.	..	X	..	State Personnel Commission
Merit System Council(e)	Highway Patrol	500	3	G	(d)	5	40	15	15	no limit	11	X	X	..	..	..	Merit System Council(e)
Arkansas																	Arkansas
Merit System Council	Grant-in-aid	3,668	3	G(b)	3	5	40	12(c)	15	90	9	\$11/mo.	X	..	..	..	Merit System Council
Division of Personnel(e)	General	9,988	..	..	..	5	37.5	12(c)	..	..	..	X	X	..	..	..	Division of Personnel(e)
California																	California
State Personnel Board.....	General	120,000	5	G(b)	10	5	40	10(c)	12	no limit	10	\$16/mo.	X	X	X	..	State Personnel Board
Colorado																	Colorado
State Department of Personnel ..	General	21,647	5	(f)	5	5	40	12(c)	15	no limit	11.5	\$10/mo.	..	..	..	..	State Department of Personnel
Merit System Council(e) ..	County public welfare	2,200	3	G	3	5	40	15(c)	15	180	11	\$6.75/mo.	..	..	X	..	Merit System Council(e)
Connecticut																	Connecticut
State Personnel Department.....	General	36,500	6	G	(d)	5	35	15(c)	15	no limit	11	100	..	..	X	X	State Personnel Department
Delaware																	Delaware
Office of Personnel(e).....	General	7,050	5	G	3	5	37.5	15(c)	15	90	11	\$11.46/mo.	..	X	..	..	Office of Personnel(e)
Florida																	Florida
Career Service System(e).....	General	62,000	5	G(b)	4	5	40	8(c)	8	no limit	8	X	X	X	X	..	Career Service System(e)
Georgia																	Georgia
State Merit System	General	37,127	3	G(b)	7	5	40	15(c)	15	90	12	3	X	..	..	..	State Merit System
Hawaii																	Hawaii
Dept. of Personnel Services.....	General	15,340	7	G(b)	4	5	40	21	21	90	13.5	30-41	..	100	X	X	Dept. of Personnel Services
Idaho																	Idaho
Personnel Commission	General	8,100	3	G(b)	6	5	40	12	12	no limit	9	\$10.83/mo.	..	100	X	..	Personnel Commission
Illinois																	Illinois
Department of Personnel	General	100,000	..	G(b)	..	5	37.5	10(c)	12	no limit	10	100	varies	100	X	X	Department of Personnel
Civil Service Commission(e) ..	General	..	3	G(b)	6	5	40	10(c)	12	no limit	9	100	..	..	X	..	Civil Service Commission(e)
State Police Merit Board(e) ..	State police	1,600	3	G(b)	6	5	40	10(c)	12	no limit	9	100	..	..	X	X	State Police Merit Board(e)
Univ. Civil Service System.....	Nonacademic	22,151	6	A	(d)	5	40	12(c)	12	no limit	9	100	..	..	..	..	Univ. Civil Service System
Indiana																	Indiana
State Personnel Division	General	16,614	4	G	4	5	40	12(c)	12	no limit	13	96	..	..	X	..	State Personnel Division
Iowa																	Iowa
Merit Employment Department ..	General	19,000	5	G(b)	6	5	40	10(c)	30	90	10	\$15/mo.	..	100	X	X	Merit Employment Department
University System	Nonacademic	11,500	10	G(b)	4	5	40	10(c)	30	90	10	X	X	33	X	..	University System
Kansas																	Kansas
Personnel Division.....	General	25,000	5	G(b)	4	5	40	12(c)	12	no limit	9	100	..	..	X	..	Personnel Division
Kentucky																	Kentucky
Department of Personnel.....	General	31,000	5	G	4	5	37.5	12(c)	12	120	10.5	X	X	100	..	..	Department of Personnel
Merit System Council.....	Local health	1,292	5	G	4	5	37.5	12(c)	12	120	9.5	100	..	..	..	..	Merit System Council
Louisiana																	Louisiana
Department of Civil Service.....	General	50,283	5	G	6	5	40	12(c)	12	no limit	8	50	..	..	X	..	Department of Civil Service
Maine																	Maine
Department of Personnel.....	General	12,500	5	(g)	(g)	5	40	12(c)	12	90	10	50	..	X	X	..	Department of Personnel
Maryland																	Maryland
Department of Personnel	General	34,444	1	G(b)	6	5	35.5	10(c)	30	100	13	50	..	..	X	..	Department of Personnel
Massachusetts																	Massachusetts
Civil Service Commission	General	70,000	..	G	..	5	37.5	10(c)	15	no limit	10	75	..	..	X	..	Civil Service Commission
Bureau of Pers. & Standardization.	General	..	..	..	..	5	37.5	10(c)	..	..	..	..	..	..	..	..	Bureau of Pers. & Standardization
Michigan																	Michigan
Department of Civil Service.....	General	52,673	4	G	8	5	40	13(c)	13	no limit	8+	90	75	..	X	X	Department of Civil Service
Minnesota																	Minnesota
Department of Civil Service.....	General	26,433	3	G(b)	6	5	40	9.75(c)	6.5(c)	100	9	100	..	..	X	X	Department of Civil Service
Merit System	Local health, welfare, civil defense	2,635	3	G	2	5	37.5	12	12	100	..	..	..	..	..	..	Merit System
Mississippi																	Mississippi
Merit System Council(e).....	Public welfare	1,140	3	A	3	5	40	15	30	..	10	X	X	X	..	..	Merit System Council(e)
Advisory Committee on Pers.....	Employment security	1,000	3	A	..	5	40	24	12	60	10	40	..	..	..	..	Advisory Committee on Pers.
Merit System Council.....	Health	1,292	3	A	3	5	37.5	30	30	60	11	50	..	..	..	..	Merit System Council
Missouri																	Missouri
Personnel Division	Grant-in-aid(h)	21,000	3	G(b)	6	5	40	15(c)	15	no limit	11	\$10/mo.	..	..	X	X	Personnel Division
Merit System(e)	Crippled children's serv.	88	3	(i)	3	5	40	15	15	45	8	X	X	X	..	..	Merit System(e)

* Prepared by the International Personnel Management Association.
1-X indicates that the State has group insurance but the employee pays the premium. In other cases, the premium percentage or dollar amounts paid by the State is indicated.
Abbreviations: G-Governor, A-Agencies, GA-Governor and agency heads, GC-Governor and Cabinet.
(a) The pattern of personnel agency coverage varies widely from State to State. Where coverage is shown as "General,"

most employees in state agencies are covered by the program. Seldom, however, is coverage complete. "Grant-in-aid" indicates that the program covers employees engaged in activities aided by the grant-in-aid programs administered by the United States Department of Health, Education, and Welfare. "Local" indicates that the program covers only local government employees administering grant-in-aid programs. Other entries indicate that the program covers the activities designated, e.g., state police, public welfare, health, employment security.

(b) With confirmation of Legislature.
(c) Additional vacation after a specified number of years.
(d) No fixed term.
(e) Data shown from prior years.
(f) Governor appoints 3 members with legislative confirmation, employees elect 2.
(g) Governor appoints 3 members from the public who serve

4 years, employees elect 1 member for 2 years and these 4 choose 5th member who serves for 2 years.
(h) Plus additional coverage.
(i) Appointed by Board of Curators, University of Missouri.
(j) Part of.
(k) Elected by General Assembly.

TABLE 6-1 (cont.)

State or other jurisdiction	Coverage (a)	Number of employees covered	Board members			Work week for office workers		No. paid vacation days	Sick leave (working days)		Paid holidays	Group insurance (including premium percentage or dollar amounts paid by States)			Statewide employee organizations		State or other jurisdiction
			No	How appld.	Term (years)	Days	Hrs.		After 1 yr.	Cumulative		Hospitalization†	Medical or surgical†	Life†	Non-affiliated with AFL-CIO	Affiliated with AFL-CIO	
Montana																	Montana
Joint Merit System	Grant-in-aid	1,800	3	G	3	5	40	15(c)	12	no limit	10	—\$10/mo.—	..		X	..	Joint Merit System
Nebraska																	Nebraska
Joint Merit System	Grant-in-aid(h)	3,000	3	A	3	5	40	12(c)	12	180	11	—100—			..	..	Joint Merit System
Nevada																	Nevada
Personnel Division(e)	General	6,000	5	G	4	5	40	15(c)	15	no limit	9	—100—			X	X	Personnel Division(e)
New Hampshire																	New Hampshire
Department of Personnel	General	7,610	3	GC	3	5	37.5	15	15	90	11	—100—	41		X	..	Department of Personnel
New Jersey																	New Jersey
Department of Civil Service	General	161,571	5	G(b)	5	5	35	12(c)	15	no limit	12	—100—			X	X	Department of Civil Service
New Mexico																	New Mexico
State Personnel Office	General	11,459	5	G	5	5	40	15	12	no limit	11	—50—			..	..	State Personnel Office
New York																	New York
Department of Civil Service	General	156,633	3	G(b)	6	5	37.5	12(c)	13	190	11	—100—	X		X	..	Department of Civil Service
North Carolina																	North Carolina
State Personnel Department	General	58,000	7	G	6	5	40	10(c)	10	no limit	9-10	—100—			X	..	State Personnel Department
North Dakota																	North Dakota
Merit System Council	Grant-in-aid	1,600	5	G	5	5	40	12(c)	12	no limit	10	X	X	X	X	..	Merit System Council
Ohio																	Ohio
Department of State Personnel	General	78,000	3	G(b)	6	5	40	10(c)	14.9	no limit	9	66½	(j)	100	X	..	Department of State Personnel
Oklahoma																	Oklahoma
State Personnel Board	General	21,000	7	G	7	5	40	15(c)	15	45	10	—100—			..	..	State Personnel Board
Oregon																	Oregon
Personnel Division	General	30,324	..	..	..	5	40	11(c)	12	no limit	9	\$15/mo.	X	..	X	..	Personnel Division
Public Employment Relations Bd. (e)			3	G	3	..	..	..	..	..	..	..	..	..	..	..	Public Employment Relations Bd. (e)
Pennsylvania																	Pennsylvania
Civil Service Commission	Grant-in-aid	75,510	3	G(b)	6	5	37.5	10(c)	15	90	13	—100—			X	X	Civil Service Commission
Bureau of Personnel	General	118,000	..	..	..	5	37.5	10(c)	15	90	13	—100—			X	..	Bureau of Personnel
Rhode Island																	Rhode Island
Division of Personnel(e)	General	11,806	..	..	..	5	35	15(c)	15	120	9	X	X	partial	X	X	Division of Personnel(e)
South Carolina																	South Carolina
Merit System Council(e)	Welfare(h)	1,628	7	(k)	4	5	36	18	15	90	11	X	X	X	X	..	Merit System Council(e)
Merit System Council(e)	Employment security	841	3	(k)	4	5	40	15(c)	15	90	11	X	X	X	X	..	Merit System Council(e)
Merit System Council	Health	2,076	7	G(b)	4	5	37.5	15(c)	15	90	12	X	X	100	X	..	Merit System Council
Personnel Division	General	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Personnel Division
South Dakota																	South Dakota
Bureau of Personnel	General	8,000	5	G(b)	5	5	40	15(c)	15	90	10	—100—	X		X	X	Bureau of Personnel
Tennessee																	Tennessee
Department of Personnel	Grant-in-aid	7,959	1	G	(d)	5	40	12(c)	12	120	12	—50—			..	..	Department of Personnel
Texas																	Texas
Merit System Council	Grant-in-aid	15,000	3	G	6	5	40	10.5(c)	12	no limit	13	—\$12.50/mo.—			X	..	Merit System Council
Utah																	Utah
Personnel Office	General	9,242(e)	3	G	4	5	40	12(c)	12	no limit	12	—100—		37	X	..	Personnel Office
Vermont																	Vermont
Personnel Department	General	5,451	3	G(b)	6	5	37.5	12(c)	12	no limit	12	—50—			X	..	Personnel Department
Virginia																	Virginia
Merit System Council(e)	Grant-in-aid	7,144	3	A	6	5	40	12(c)	15	no limit	10	X	X	X	..	..	Merit System Council(e)
Division of Personnel	General	60,000	..	..	..	5	40	12(c)	15	no limit	10	—100—		24	..	..	Division of Personnel
Washington																	Washington
Department of Personnel	General	33,000	3	G(b)	6	5	40	12(c)	12	..	11	—\$18.98/mo.—		75	X	X	Department of Personnel
West Virginia																	West Virginia
Civil Service System	Grant-in-aid(h)	13,000	3	G(b)	6	5	varies	15(c)	18	90	12	—70—			..	..	Civil Service System
Wisconsin																	Wisconsin
Bureau of Personnel	General	50,623	5	G(b)	5	5	40	10(c)	13	no limit	9	—90—	X		X	X	Bureau of Personnel
Wyoming																	Wyoming
Personnel Division	General	5,448	..	..	..	5	40	12(c)	12	120	10	\$10/mo.	\$15/mo.	X	X	..	Personnel Division
Career Service(e)	Grant-in-aid	684	3	G	3	5	37.5	12(c)	12	90	10	—60—		X	X	..	Career Service(e)
Guam																	Guam
Department of Administration	General	3,397	7	G(b)	3	5	40	13(c)	13	no limit	13	—50—			..	X	Department of Administration
Puerto Rico																	Puerto Rico
Office of Personnel	General	58,388	3	G(b)	4	5	37.5	30	15	90	18	\$10/mo.	X	..	..	..	Office of Personnel
Virgin Islands																	Virgin Islands
Division of Personnel	General	6,497	5	G	3	5	40	15(c)	13	no limit	22	—75—		..	..	..	Division of Personnel

It may be seen that merit systems, either general or specific, are generally administered by state personnel offices, boards, commissions, or divisions of the civil service or merit system commissions or councils and that the number of employees covered ranges from sixteen hundred in North Dakota to 193,510 in Pennsylvania.

INTERGOVERNMENTAL RELATIONSHIPS

While historically, there had been almost no connection between state and local personnel systems and that of the federal government, with the passage of the Intergovernmental Personnel Act of 1970, a significant "foot in the door" was created. This act provided for grants from the Civil Service Commission to state and local governments for the creation of new and the improvement of existing merit systems. Even the state and local governments not wishing to establish merit systems could qualify for grants to improve their personnel systems, but presumably on the assumption that such improvements would eventually result in merit systems. Under federal encouragement the temporary exchange of federal with state and local government officials should also eventually help achieve greater cooperation and interdependence of the various government personnel systems.

The Act makes federal assistance available for the fulfillment of state and local purposes consistent with merit principles. Specifically, it attempts to foster greater intergovernmental cooperation; but at the same time, it encourages innovation and

and allows for diversity on the part of state and local governments in the design and management of their respective systems of personnel administration.

The scope of the Act includes the following:

1. Grants -- Presently the Civil Service Commission is authorized to grant a state up to 75 percent of the total cost of developing and implementing programs to strengthen personnel administration and training in the state government or in its local governments or combinations thereof, which serve a population of at least fifty thousand. The Commission also may make grants to certain other organizations for training state and local officials and professional, administrative, and technical employees.
2. Direct assistance --The Commission may furnish direct technical assistance to states and localities, seeking to improve their personnel administration systems.
3. Mobility -- The temporary (up to two years with the possibility of a further extension up to two more years) assignment of personnel between the federal government and state and local governments and institutions of higher learning is made possible by the Act.
4. Joint recruiting and examining -- The Commission may cooperate with state and local governments in recruiting and examining activities on a shared-cost basis. There

is already a number of intergovernmental job information centers where there is an agreement involving cooperative testing and joint referral of eligibles to the participating jurisdictions.

5. Interstate compacts -- The consent of Congress is given to interstate compacts for the purpose of mutual assistance in developing personnel programs for state and local governments.
6. Coordination -- The Commission is to coordinate with state and local governments such personnel administration support and technical assistance as provided by the various federal agencies to those states and localities.
7. Merit systems -- The prescription and monitoring of compliance with merit system standards for those grant-in-aid programs which require the maintenance of a merit system were transferred by the Act to the Commission from the agencies (e.g., the U.S. Department of Health, Education, and Welfare) administering the grant programs.
8. Presidential advisory council -- An advisory council has been appointed by the President to study and make recommendations regarding the intergovernmental dimensions of personnel policies and programs.

he grants program encompasses the following criteria:

1. Of the available funds, 80 percent are to be distributed by formula on a weighted basis, using factors such as population and the number of state and local employees

affected. Local governments must receive at least 50 percent of the funds allocated to the state.

2. Some 20 percent of the funds are discretionary, based additionally upon such factors as urgency of the program, need for funds to carry out the purposes of the Act, and the capability of the jurisdiction to use the funds effectively. These grants are based upon competitive proposals.
3. No state may receive more than 12.5 percent of the appropriations available for any fiscal year under the Act.
4. For fiscal year 1972, the grants budget was \$12.5 million; for fiscal year 1973, it was \$15 million.
5. Grant proposals may be submitted by chief executive officers of states and of local jurisdictions which exceed fifty thousand in population. They may also be made by universities or by public interest groups such as municipal leagues or similar organizations. With few exceptions, the grants may be used for any personnel activity, provided a state does not use federal funds to diminish its own contribution.

Technical assistance includes the following:

1. It may deal with any personnel management or training matters.
2. Some technical assistance must be on a reimbursable basis, as in the case of comprehensive projects involving long-term periods of time.

3. Some technical assistance is nonreimbursable, as in the case of short-term periods, advice on meeting merit system standards, written technical material, and preapplication consultation.
4. There is also the possibility for many programs of sharing costs between the federal government and state and local governments.
5. Both in the grants program and where technical assistance is concerned, there is considerable interest in developing programs in which personnel problems at the state level are considered in relation to those at the local level. Where possible, a common strategy should be developed to answer the needs of both. This kind of arrangement may well help to overcome the difficulties which arise in those programs where there are state-imposed standards and state supervision, but where the actual administration of the programs is local.

The federal presence at the state and local levels is also felt through the extension of the jurisdiction of the Equal Employment Opportunity Commission to those levels, requiring the establishment of uniform record keeping and reporting responsibilities as well as affirmative action programs for eventually guaranteeing equal access to government employment of racial and ethnic minorities as well as females.

The federal Public Service Careers program, working with state and local government agencies, sought to promote equal access

of disadvantaged groups not only to initial employment but also to advancement by the elimination of many discriminatory barriers as a condition for receiving federal assistance -- technical and monetary. The Emergency Employment Act federally subsidized added positions for state and local governments, to be allotted to the unemployed and underemployed, especially veterans and graduates of other manpower programs.

Through all of these programs, there has been an attempt to gradually extend the merit principles of personnel administration developed by the Civil Service Commission to the state and local levels.

MEANING OF A "MERIT SYSTEM"

According to the Intergovernmental Personnel Act of 1970, a merit system is based on:

1. Recruiting, selecting, and advancing employees on the basis of their relative ability, knowledge, and skills, including open consideration of qualified applicants for initial appointment
2. Providing equitable and adequate compensation
3. Training employees, as needed, to assure high-quality performance
4. Retraining employees on the basis of the adequacy of their performance, correcting inadequate performance, and separating employees whose inadequate performance cannot be corrected

5. Assuring fair treatment of applicants and employees in all aspects of personnel administration, without regard to political affiliation, race, color, national origin, sex, or religious creed, and with proper regard for their privacy and constitutional rights as citizens
6. Assuring that employees are protected against coercion or exploitation for partisan political purposes and are prohibited from using their official authority for the purpose of interfering with or affecting the result of an election or nomination for office

When the idea of a merit system first began to take hold in the late nineteenth century (and well into the twentieth), the prevailing philosophy was to "keep the rascals out." Today the approach is a more positive one of attempting to attract the very best. There is a growing tendency to see the need for continuously challenging and reexamining whatever potential barriers exist to this objective. Today the emphasis is more on vigorously pursuing the goal of recruiting talented and able persons for the public service.

Effective merit system implementation is less and less viewed in negative "watch-dog" terms. In recent years there has been an attempt to open public employment to a broader segment of society, as illustrated by the concern of merit systems generally with developing "affirmative action" plans for recruiting members of minority groups and women, and to employ the disadvantaged in order to achieve the goal of equal employment opportunity.

The old conflict between merit and patronage, in the view of some observers, is fading in importance as the public service becomes more and more professionalized and organized, requiring specialized expertise and frequently requiring credentials by professional organizations. However, the impact of the merit system has been uneven. With some categories of positions such as those in public health, the merit system, coupled with the factors mentioned above, has significantly raised the competence level of public employment. With some other categories, however, the impact of merit principles has been less obvious.

ROLES AND RESPONSIBILITIES OF STATE PERSONNEL OFFICES

Some central personnel agencies are legally independent of political control by the governor. This independence, however, may be real or it may only have that appearance. In some states, responsibility for the personnel function is vested in a board, usually with members having overlapping terms, or it might be vested in a single director. Even where the latter pattern prevails, there is usually a board with advisory or appellate powers.

Some personnel affairs are being increasingly decentralized to the operating agencies, particularly in areas such as position classification. However, the state personnel agency will necessarily perform most if not all of the following functions:

1. Developing and recommending broad personnel policies to the legislature or chief executive.
2. Providing guidance on personnel management within the framework provided by the legislature or the chief executive.

3. Supervising the development of a position classification plan, based upon the duties, responsibilities, and qualifications of positions within the personnel agency's jurisdiction. This involves more than describing and allocating positions, but "job engineering" as well (i.e., the analysis of work functions and regrouping of component parts so that employees work at their maximum skills and abilities to the fullest possible extent). It involves the following:
 - a. Classification is the grouping together in categories of those positions which are sufficiently similar in duties and responsibilities and which can be treated alike. Standard titles are provided, as well as a standard format for statements relating to common duties, responsibilities, and qualifications. The expectation is that a rational system of organization exists, providing an objective basis for compensation, recruitment, appointment, and promotion.
 - b. The qualifications for a given position in a personnel system with a classification plan based upon current job analysis are directly related to the examination process. Moreover, the education and experience requirements serve to screen prospective candidates, eliminating those who do not possess reasonable minimum qualifications from the examination process.

- c. A classification plan is most commonly devised by having employees describe their own duties, supplemented by oral interviews conducted preferably by personnel specialists and checked against supervisor and peer opinions.
 - d. Job analysis results in the identification of the kinds of education and training which can be reasonably expected to produce the skills, knowledge, and abilities necessary for the job. Minimum qualifications ought not to include any requirement which can be easily acquired on the job after appointment. They should represent essential minimum backgrounds, not ideal ones.
 - e. Job classification is not an exact science. There are occasionally some incorrect, arbitrary decisions involved, and there should be a mechanism for employees to use if they think that their jobs are misclassified. Moreover, jobs themselves change in such a way that no classification plan should be viewed as static.
- 4. Leadership in the recruiting of qualified personnel, with ideally a broad view of identifying sources of talent.
 - 5. The administration of the selection process, which should include several parts (e.g., written and oral examinations and performance examination whenever appropriate, reference checks). It is highly desirable that the various operating

personnel offices play a direct role in the development of examinations for the purpose of helping to ensure that the examinations measure qualities directly related to the positions for which the tests are designed.

6. The administration of a pay plan, often based upon the job classification plan, but with continuing attention to compensation schedules for comparable positions in the private sector and other public jurisdictions and to considerations of social equity (i.e.: Is the jurisdiction's compensation plan adequate in relation to government's moral obligation to pay a living wage?).
7. The establishment and implementation of procedures for attendance, leave, conduct and discipline, promotion and transfer, separations, performance evaluation, working conditions, fringe benefits, and appeals and grievances.
8. The design, layout, and monitoring of overall in-service training programs and the training implementations for common classes of personnel. This is a growing function of state personnel agencies.
9. The conduct of research as to how personnel policies affect both productivity and morale, and the recommending to the governor or the legislature of changes and improvements.

A few specific examples of how the state personnel agency might exercise responsibility are as follows:

1. The state personnel agency might be engaged in manpower planning. A possibility considerably enhanced with the Civil Service Commission action of 1974 requires federal agency manpower planning. Specifically, this might mean that it would play the leading role in developing policy on recruitment. It might attempt to exert special efforts to attract qualified students from educational institutions where minority students predominate. Another strategy might be to produce a career directory for college-level positions, particularly at junior entrance levels. Moreover, it might play a pioneer role in supplying training needs where new programs suddenly assume overriding importance, accompanied by a lack of qualified individuals with technical competence to manage those programs.
2. If complaints of discrimination by the entrance tests against minorities were received by the state personnel agency, it would review the tests, and might find that they did not really measure the skills necessary to start the job. In that event, the agency should take steps to modify the testing program accordingly, in keeping with equal employment opportunity objectives and sound selection principles.
3. If there were a substantial number of grievances relating to performance evaluation, the state personnel agency might conclude that the evaluation instrument measured too greatly such things as personality traits, rather than

actual work performance, and as a result, might modify the instrument. Or it might find that supervisors were not using the instrument as it was intended to be used, in which case the state personnel agency might institute a training program for supervisors to rectify errors in administration of the evaluation programs.

Of growing importance in the state personnel picture are consultation and negotiation with employee organizations, including labor unions, on issues relating to personnel policy. Feedback from these sessions will aid the state personnel staff in making employee functions more meaningful, not only to the agency but to the employees themselves.

Beyond the question of the roles and responsibilities of the state personnel office is the relationship between that office and the governor. As one writer said:

Most progress in personnel administration . . . seems to have come where the political system has produced leadership able to inspire administrative staffs with such deep interest and regard for effective performance that competent persons have been attracted to public employment and the attitude and productivity of employees have improved.

Finally, it is apparent that everything done by the state personnel agency bears a relationship to individual and group morale and therefore probably to productivity as well.

RELATIONS BETWEEN THE CENTRAL PERSONNEL OFFICE AND THE OPERATING AGENCY PERSONNEL OFFICE

In the view of some observers, there is a tendency to decentralize authority to the operating office, trusting it to act on its own responsibility. There is considerable debate

concerning whether this decentralization is an unmixed blessing. Generally, in instances when some decentralization has occurred, the central office makes policy and the operating offices carry it out. It follows in those instances that a main function of the central office is the reviewing and monitoring of the work of the operating personnel office. The state has a vested interest in preserving some elements of central direction in the interest of consistency. However, as the volume of business grows, there is considerable advantage in expediting the answer to as many questions as possible at the point where they arise. There is also the need to adjust programs to local conditions, further reinforcing the importance of delegating authority.

One vital element of the relationship between the state personnel office and the agency offices is record keeping and reporting. The better the system of record keeping established by the operating personnel office, the better able it will be to respond to requests for reports and the better can be the manpower planning.

COORDINATION AND COMMUNICATION

Organizations depend upon two-way communication between management and subordinates -- both formal and informal. Effective communication involves receiving and understanding as well as telling. Experiments have shown that one-way communication is speedier, but it is less accurate as well as less effective in assuring coordination. When the sender receives feedback from those for whom the message is intended, he may conclude that the message sent should be modified. Feedback from the receiver is necessary to confirm that the real message has been received and coordination is taking place.

The more access to management allowed to subordinates by those in authority, the less difficulty in communication there is likely to be. Communication may follow official channels -- or it may not. There is general recognition that when communication bogs down in channels, there is something wrong with the arrangement of the channels. Effective organizations make sure that communications get through to their intended recipients even if the channels themselves need to be altered.

From another perspective, the purpose of any communication system is to provide each employee with the information he or she needs to do the job. When there is excessive interference with the transmission of messages, even though the interferences may be psychological rather than physical, that job is made more difficult. It is a primary management function to reduce or eliminate that interference.

The following may be classified as examples of barriers to organizational communication:

1. Distance -- Infrequent face-to-face supervision creates difficulties.
2. Distortion -- Problems reaching the manager often involve both factual data and feelings, emotions, and psychological distortions. It is frequently difficult to separate them.
3. Lack of trust -- The subordinate's expectations concerning how the manager responds to communications he or she receives from a subordinate will determine what the subordinate will communicate in the future.

4. Substituting personalities for issues -- Sometimes issues are personalized, making communication difficult, if not impossible.
5. Semantic differences -- The same word may often be interpreted differently by different persons. Management should be sensitive to the need for clarity in terminology.

CONTEMPORARY WAGES IN THE PUBLIC SECTOR

At one time it may have been possible for the public administrator to act in a relative vacuum in determining wages and fringe benefits. With inflation, expanding labor markets, and most importantly increasing worker militancy and unionization, this is no longer true. An internally consistent wage system may be developed, but to be viable it must take into consideration the relevant labor market.

The relevant labor market for each occupation or closely related group of occupations differs. A nationwide labor market may exist for scientists and engineers, while a regional one exists for computer technicians, and a local market for secretaries, craftworkers, and laborers. But whatever the market, it must be taken into account in the development of a wage system by any public agency. To avoid such consideration may result in recruitment difficulties, excessive voluntary quits, morale problems, and unionization or strike activity. This observation is no less true for public service employment than it is for the private sector.

As the personnel systems of the local and state governments and of the federal and state governments become increasingly

interrelated, the differentials in pay schedules of many of the respective employees will tend to narrow as workers transfer from relatively poorly rewarded jobs to relatively well rewarded positions. What is actually happening in this process is an expansion of the relevant labor market.

While pay and fringe benefit considerations are not the only determinants of the extent of union activity, in this day standard compensation becomes a primary target for such activity. If a union does not exist, one will tend to find entrance. If it already exists, it will exploit the disparities. To minimize union confrontation, manpower planners must recognize the need for compensation to be at least competitive.

One of the primary complaints of civil service at all levels has been its wage rigidity -- the attempt to maintain pay schedules beyond the point of viability. It is suggested that instead of using a short-cut benchmark occupation against which other related occupations are measured for pay purposes, a more complete survey be conducted on a periodic basis, showing prevailing wage rates for a substantial group of related occupations at various levels, using the labor market that is appropriate for each occupation or group of occupations. If this is done frequently enough, public service pay will be competitive and therefore not the primary source of worker discontent. All of this of course assumes that the administrator will be able to come up with the budget necessary to make compensation competitive.

Of course, if this is to be done, determination of a nationwide pay scale for a given occupation would be appropriate only for those occupations for which there is a national labor market. For many occupations, especially clerical, craft, custodial, and labor with less than national markets, the federal civil service has decentralized its pay scales to take this into consideration.

It is also suggested that in developing a fringe benefit package, its total size be determined as a percentage of payroll costs and compared with such packages in the appropriate labor market. After this is done, the composition of the packet can be determined in consultation with affected persons.

ORGANIZATION OF MANPOWER PLANNING IN THE FEDERAL PUBLIC SECTOR

The tentative policy statement of the Civil Service Commission on manpower planning issued in September 1974 had two objectives in mind: (1) to provide a management tool which would demonstrate the importance of manpower planning in overall planning, and (2) to establish an effective data system for manpower planning. Recognizing the deficiency of expertise in manpower planning in the various departments of government the Commission planned to provide the following assistance: (1) training courses, (2) training modules, (3) guidelines, (4) research in methodologies, (5) technical assistance, and (6) a clearing house for information.

One of the interesting things about the issuance is that the Commission sees an Executive Order of 1947 and a Presidential Memorandum of 1969 as the source of authority for instituting a

program of manpower planning within the federal establishment. One cannot help but wonder why it took so long for the Commission to implement such a policy. It sees organization of manpower planning as "a vital and continuing function of federal organization management" in all agencies of government with a major role in: (1) planning and budgeting, (2) maintaining and improving quality and efficiency, (3) meeting responsibilities in an "efficient economical and timely way," and (4) integration of personnel management processes with each other and with other management systems.

The manpower planning system envisioned by the Commission would have the following functions:

1. Participation of manpower planning in the overall management planning system
2. Performance of such manpower analyses as:
 - a. The size, composition, skills, and so on of both the onboard and planned manpower
 - b. Levels and trends of work force attrition and position flows (transfers)
 - c. Effects of management actions and policies on the work force
3. Estimation of future manpower requirements
4. Summary of future manpower requirements
5. Analysis of feasibility, costs, and the like, and staffing actions made necessary by the establishment of operational goals
6. Recommendation on changes in current or proposed work force or budget estimates

7. Establishment of and maintaining a data system
8. Provision for regular and systematic evaluation of the effectiveness of system policies

As may be seen in later chapters, these are essentially the steps suggested by the authors for micromanpower planning in the public sector. It may also be seen that the establishment of such a system rationalizes the traditional functions of personnel management, but extending them beyond tradition, involving them in the organization's overall planning efforts. Certainly the Civil Service Commission issuance constitutes an official acceptance of the need for manpower planning by federal agencies.

HUMAN ENGINEERING¹

Data derived from the disciplines of industrial engineering and industrial psychology can be used extensively in manpower planning in the public sector. We shall refer to these and related disciplines as "human engineering." Industrial engineering brings to human engineering the knowledge of equipment layout, work flow, job or task time requirements, and safe use of plant facilities. Industrial psychology makes its contribution in the area of testing, selection, placement, training, counseling, and evaluation of workers. Both disciplines are concerned with developing and implementing programs to promote efficient manpower use. Therefore our purpose here is to (1) give the manpower planner a capability to apply manpower planning criteria, (2) provide a means for understanding the disciplines, methods, and concepts applied to develop the criteria, and (3) provide a means for understanding how the methods and concepts of human engineers -- industrial engineers and industrial psychologists -- can be applied to overcome problems and improve practices related to manpower recruitment, use, and retention.

¹The material in this part of the manual is from a paper submitted by C. E. Smith and L. H. Park, Department of Industrial Engineering, Iowa State University, March 1973.

The work of C. E. Smith and K. L. McRoberts of Iowa State University has been used extensively in this part of the manual. Drs. Smith and McRoberts coauthored a study titled, "Estimating Manpower Requirements and Selected Cost Factors for Small Wastewater Treatment Plants, Part 1."

Manpower planning as seen by the "human engineers" is the act of:

1. Determining the organization's manpower need in terms of numbers, skills, and capabilities, and matching these needs in terms of skills, capabilities, and numbers
2. Determining the future manpower needs in terms of numbers, skills, and capabilities based on expected retirement and turnover rates and the anticipated growth (or decline) of the service provided to identify future human resource needs in terms of skills, capabilities, and numbers with the expected date when these needs will be paramount
3. Determining training requirements and developing programs to meet the manpower and training needs and overcome problems of manpower recruitment, retention, and use

Manpower planning therefore results in personnel policies and practices which support the filling of current manpower needs as well as future manpower needs. Manpower planning will also have an influence and effect on the present and future recruitment and selection procedures used and on the type and amount of training and development offered to personnel. The establishment of employment goals, training programs, and budget needs is based on manpower planning done by administrators, design engineers, state agency inspectors, and so on.

An essential step in manpower planning is the development of a "manpower staffing plan." To do the staffing, the manpower planner must first analyze the current system. System analysis identifies

the objectives and evaluates the different strategies which are available for achievement of the objectives. It is the act of studying a total system to identify and evaluate:

1. All inputs into the system, such as personnel, raw materials, equipment, and so forth
2. The actions and transformation activities being performed by personnel and physical facilities on other system inputs to achieve system objectives, and the time and frequency performance associated with these actions
3. The interrelationships between the different actions and activities
4. The outputs of the system as compared to desired objectives
5. The alternative actions and activities available for achieving system objectives

The result of a complete system analysis will be, among other things, the identification of those treatment activities being performed by the present facilities, the "work tasks"² which need to be performed by the plant personnel in providing these treatment activities, and the time required to perform these tasks.

²For the purposes of this manual, a work task is defined as an action or action sequence grouped through time and designed to contribute a specified end result to the accomplishment of an objective and for which functional levels and orientation can be reliably assigned. The task action or action sequence may be primarily physical, such as operating an electric typewriter, or primarily mental, such as analyzing data, or primarily interpersonal, such as consulting with another person.

The planners for each government facility must accomplish the above, either superficially or after great study and thought. In either case, some guidelines for determining job assignments with their job descriptions and specifications would be helpful.

To aid the planners in this analysis, a "conceptual model," such as that shown in Figure 7.1, is provided to show pictorially the dynamic characteristics of work relationships and those variables which influence the effectiveness of human effort at work and their relationships. Variables that are discussed in some detail are represented by a circle, while a rectangle identifies those variables which influence, or are influenced by, the variables studied. For identification purposes, each variable is represented by a number. The arrows indicate direction of influence; thus: A \longrightarrow B means A influences B.

SYSTEM EFFECTIVENESS

One of the primary concerns of the manpower planner is increasing the effectiveness of a system of facility. "System effectiveness" (variable 1) represents the extent to which the system produces acceptable product or service and is influenced by three major variables: (1) the quality of the raw material of the inputs, (2) the present physical facilities (variable 2), and (3) the job performance by the employees (variable 15) (Figure 7.2).

Another way of representing this relationship is to state the following expression:

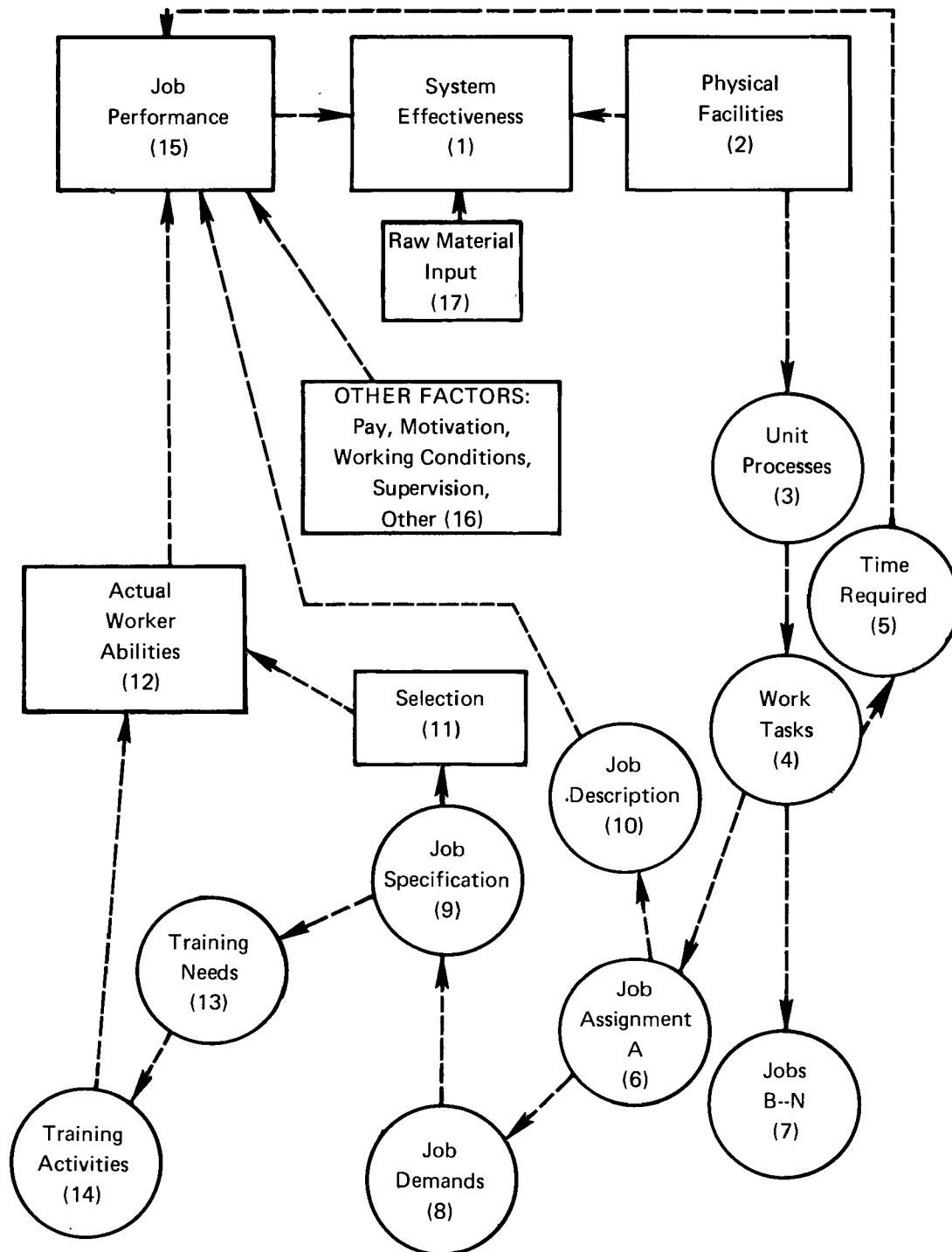


FIGURE 7.1. Dynamic Characteristics of Work Relationships and Variables (1 through 17) Which Influence the Effectiveness of Human Effort

System effectiveness = $f(JP, PF, I, O)$ where

JP = job performance
 PF = physical facilities
 I = raw materials
 O = other variables

In our model, the "other variables" are not identified and are assumed to be relatively insignificant.

Physical Facilities

"Physical facilities" (variable 2) represents the current and given physical facilities at a given location. These facilities might be (1) new, old, or middle aged, (2) well maintained or in some degree of disrepair, and (3) excellently designed, poorly designed, or somewhere in between.

This variable influences, as we have shown in Figure 7.3, the total system effectiveness. It is also the major variable influencing the "unit processes" (variable 3), for the activities performed at any location are a function of the condition and state of the physical resources of the facility. This can be represented by:

Unit processes = $f(PF)$

where

PF = the physical facilities

Unit Processes

"Unit processes" (variable 3) identifies the different functions. Each unit process of function accomplishes a specified end result which contributes to the total objective of the facility.

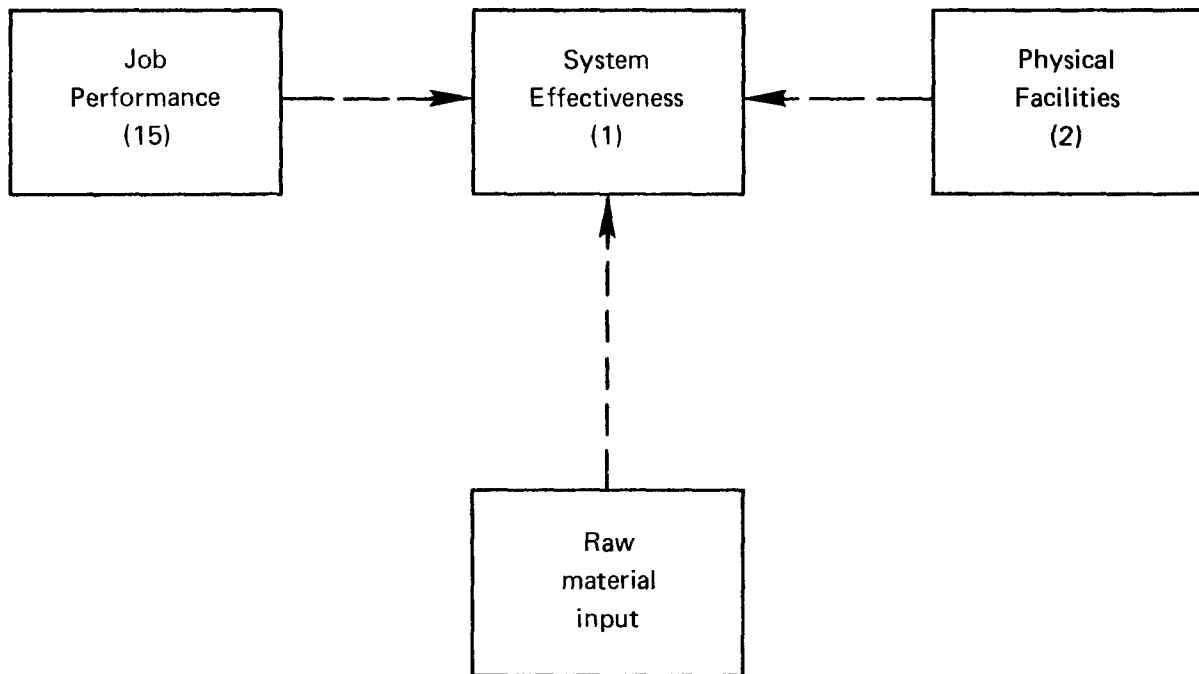


FIGURE 7.2. Influence of Job Performance, Physical Facility, and Inputs on System Effectiveness

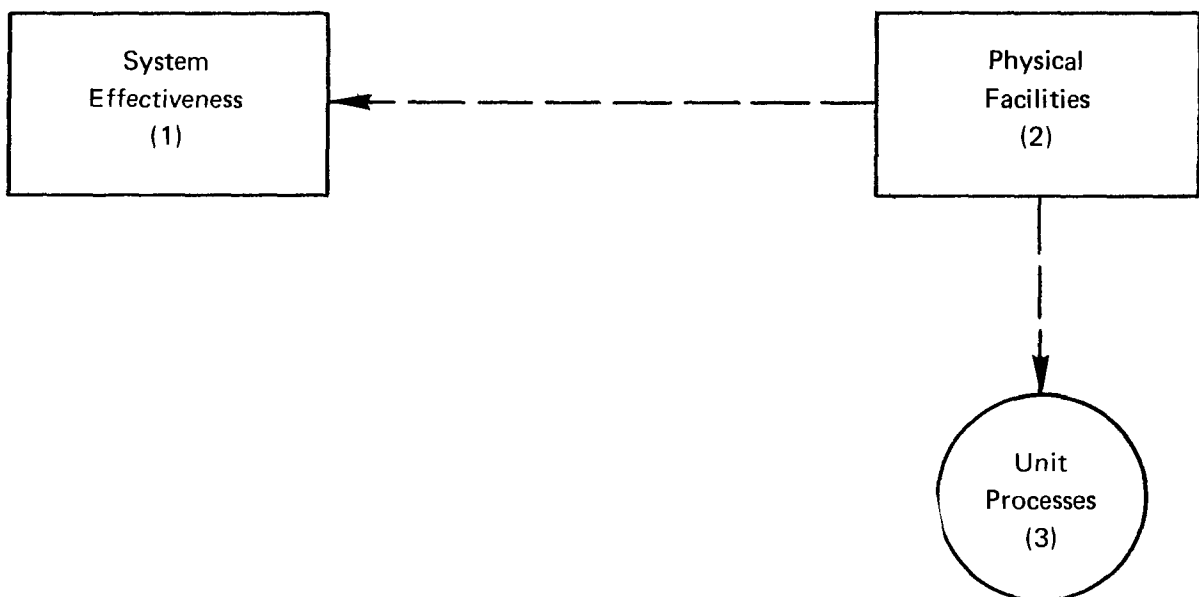


FIGURE 7.3. Influence of Physical Facilities on Total System Effectiveness

Another way of viewing the unit process variable is to see it as representing a way of classifying or categorizing portions of the total area of responsibility according to their function. The unit processes influence the work tasks (variable 4) which must be performed by the human resource as the operation and maintenance function of the given facility (Figure 7.4).

Work tasks are performed by human resources in conjunction with the physical facilities as the specified treatment activity is accomplished. Only by the introduction of the human element do the physical facilities and their resulting activities become operational. The effective operation of the physical facilities requires that certain functions be performed by the human resource

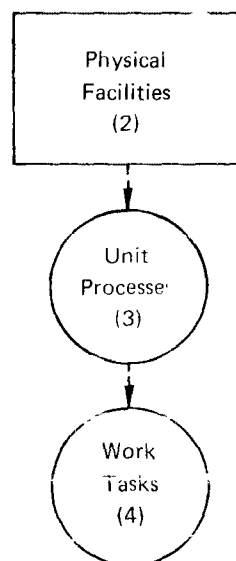


FIGURE 7.4. Influence of Physical Facilities and Unit Processes on the Work Tasks

input. The "work tasks" (variable 4) therefore represent the variety of different work tasks which are associated with a particular operation. Work tasks will vary in their complexity and in their demands upon the employee, and are a function of the "unit processes" performed, and are basic building blocks in determining specific job assignments (variable 6, see Figure 7.5).

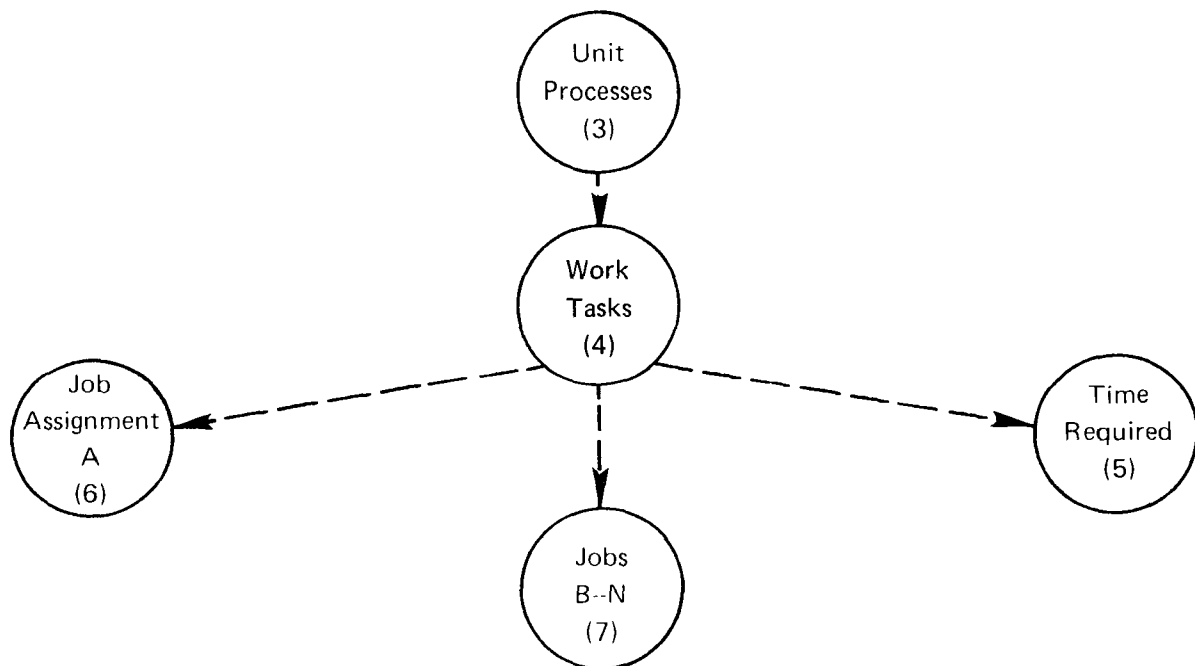


FIGURE 7.5. Basic Building Blocks for Specific Job Assignments

Time Task Requirement

Each task is measured in terms of the time (variable 5) which the performance of that task should be expected to require.

Job Assignments

Job design is the act of determining which specific work tasks will be grouped together and considered as a work unit for assignment to one individual. The resulting group of work tasks assigned to one employee is considered a work job assignment (variable 6) shown in Figure 7.6. This may be represented by:

Job assignment A = selected work tasks

Each work task requires an action or behavior on the part of the employee which takes time and places various "demands" on the individual. The normal approach to job design is to group work tasks so that the time demand upon the individual for the total job represents the time the individual is hired to work. Normally this represents an eight-hour workday.

Job Demands

The work tasks are also combined, where possible, so that demands on the individual by the various work tasks are similar. That is, either all of the work tasks place minimal demands on the individual or the majority of the work tasks place considerable, yet comparable, demands on the individual. Job demands (variable 8) therefore are influenced by the job assignment and the work tasks associated with that assignment. The job demands variable represents

the abilities, personal traits, and individual characteristics required of the employee to adequately perform the job assignment.

Job Specifications or Descriptions

Once the job assignment has been determined and the resulting job demands identified, the job description or job specification (variable 9) can be written (Figure 7.7).

The job description is a statement in rather general terms about the tasks which comprise the job being described. It includes a description of

1. What actions or work tasks are to be performed by the worker
2. What accomplishments are expected by these actions or work tasks
3. The tools or equipment the worker is expected to use or operate
4. The degree of discretion the job holder has in determining when actions are to be taken (i.e., whether actions are prescribed by others or by equipment, or whether they are the discretion of the worker)

The job's design influences the job description. It also determines, as has been noted, what demands the job will place on the individual.

Selection

The selection decision is based on the applicant's ability to perform the job, based on job specifications (variable 9; Figure 7.8).

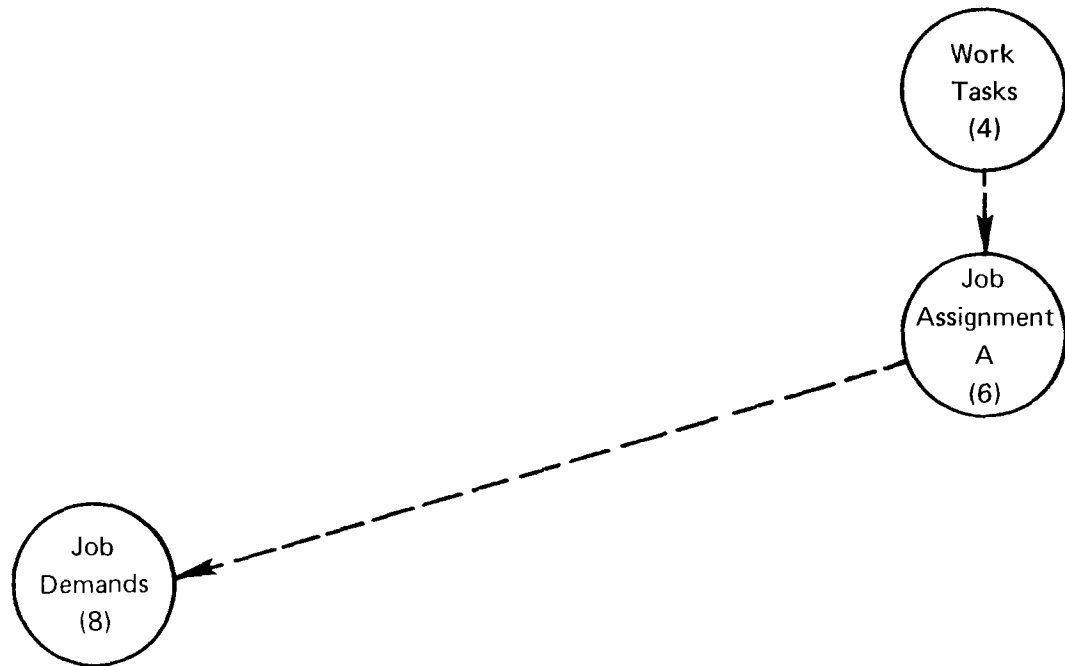


FIGURE 7.6. Components of the Job Assignment

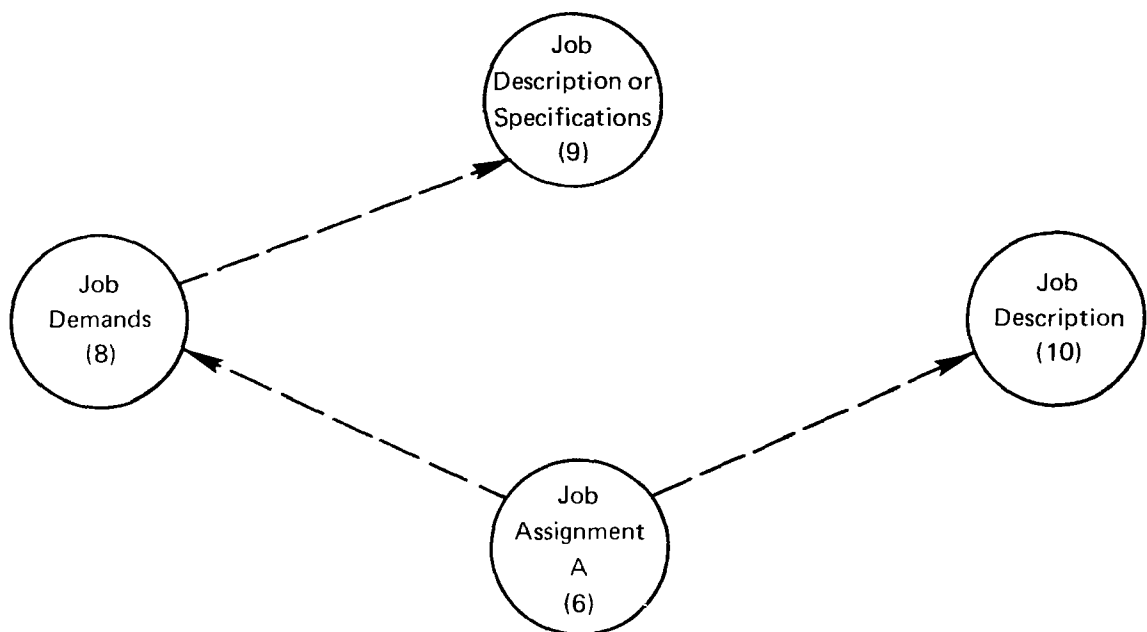


FIGURE 7.7. Influences on the Job Specification and Description

Typically an entry-level examination is administered to assist in this determination.

The individual selected brings to the job and the organization specific capabilities and capacities (variable 12). It will be unusual if the employee selected brings to the organization the necessary requisites to fulfill the job demands immediately. In all probability, the job's demands will exceed in some manner the capabilities of the employee when employed, and the employee's deficiencies must then be reduced through a training program.

Training

Training needs (variable 13) are thus immediately a function of the job specifications (variable 9). Training needs, once identified, should then lead to specific training activities (variable 14).

Training is defined as effort directed toward increasing an individual's skills and capabilities (variable 12). If it is effective, it results in modification of the individual's behavior and capabilities and leads, it is hoped, to improved job performance and effectiveness. As the individual's capabilities are modified and changed through training, there is a corresponding revision of the individual's deficiencies and thereby the training needs (variable 13).

Opportunities for appropriate training include formal academic programs (leading to two- and four-year degrees), "short courses" on university or community college campuses, correspondence courses, and on-the-job training in the operating facility.

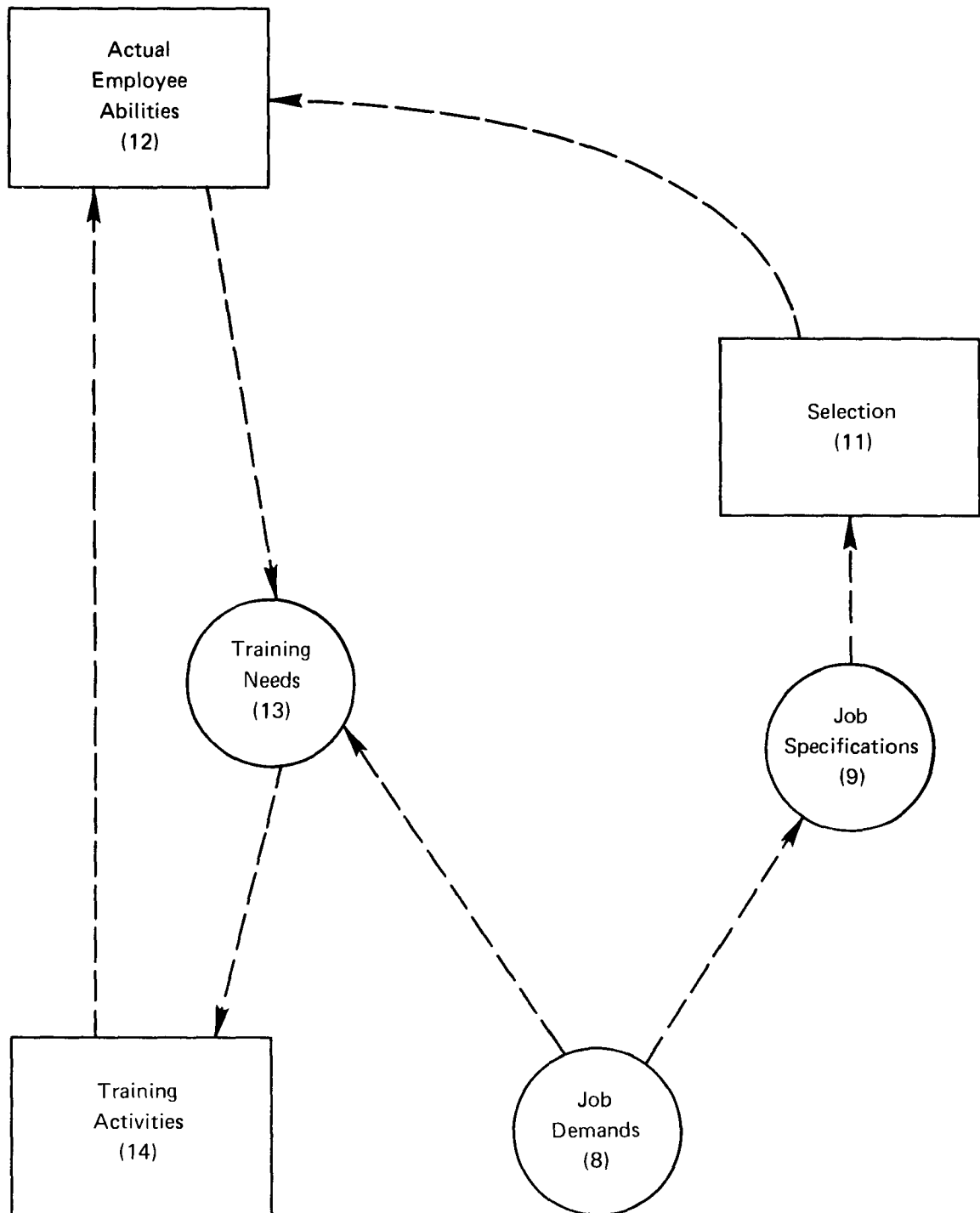


FIGURE 7.8. Selection Based on Job Specifications

Job Performance

The individual's job performance (variable 15; Figure 7.9) is influenced by the following:

$$\text{Job performance} = f(\text{EC, JS, TA and OF})$$

where

EC = the given employee's capabilities (variable 12)

JS = the job specifications or description (variable 9)

TA = the time allocated to the job (variable 5)

OF = other significant factors (variable 16)

The need for well-trained, highly capable employees to achieve highly effective job performance is without question. There is a direct relationship between the employee's job performance and his capabilities at a point in time. Other factors being equal, an increase in the employee's job capabilities will increase the possibility for improved job performance.

There are other variables, however, which are significant in influencing job performance. One is the time allocated to the total job or the specific work tasks (variable 5). Given equally capable individuals and identical job assignments requiring six hours of time, the worker allocated eight hours of time to perform the assignment will usually achieve better job performance than the individual allocated less time, say four hours, for the same assignment.

Likewise, the employee's attitude toward the job, its pay, the supervisor, and the working conditions generally will greatly influence the employee's level of motivation and the effort expended on the job (variable 17). While the cause and effect relationships

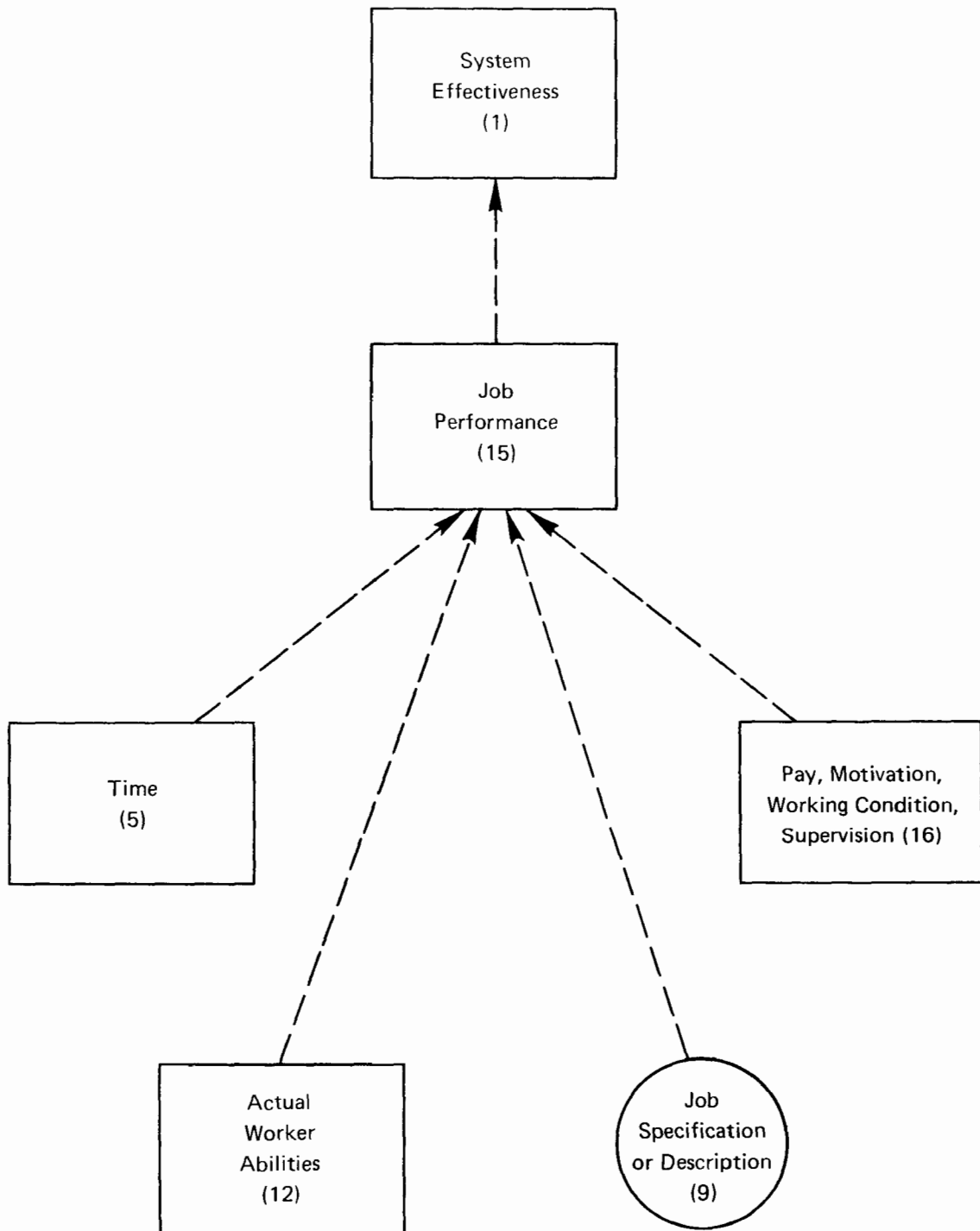


FIGURE 7.9. Bases of Job Performance

are difficult to identify positively, it is generally true that low or inequitable pay, poor supervision, undesirable working conditions, and the lack of recognition will each influence attitudes negatively and reduce levels of motivation, and thereby cause less effective job performance.

Improved Effectiveness

We have now come full circle . . . for the importance and influence of job performance on the plant's effectiveness have been recognized. The complete model is again given in Figure 7.10. To complete our conceptual model we have added two additional variables. First, we recognize that facility effectiveness is determined by comparing the facility's performance against predetermined goals or desired performance. These goals are influenced by local, state, and federal agencies and are a variable (18) to the extent that one desires and attempts to achieve a higher quality output. A "goals" variable has, therefore, been added to the model as they affect management decisions.

The second additional variable is now a "management decision" variable (variable 19). This recognizes that the managers of each new government facility will compare the facility's effectiveness against the goals which have been established. When facility's effectiveness is below the goal, the facility's manager will determine what action is required to improve effectiveness. The actions taken to improve facility effectiveness in these instances will be varied. The possible decisions include:

1. Modification of the physical facilities
2. Rearrangement of work tasks into job assignments for improved worker use
3. Increased training activities
4. Allocation of increased time for job performance
5. Increased pay for job assignments
6. Improved worker selection techniques
7. Improved use of the human resources through better supervision
8. Changes in raw material inputs (variable 17)

Development of Planning Criteria

The chart shown in Figure 7.11 provides an illustration of the steps required to prepare job descriptions and job specifications. This chart is supported by Figures 7.12 and 7.13 which provide pictorial illustrations of the steps discussed herein. Three new terms, "occupational definition" (step 8), "qualifications profile" (step 9), and "staffing guide" (step 11) have been introduced.

OCCUPATIONAL DEFINITION AND QUALIFICATIONS PROFILE

The term "occupational definition" corresponds with the term "job description" previously identified. The major difference is that an occupational definition applies in general terms to personnel performing a group of tasks. They serve as tools or guides for the preparation of job descriptions which are provided for as specific job or family of jobs at a given facility.

There are two significant inputs leading to occupational definitions. First, there is the quantitative process such as work

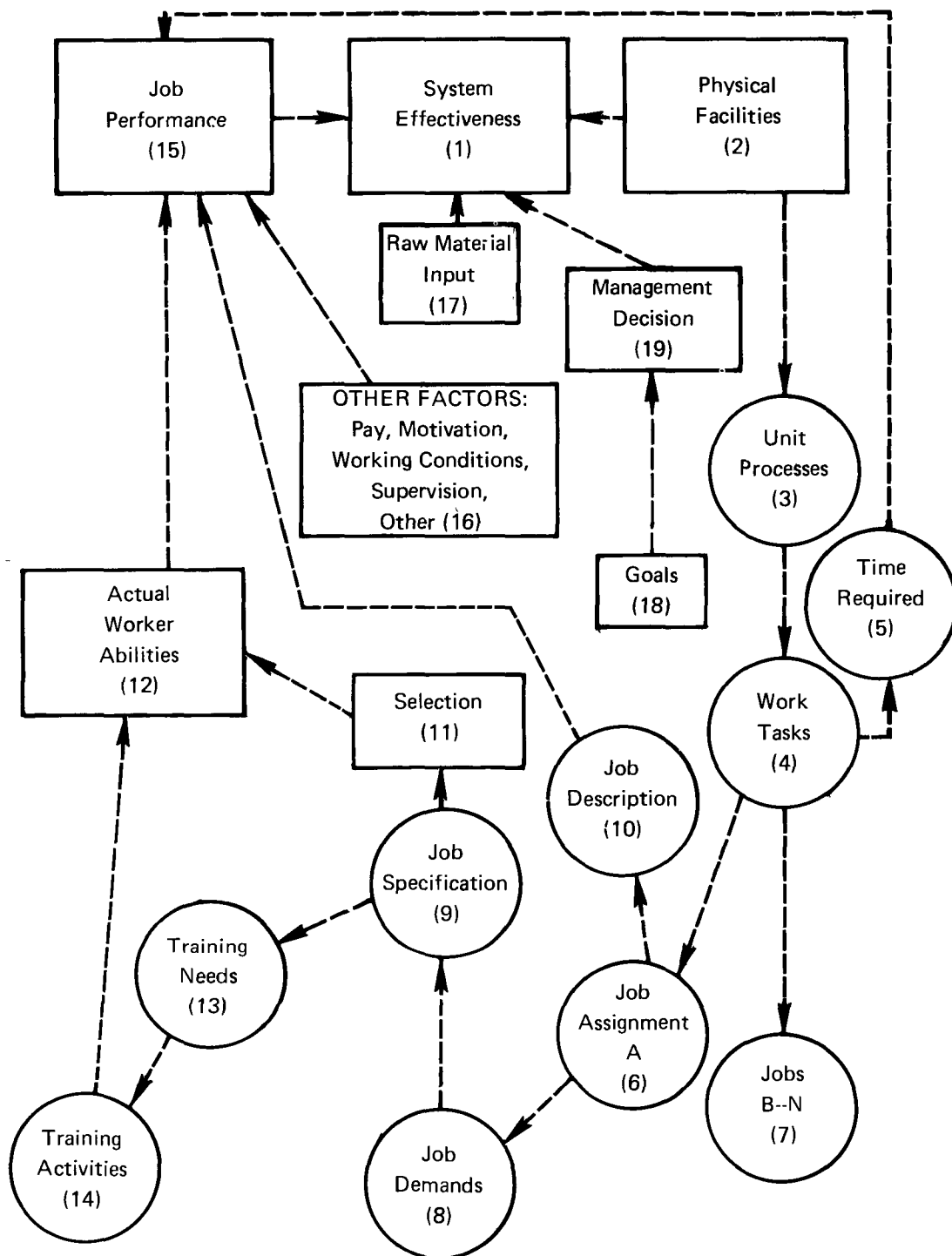
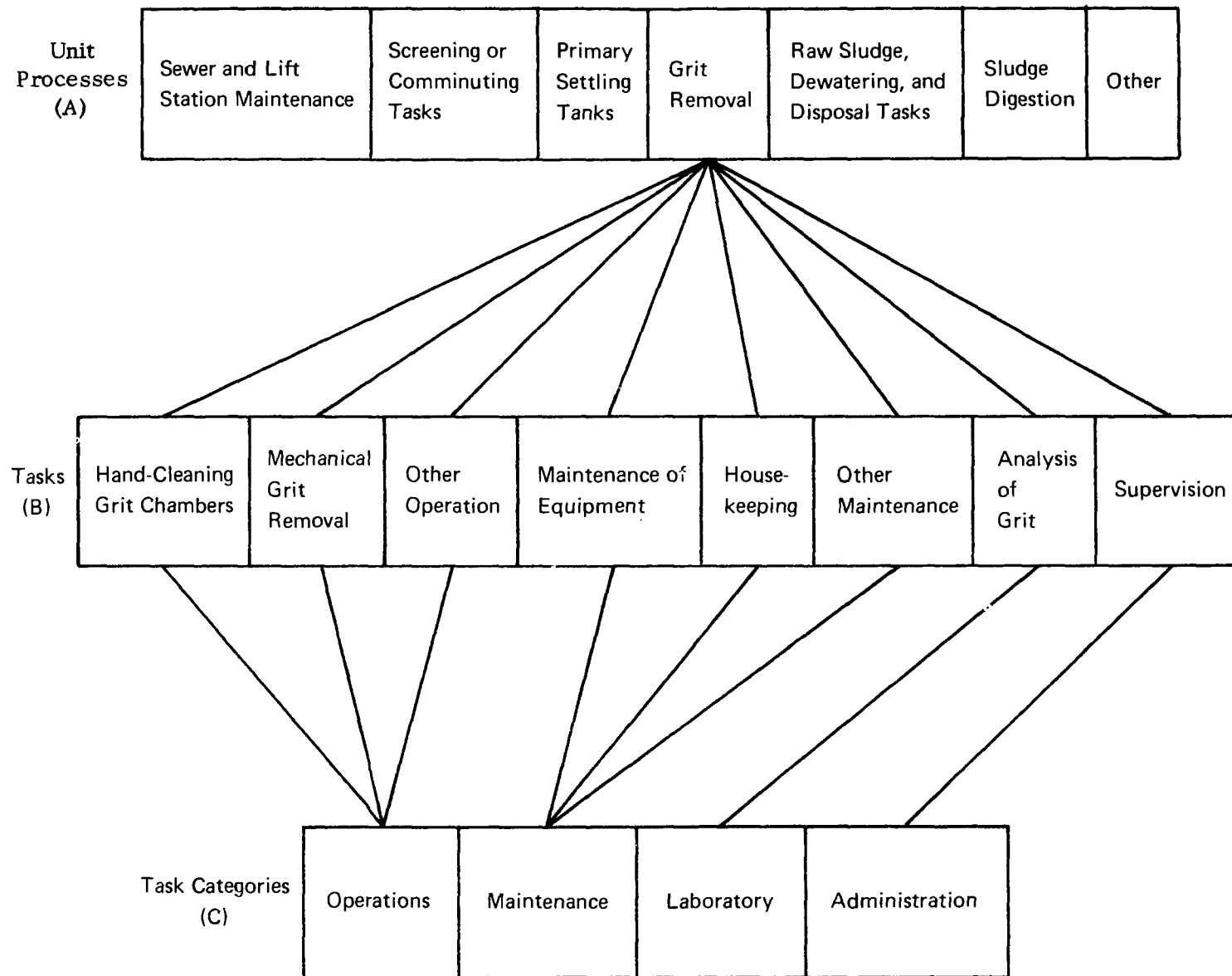


FIGURE 7.10. Dynamic Characteristics of Work Relationships and Variables (1 through 19) Which Influence the Effectiveness of Human Effort

simplification, methods engineering, time and motion study, and work measurement. These methods are applied in the design and layout of the physical facilities, unit processes, the design of work tasks, and the grouping of work tasks. Also considered is the design and location of equipment to facilitate performance of required work tasks, this concern for coordination is often referred to as "human factors engineering."

Step	
1	Determine total unit processes to be accomplished (see A, Fig. 7.12).
2	Describe the tasks within each treatment activity (see B, Fig. 7.12).
3	Estimate the time required to perform each task (see Table 7.2).
4	Group tasks according to general task categories (see C, Fig. 7.12).
5	Evaluate groups in terms of kind of work performed and technology (see B and C, Fig. 7.12).
6	Determine if cumulative totals of estimates of workday time for the tasks in tentative groups will justify full-time jobs (see Table 7.3).
7	Evaluate and adjust groups until most feasible practical arrangements of tasks are developed.
8	Prepare occupational definitions (see D and E, Fig. 7.13).
9	Determine job demands (general) (see F, Fig. 7.13).
10	Prepare qualifications profile (see G, Fig. 7.13).
11	Formulate staffing guide (see Fig. 7.15).
12	Determine certification requirements.
13	Determine job assignments.
14	Prepare detailed job descriptions.
15	Determine job demands (specific).
16	Prepare job specifications

FIGURE 7.11. Chart for the Preparation of Job Descriptions and Job Specifications



7-41

Note: The operator of a wastewater treatment plant is the example.
 FIGURE 7.12. Steps Required to Perform a Job (Worker Function Scale)

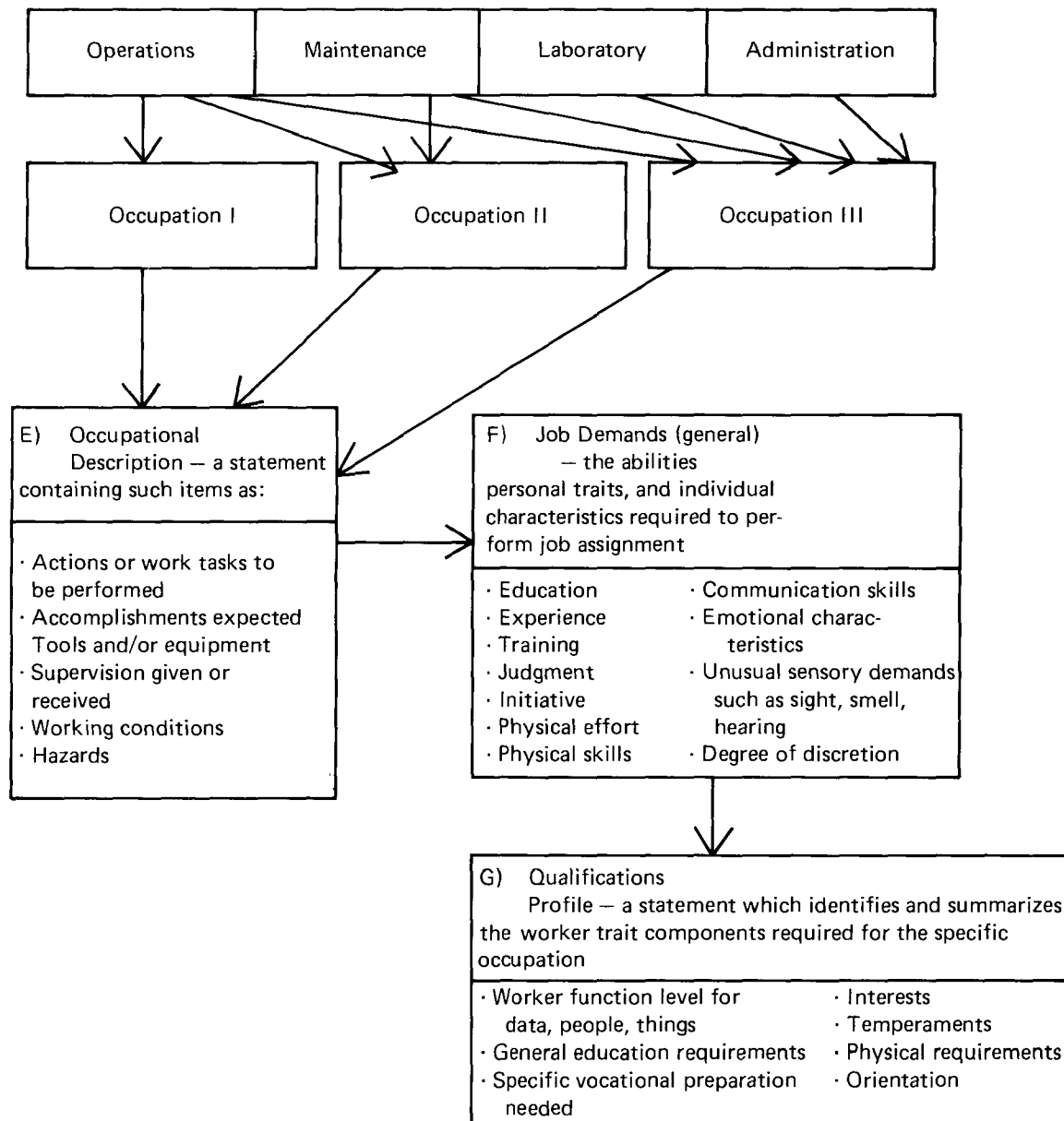


FIGURE 7.13. Additional Steps Required to Perform a Specific Job

Second, the qualitative process (job study) involves the subjective determination of the characteristics that are required of an employee to perform a particular job. A statement which in general terms the job demands, the minimum requirements of the individual selected to perform the given job assignment, is typically identified as the "qualifications profile." It also identifies those abilities, personal traits, and individual characteristics required of a worker to achieve average-successful job performance.

A qualifications profile corresponds with the term "job specifications." Again the major difference is the degree of generalization, in that a job specification is prepared for a specific job at a given facility. The qualifications profile serves only as a model or planning tool as a representative, for an occupational definition used alone recognizes the inclusion of a qualifications profile.

It is recognized that work tasks may vary in complexity, from the simple to the highly complex, and thereby place differential demands upon the worker. The method used by the U.S. Employment Service for describing what workers do while performing a given work task recognizes that all work is related, in some manner, to data, people, or things: "What workers do as they perform the tasks that make up their jobs, they do in relation to data, people, and things. All jobs involve the workers, to some extent, with information or ideas (data), with clients or co-workers (people), and with machines or equipment (things)."

Each work task places unique demands upon the worker. If a task requires the worker to be involved with machines or equipment (things), the worker will use physical resources (strength, dexterity, motor coordination, and so on). Work tasks which require the worker to communicate and use information or ideas (data), will require the worker to use mental resources (knowledge, thought, decision making, insight). And finally, work which requires the worker to associate with customers, and co-workers (people), will require the worker to use interpersonal and social resources.

The concrete and specific actions workers perform in relation to data, people, and things as they execute different tasks can probably be described in an infinite number of ways; that is, there are as many specific ways of expressing what workers do in relation to data, people, and things as there are specific tasks to be performed or unique content and conditions to which to relate. While there may be an infinite number of ways of describing tasks, there is only a handful of significant patterns of behavior (functions) which describe how workers use themselves in relation to data, people, things.

These patterns of behavior which have been articulated as describing generally the entire universe of work are defined in "worker function scales" (Figure 7.14).

The functions in each of the three areas of data, people, and things can be defined by a worker function scale, in which the performance requirements range from the simple to the complex in an ordinal scale. The scale is ordinal (that is, one in which any point on the scale includes lower levels and excludes higher ones). For example, on scanning the worker function scale for data, when one selects the compiling function as the appropriate worker behavior to describe the way a worker must relate to information in a given task, he is deciding two things: (1) that the worker's performance is more complex than copying and less complex than analyzing; and (2) that the worker must be able to perform all or at least comprehend all the data functions below compiling, but does not have to be able to perform or comprehend higher functions such as analyzing or coordinating (emphasis added).

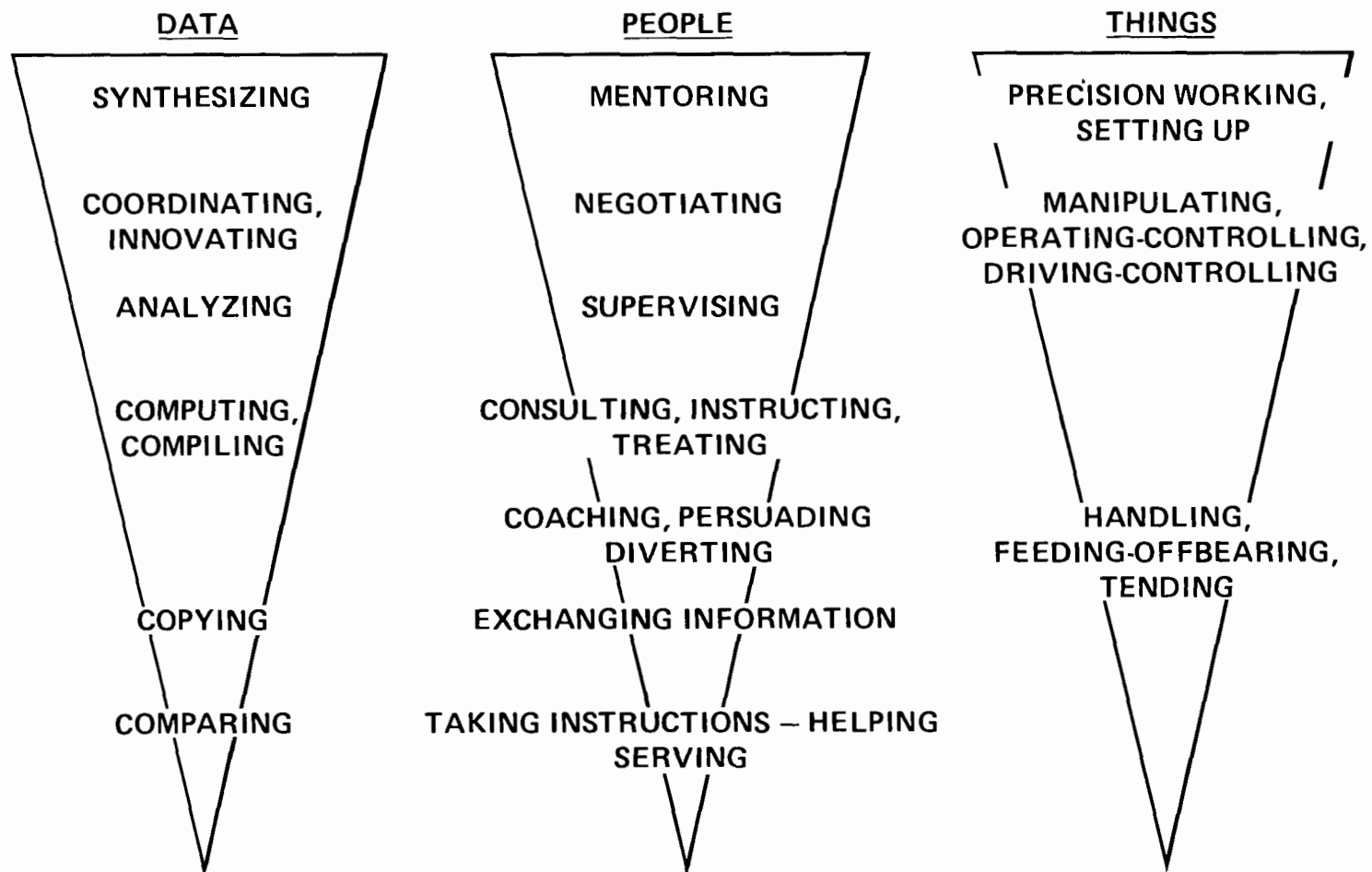


FIGURE 7.14. Summary Chart of Worker Function Scales

It is now possible to identify the "level" and "orientation" of a job -- measures of the job's demands on the individual (variable 8). The level of a task indicates its relative complexity. It is expressed by selecting the appropriate pattern of behavior on each of the worker function scales. The ordinal position of the function on each scale is the level measure. Thus for the data function scale, tasks requiring computing and compiling are a higher level than those requiring only copying.

The orientation measure indicates the relative involvement of the worker with data, people, and things as he or she performs a given job assignment. For example, Table 7-1 shows a job which requires 50 percent of the worker's time working with data at a copying level, 40 percent of the worker's time working with people in the exchange of information, and 10 percent of the worker's time relating to things at the handling level.

A job specification therefore summarizes the worker trait components which are required of the worker assigned a specific job. The specification identifies:

1. Worker function level for data, people, and things
2. General education requirements
3. Specific vocational preparation needed
4. Approximate interest
5. Temperaments required
6. Physical demands of the job
7. Working conditions of the job

TABLE 7-1
Example Job Level and Orientation Profile

Area	Functional Level	Orientation
Data	Copying	50%
People	Exchange information	40%
Things	Handling	10%

A more detailed discussion of the "components and benchmarks" is used by the Labor Department in describing worker characteristics and abilities that contribute to successful job performance.

STAFFING GUIDE

The staffing guide (step 11 of Figure 7.11) depicts in model form the total manpower requirement for all on-site personnel required for operation and maintenance of a facility. The staffing guide shown in Figure 7.15 was compiled and developed for activated sludge wastewater treatment plants by Black and Veatch.³ A staffing guide is developed from time values for unit process followed by aggregating the processes as appropriate. In the example provided, the time for each process was computed for both operation and maintenance and then totaled. Table 7-2 can be developed from the plant staffing summary. Table 7-3 provides a form for such a summary and development of a staff complement. In using the latter

³W. L. Patterson and R. F. Banker, Estimating Costs and Manpower Requirements for Conventional Wastewater Treatment Facilities (Washington, D.C.: U.S. Government Printing Office, 1971), prepared for the Office of Research and Monitoring, Environmental Protection Agency, by Black & Veatch Consulting Engineers, p. 181.

Occupation Title	Plant Average Day Capacity, mgd									
	1	3	5	10	20	35	50	65	80	100
	Estimated Number of Personnel									
Superintendent		.5	.5	1	1	1	1	1	1	1
Assistant Superintendent						1	1	1	1	1
Clerk Typist					1	1	2	2	3	4
Operations Supervisor							1	1	1	1
Shift Foreman						1	2	3	3	5
Operator II	2	3	4	4	5	8	11	12	15	17
Operator I	4	5	6	6	9	12	14	17	19	25
Auto. Equipment Operator						1	1	2	2	2
Maintenance Supervisor								1	1	1
Mech. Maintenance Foreman						1	1	2	3	3
Maintenance Mechanic II				1	2	2	2	2	2	3
Maintenance Mechanic I				1	1	2	2	2	2	2
Electrician II				.5	1	1	1	2	2	2
Electrician I						1	1	1	1	2
Maintenance Helper				1	2	3	4	4	5	6
Laborer		.5	1	2	3	4	5	6	7	8
Painter								.5	1	1
Storekeeper								1	1	1
Custodian							1	1	1	1
Chemist									.5	1
Laboratory Technician	1	1	1	1.5	2	2	3	3	3	3
Total Staff Complement	7	10	12.5	18	27	41	53	64.5	74.5	90

Note: Plant components included in this example (no. 9) are:

Liquid Treatment
 Raw wastewater pumping
 Preliminary treatment
 Primary sedimentation
 Aeration
 Final sedimentation
 Recirculation pumping
 Chlorination

Sludge Treatment
 Primary sludge pumping
 Sludge holding tanks
 Vacuum filtration
 Incineration

Other Plant Components
 Yardwork
 Laboratory
 Administration and general

FIGURE 7.15. Staff Complements for Wastewater Treatment Plants

TABLE 7-2

Staffing Requirements by Occupational Title

Cost Component	Component Parameter	Estimated Annual Payroll Man-Hour Requirements		
		Operation	Maintenance	Total
Raw wastewater pumping	_____ mgd firm pumping capacity	_____	_____	_____
Preliminary treatment	_____ mgd average plant flow	_____	_____	_____
Sedimentation -- primary	_____ 1,000 square feet surface area	_____	_____	_____
Trickling filters	_____ 1,000 square feet filter surface area	_____	_____	_____
Aeration -- diffused air system	_____ 1,000 cfm firm blower capacity	_____	_____	_____
Aeration -- mechanical aerators	_____ horsepower total installed capacity	_____	_____	_____
Sedimentation -- secondary	_____ 1,000 square feet surface area	_____	_____	_____
Recirculation or intermediate pumping	_____ mgd firm pumping capacity	_____	_____	_____
Chlorination	_____ tons per year chlorine use	_____	_____	_____
Primary sludge pumping	_____ gpm firm pumping capacity	_____	_____	_____
Sludge holding tanks	_____ 1,000 cubic feet sludge volume	_____	_____	_____
Sludge digestion	_____ 1,000 cubic feet sludge volume	_____	_____	_____
Sludge drying beds	_____ tons per year dry solids applied	_____	_____	_____
Sludge lagoons	_____ tons per year dry solids applied	_____	_____	_____
Vacuum filtration -- sludge to landfill	_____ tons per year dry solids applied	_____	_____	_____
Vacuum filtration -- sludge to incinerator	_____ tons per year dry solids filtered	_____	_____	_____
Centrifugation	_____ tons per year dry solids applied	_____	_____	_____
Incineration	_____ tons per year dry solids incinerated	_____	_____	_____
Yardwork	_____ mgd plant average day capacity	_____	_____	_____
Laboratory	_____ mgd plant average day capacity	_____	_____	_____
Administration and general	_____ mgd plant average day capacity	_____	_____	_____
Total estimated annual payroll man-hour requirements		_____	_____	_____

TABLE 7-3
Estimated Plant Staffing Complement

Staff Position	Estimated Annual Payroll Requirements		Suggested Staffing
	Man-Hours	Number of Employees ^a	Number of Employees
<u>Administration and general:</u>			
Superintendent			1
Assistant superintendent			
Clerk-typist			
Storekeeper			
Subtotal	2,100 ^b	1.0	
<u>Operation labor:</u>			
Operations supervisor			
Shift foreman			
Operator II			4
Operator I			6
Automotive equipment operator			
Subtotal	20,200 ^c	9.7	
<u>Maintenance labor:</u>			
Maintenance supervisor			
Mechanical maintenance foreman			
Maintenance mechanic II			1
Maintenance mechanic I			1
Electrician II			.5
Electrician I			
Painter			
Maintenance helper			1
Laborer			2
Custodian			
Subtotal	11,750 ^d	5.7	
<u>Laboratory:</u>			
Chemist			
Laboratory technician			1.5
Subtotal	3,600 ^b	1.7	
Total labor requirements	37,650	18.1	18

^aMan-hours divided by 2,080 hours per year.

^bOperation man-hours only.

^cAll operation man-hours except "administration and general."

^dAll maintenance man-hours.

table, one can obtain the payroll man-hour requirements for the major categories of "administration and general," "operation labor," "maintenance labor," and "laboratory" from the labor requirement summary in Table 7-2. The total number of full-time employees required may be estimated by dividing total payroll man-hours by 2,080, the number of hours in the normal payroll year. When the approximate number of employees has been determined in each major category, the suggested staffing can be developed on a judgmental basis.

Other factors requiring consideration in developing a suggested staff complement include the fact that for each position which must be filled 24 hours a day, 365 days a year, it is necessary to have almost five employees on the payroll. Also, during certain intermittent operations, such as vacuum filtration and incineration, an above-average number of employees must be on duty.

The suggested staffing could include part-time personnel if local circumstances so indicate. This would most likely be the case at smaller plants and would be dependent upon availability of part-time employees.

Table 7-3 illustrates the use of the estimated annual payroll requirement data in developing a suggested plant staff complement.

CERTIFICATION REQUIREMENTS

In some government activities, workers may be required to be "certified." Certification requirements which appropriately reflect job demands should be used as a planning guide in determining training needs. The task list should be used extensively in developing

statewide certification requirements and training courses. Each class or training period should be designed with appropriate task requirements and end performance objectives defined. Completion of training phases should be followed by rigorous, yet realistic examinations. Proper training of plant personnel regarding how to perform operating and maintenance tasks, the impact of improper task performance, and the ability to "troubleshoot" problems as they occur and to take proper corrective action are of the utmost importance. For a small facility dependent upon a relatively small number of people, the training factor is crucial. As an aid to the small facility, it is important that:

1. Statewide certification standards be provided to assure that adequate capability and knowledge levels are maintained
2. Regional training courses in all phases of facility operation be continually made available
3. A competent professional staff be available through state agencies, private organizations, or other governmental units which can readily provide troubleshooting assistance, emergency relief, and perhaps aid as a "clearinghouse" in locating and placing qualified people in operating positions at small facilities
4. Attention to be given to wages scales and compensation plans to small plant personnel to encourage competent individuals to take the responsibility of plant operations

Figure 7.16 incorporates the planning tools, certification requirements (A), staffing guide (B), and occupation definition (C) into the conceptual model.

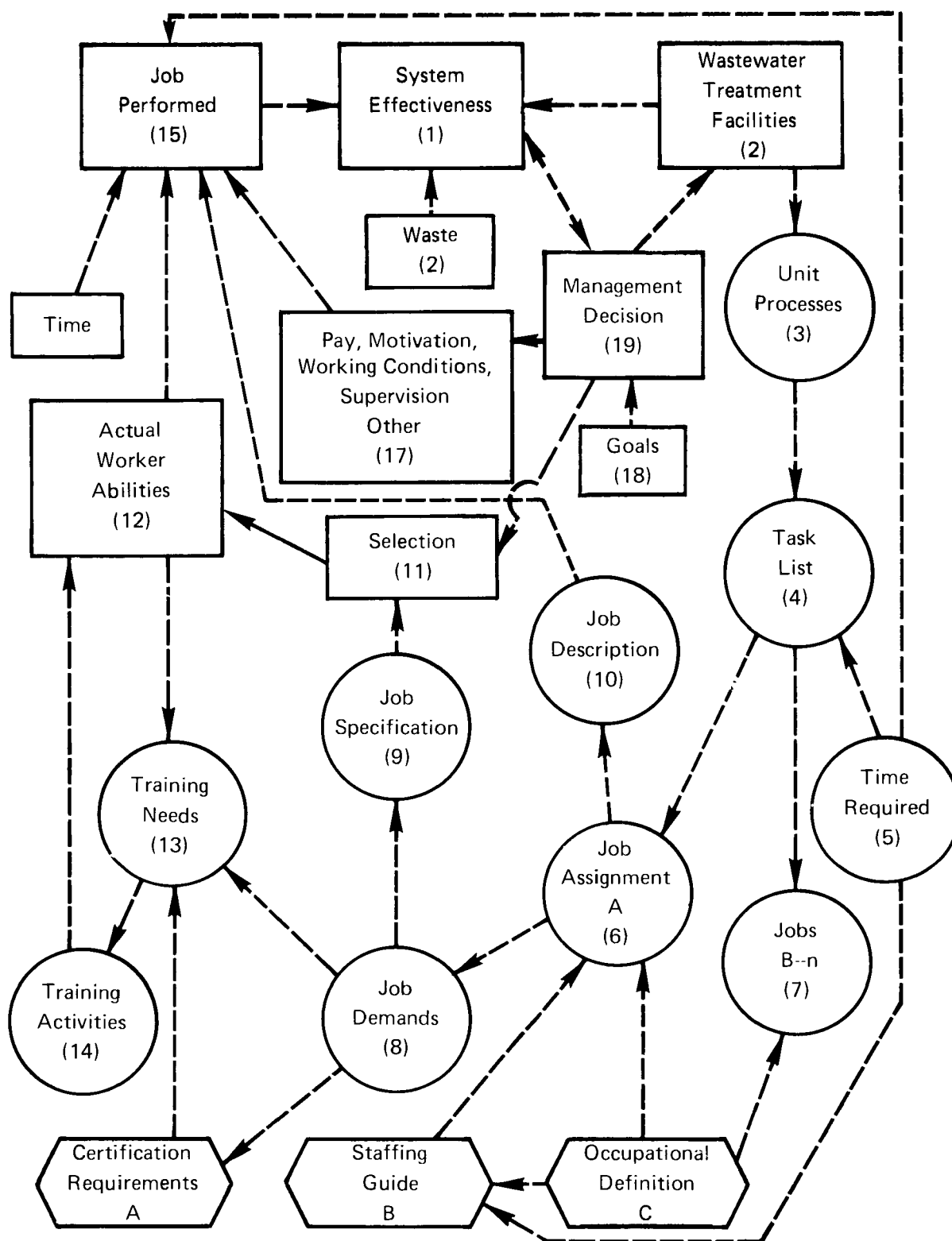


FIGURE 7.16. Incorporation of Planning Tools into the Conceptual Model

SUMMARY

The variability of operations in the public sector requires that each organization develop, for those positions within that organization, job descriptions and staffing guides relevant to specific job assignments. Only then can the appropriate job specifications be determined and written and proper selection, training, and certification be performed.

The techniques obtained by this chapter and the occupational definitions and qualifications profile can be used as guides to help develop job descriptions as well as staffing guides and training program certification requirements applicable to the specific positions within an organization. The analysis of the work being performed currently and consideration of future work requirements is a part of "system analysis" and the manager's responsibility.

While the manpower planner may not actually engage in this full kind of analysis, to develop job descriptions, staffing guides, certification requirements and training programs in an orderly way, some form of human engineering will probably be required. However, the manpower planner must be aware that while such a process may be required, in the presence of an interested labor force, and especially a union, unilateral establishment of standards, and such are probably not feasible. Workers will probably insist on making an input and will insist that existing workers not be negatively affected by such.

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PUBLIC SECTOR UNIONISM

Two additional related institutions affecting manpower planning in the public sector are labor unions and the concomitant collective bargaining. With some four million of the fourteen million public service employees organized, a manpower planner who fails to understand these two institutions and take them into account in his or her planning is bound to run into difficulties. They have, and will increasingly have, a material effect on planning the involvement of human resources in the public sector.

LEGAL AND INSTITUTIONAL DEVELOPMENTS

Labor unions began in the early 1800s, evolving from the guilds that had for centuries controlled the relationship of producer to consumer. As workshops grew in size, becoming less and less personal, the gulf between the owner of physical capital and the owner of human capital (workers) increased. Factories were being organized, competing successfully with the age-old crafts and threatening craftworkers with the extinction of their hard-earned, historical, significant, social, and economic status. Workers organized unions of working people in self-protection. Their attempts were met by employer and legal resistance, being treated under the common law as "criminal conspiracies."

The threats to craftworkers were so great that they continued to organize unions and to deal collectively with employers in spite of the legal and extra-legal hamstrings. In the United States, by

1842, the "criminal conspiracy" legal doctrine began to break down, unions increasingly being recognized as legal entities. However, new legal techniques were developed, especially in the United States, to limit the unions in the exercise of their power -- court-made law rather than legislation governing labor union activity.

As the industrial revolution proceeded, a new brand of unionism began to develop. Whereas the earlier unionism had been based on skilled crafts or trades -- such as carpenters, typographers, tin-smiths, iron moulders, and so on, the new unionism was industrial in nature, all workers in a plant or industry, regardless of the nature of their work, being organized into a single union. The miners and eventually the textile workers led the way in this brand of unionism. Their power lay not in the monopoly and membership restrictions, typical of the craft unions, but in their numbers. However, as with their craft union brothers, industrial workers, too, were met by legal restrictions.

Workers also were met by resistant employers who used the blacklist and the power to hire and fire their workers to discourage union activity. The workers in turn became well enough organized that they could call effective strikes, pickets, and boycotts. The ensuing confrontation of workers and employers, each engaged in a "holy and constitutional" cause, frequently erupted in violence. State militias were called out and private detectives hired to protect property with orders to shoot to kill; on the other hand, workers, seeing the "property rights" of their jobs threatened,

sometimes destroyed the physical capital they had been using and used violence against the hated strikebreakers or "scabs."

While there were earlier developments leading toward a more peaceful form of industrial and labor relations, it was a change in legal attitude in the 1930s, along with economic recovery, that produced the capacity of the private sector to resolve industrial conflict in a relatively peaceful way.

Preceded by other legislation leading the way, in 1936 the Wagner or National Labor Relations Act was passed. With it, workers in the private sector were guaranteed the right to select or reject a union of their choice and to bargain with their employers. Employers were not too happy about the one-sided new law. Legal amendments and additions were made to the law, which also protected employers' and consumers' rights -- as found in the Taft-Hartley Act of 1947 -- and protected union members' rights in their relationships with their unions -- as seen in the Landrum-Griffin Act of 1959 -- but the guarantee of the right to bargain collectively remained. While neither employers nor unions may be completely happy with the current state of the law, there are no great groundswells in the private sector to change the law.

BEGINNING OF COLLECTIVE BARGAINING

It was the mutual recognition by the law and the industrial parties of the rights of each other -- namely the right of management to manage and the right of workers to participate in decisions most directly affecting them -- that established and made effective

collective bargaining, taking the place of destructive confrontation. Collective bargaining consists of the action of the collective agent of the workers (the union) and the collective agent of owners (the management) sitting down in mutual respect for the rights of each other for the purpose of negotiating a contract or constitution, delineating the terms of employment and the rights and responsibilities of both parties. It also involves the inevitable negotiations over the meaning and administration of that contract.

While parties bargaining in good faith may hope for a peaceful resolution of differences, they also recognize that such is not always possible. Owners may place excessive demands on management. Workers may make impossible demands on the union leaders. The status of the economy or the nature of the competition -- either from business or union competitors -- may make settlements difficult if not impossible. Impasses are bound to occur at times, even between parties that previously negotiated in a spirit of good will. When these impasses occur, the workers have the legally protected right, at least in the private sector, to strike, picket, and boycott. These are not absolute rights, legal limitations having been placed on their application. On the other hand, employers have the legal right to continue to operate. The exercise of this right, especially if new workers are brought in (as contrasted with using management personnel), comes into conflict with what the workers still consider as their right, that of returning to their jobs. It is this conflict of legal and perceived rights that is the most frequent cause of what little violence remains today in labor relations.

Internal Conflict

While labor unions were "winning their spurs" in collective bargaining, they did not achieve it as one big, happy family. There have been severe strains within the union movement itself, often with as much conflict as with public officials and employers.

In the early 1800s, unionization meant the formation of locals, with the workers of a given craft in a given location organizing a union. In the 1830s and '40s these locals organized city and state federations to give themselves political power in dealing with the legal establishment frequently controlled by employer interests. With the expansion of the product markets, workers found themselves in destructive competition with workers from other parts of the country. In response they organized national craft unions of carpenters, painters, typographers, and so forth. Later in the century, industrial workers began to organize nationally. The attempt of the Knights of Labor in the 1870s and '80s to unite all workers into a common, overarching national federation was abortive, the conflict of philosophies and needs between the skilled and unskilled workers being too great. In 1886, the American Federation of Labor was formed, with the craft unions in control, placing limitations and restrictions upon the organization of workers into industrial-type unions.

The industrial workers resented the attitude of the craft union leaders controlling the AFL, attempts being made to change the AFL philosophy internally. Some of them also established another overarching, single union -- the Industrial Workers of the World -- in

the early 1900s. This was also a revolutionary union dedicated to destroying capitalism. Its economic effectiveness was destroyed when its leaders were imprisoned, executed, escaped to Russia, or went underground at the end of World War I, resulting in its demise.

Industrial unionism, as a viable force, was reborn in the mid-1930s when a substantial number of leaders of industrial unions that had maintained an uncomfortable relationship within the AFL rebelled, forming what became the Congress of Industrial Organizations. While it contained some revolutionists, basically it accepted the American economic system. The burgeoning new mass-production industries seemed to demand union organization along industrial rather than craft lines, and while the AFL did not "lie down and die," much of its membership was lost, and it no longer was the single voice of labor.

It was the shock of the Taft-Hartley Act of 1947, the right to work movement of the early 1950s, and the leveling off of union membership in that decade that shocked many leaders of the AFL and the CIO into a recognition of the need for amalgamation. In 1955 the AFL and CIO began the difficult, often uncomfortable task of creating a singular voice for workers. While the AFL-CIO remains the single most powerful voice for labor, the "house of labor" continues somewhat divided, with several of the most powerful national unions, including the mine workers, the automobile workers, and the teamsters, remaining outside the AFL-CIO -- the first by choice and the others by expulsion.

The amalgamation did not resolve many of the problems facing American unions. It was unable to develop sufficient support to repeal the Taft-Hartley Act, nor could it prevent the passage of the Landrum-Griffin Act. While the right to work tide was stemmed, it was not reversed. The amalgamation has not been able to produce a return to the expanding days of the 1930s and '40s in which union membership boomed. For the union movement as a whole, membership figures have become stagnant.

A New Industrial Age

With the 1950s and carrying into the 1970s, a new economic age seemed to arrive and with it the changes in the labor movement already mentioned. Through World War II, the production of goods, taking place in easily organized factories and shops and construction sites, dominated the American economy. With the end of the extremely heavy demands on goods production of World War II and the goods fulfilling years up to the Korean War, American production turned to a different form. While the American consumers continued their heavy demand for goods, it was a growth that had slowed down. In the continued, relatively prosperous years of the 1950s and '60s, the American consumer turned to increased services. The service-producing sector became dominant in the 1950s.

It was perhaps this economic change more than any other that produced the stagnation in union membership. While many service industries themselves are heavily unionized -- transportation and communication being but two examples -- the service and the white-collar occupations had historically remained weakly organized by

unions, if organized at all. It was a new breed of worker and new institutional forms that faced the old-line union leaders. Many of the white-collar and service occupations were more closely tied to management than to blue-collar, unionized workers. Harder to organize, women were concentrated in many of the service occupations. Traditional union leaders seemed incapable of meeting the new challenges.

Rise of Public Service Labor Unions

Government workers have been involved in this change. Most government workers are in the service-producing sector, albeit it is the production of government services. They, like their private sector counterparts, have been reticent to organize -- with notable exceptions of such groups as the postal workers who have been well organized for many years. Despite their historical reluctance and lack of protective legislation, government workers along with the private sector service occupations have begun to organize. In fact it is among the service workers, both private and public, that unionism is finding its principal organizing successes in the 1970s. And just as it is the state and local government units that are growing most in relation to federal agencies, so it is that it is among state and local government workers that the greatest growth in unionism is taking place. It is because of this growth that micromanpower planners in the public sector must take special cognizance of the labor movement and collective bargaining.

Gone are the days when public managers could ignore the voice of the workers. Heard less and less is the old argument that for

government officials to sign labor contracts was an abrogation of sovereignty. The federal government has finally recognized collective bargaining, and most states now have laws or attorney general opinions recognizing collective bargaining at least for some state employees.

Unionization in the public sector began at the federal level. In 1912, the Lloyd-La Follette Act gave federal employees the right to become affiliated with those worker organizations which did not require them to strike. Federal workers were given the specific right to petition Congress. Under this legislation, Government Printing Office employees and crafts in defense facilities formed unions. (Postal workers had organized craft-oriented postal unions in the nineteenth century.) The industrial-type National Federation of Federal Employees and American Federation of Government Employees, AFL-CIO, were organized. While these unions could petition and deal with Congress, they were barely tolerated by government officials.

In the late 1950s and early '60s, the pressures began to build up within the federal establishment for a formal recognition of the collective bargaining rights of federal employees. Until that time department heads were relatively free to resist efforts of federal workers to organize or to deal with them in any formal way. Government workers were given none of the organizing and bargaining protections and guarantees of the Wagner Act and other federal legislation.

With the rising pressures, and with some ideological commitment, in 1962 President Kennedy issued the landmark Executive Order 10988 which formalized several types of relationships between labor unions and the federal agencies. However, the decentralization

and fragmentation characteristic of federal labor relations under this order caused much difficulty and uncertainty. Consequently in 1969, President Nixon issued Executive Order 11491 providing only exclusive recognition, when a majority of the workers in a bargaining unit supported a union. In addition, agency heads are no longer free to make final decisions as to what constitutes a bargaining unit, which union is to be the bargaining agent for the workers, and what are unfair labor practices. The Assistant Secretary of Labor Management Relations in the Labor Department makes these decisions, with appeal to a federal labor relations council possible. In addition, a federal arbitration body, the Federal Service Impasses Panel, is empowered to resolve conflicts between managements and unions.

In 1971, Executive Order 11491 was amended by Executive Order 11616 providing for limited negotiation by unionized workers during working hours, not allowed under the previous order. It also allows for nonbinding arbitration of grievances.

Under this legal encouragement and the economic and philosophical changes taking place, unionization of federal employees has proceeded at a rapid rate. In 1963, postal unions had over 625,000 members, representing about 85 percent of that work force. Other federal employees organized, increasing membership to 1,600,000 in 1971 and representing about a third of the non-postal federal labor union force. The principal union of federal employees is the American Federation of Government Employees. In 1960 the membership of this union was 70,300. By 1970 it had increased to 337,900 and now represents well over 530,000 federal employees. This is an

industrial-type union, with workers of many crafts, skills, and occupations as members of a single union in locals throughout the country. Other major unions of federal employees in order of size are the American Postal Workers Union, the National Association of Letter Carriers, the National Federation of Federal Employees, and the National Association of Government Employees.

A number of primarily private sector, craft-type unions have organized workers in closely related given occupations. For example, the International Association of Machinists and Aerospace Workers have contractual relations with a number of federal installations, as do the Oil, Chemical, and Atomic Workers. As of 1974, almost half of the federal employees were organized into unions, although about a third of the 3,600 locals had been unable to secure bargaining agreements with the cognizant federal agencies. Within the AFL-CIO, some 22 national unions are involved in the organization of public employees.

Not only have federal employees organized in unprecedented numbers, they have on occasion defied the law and taboos by engaging in strike activity. Shortly after the issuance of Executive Order 11491 in 1969 (effective January 1, 1970) some two hundred thousand postal workers struck, the first major strike of federal employees in the nation's history. While the military was brought in to try to move the mails, the strike was successful. In exchange for a union agreement to support postal reorganization, postal workers received the largest pay increase ever granted. And the government agreed not to prosecute or retaliate against strikers or their leaders.

This strike was followed by a "sick-in" of federal air traffic controllers, which met with less success but nevertheless demonstrated the potential for strike action on the part of federal employees.

What produced this immense increase in militancy on the part of federal public employees during the 1960s and '70s? While the AFL-CIO and its affiliated unions may be given some of the credit because of their increased and improved organizing efforts, the real reason lay with the economic changes and the government workers themselves. The latter were no longer content to see private sector workers alone increasing their bargaining power, resulting in relatively greater increases in benefits than government workers. The managers of nonunionized or weakly organized government employees had not learned from the nonunionized private sector that to remain nonunionized required competition with these unions in the provision of benefits at least equal to those of unionized areas. Another reason for the huge increase in public sector unionization is part of a changing attitude toward government. People in general have lost much of the awe, if not the respect, for government and are less and less reticent about challenging previously "sacred cows." They have therefore become insistent upon equitability of treatment. Failing to get it short of union activity, they have taken what appeared to them to be the only conceivable recourse.

In addition, inflation has taken its toll. Persons on fixed incomes may be happy to remain in that status in times of price stability or decline if they have relatively secure jobs. But in times of inflation, job security does not seem so important as

meeting the increased cost of living. Government workers, whose incomes have historically been relatively fixed, in the inflation of the 1960s and '70s have been willing to risk job security for increased compensation and fringe benefits, as well as a more effective voice in establishing working conditions.

UNION ORGANIZATION AT THE STATE AND LOCAL LEVELS

Encouraged by the success of federal employees, state, county, and city workers, as well as schoolteachers, have been engaging increasingly in collective action. The American Federation of State, County, and Municipal Employees is the dominant industrial-type union at their levels of government, having grown from 210,000 members in 1960 to over 460,000 members in 1972. The Wall Street Journal asserted on August 6, 1974 that membership of the Federation was seven hundred thousand. In addition, numerous other unions and union-type organizations exist. For example, the American Federation of Teachers, with 205,300 members in 1970 (up from 56,200 in 1960), is associated with the AFL-CIO, while the National Education Association, with approximately a million members, as it saw the membership encroachments of the American Federation of Teachers and as its members increased their pressure, became more and more militant. Its national leaders now recognize it as a union, but independent of the AFL-CIO.

The International Association of Firefighters has more than 150,000 members. The nurses in public hospitals are increasingly organized in various forms. Sanitation workers have their unions, especially in larger metropolitan areas, as do water works employees.

A number of these public service worker unions are associated together, at the national and state levels, in the Coalition of American Public Employees. In addition, in some states many public employees belong to employee associations not associated with the AFL-CIO but with many of the functions of labor unions. As time moves on, these -- like the education associations -- may virtually become labor unions. Even police officer associations are becoming more and more vocal in their demands and acting more and more like labor unions.

At the local level, most organization has taken place among city rather than county workers. Of the municipalities with ten thousand or more people, about two-thirds of the employees are represented by unions. As might be expected, the large cities in the highly organized Northeast are the most heavily organized. But the greatest rates of growth are in the smaller cities and in the South. Only about half of the counties have some unionization among their employees. This is to be expected because of the less concentrated nature of county employees.

Just as the federal government has responded through executive orders to the demands of workers for collective bargaining, state governments, with less alacrity, have likewise responded, but their response is through legislation. As of 1972, only seventeen states had enacted comprehensive laws governing in some way the organization of state and local employees. In eleven states, public employers were actually required to bargain collectively with their workers, while in two others, they are given permission to do so.

In four states, public jurisdictions are required to at least meet and confer with duly assigned representatives of their workers. Workers especially designated for collective bargaining by state law are: firemen, teachers, police officers, hospital workers, transportation workers, university employees, public utility workers, and nurses. Only four states legally permitted strikes, and only for selected groups and only after full effort had been made to resolve the dispute.

So many employees at the state and local level have become unionized that they, too, are beginning to exercise the right to strike. In the constitutions of most unions and associations dealing exclusively with government employees, this right was originally denied. But these provisions are being removed from the constitutions, and while state laws still generally do not recognize the right to strike, increasingly state and local government workers perceive it as their constitutional right as citizens, maintaining that they do not give up the rights of citizenship just because they work for a government agency. And the interesting thing is that generally speaking when they defy the law, going on strike, they essentially get away with it. Especially is this true when large numbers of worker-strikers are involved in an essential service.

While in 1958 there were only fifteen work stoppages of public employees, involving 1,720 workers in a loss of 7,510 man-days, in 1968 there were 251 work stoppages involving state and local government workers in a loss of two and a half million man-days. The

biggest strike in the history of the nursing profession, in San Francisco in 1974, ended successfully for them. Teachers now strike so frequently that it is no longer novel.

It would appear that the historical position in the United States, differing from that of many other advanced nations including Canada, which says that government workers have no right to strike is no longer viable. The old reliance of government officials on the unavailability of the strike weapon to their workers no longer has credence. Unless this trend is reversed, they will have to recognize the strike as the ultimate weapon of public employees. This development will materially weaken the officials' bargaining power in dealing with their employees.

Another distinction between the collective bargaining of the private sector and that of much of the public sector has been the idea that while workers may organize they cannot bargain with management over wages. This concept is based upon the presumption that management itself has no power over its budget and therefore none over wages, that power remaining with the electorate and its elected representatives who control the purse strings. How long this resistance to wage negotiating will hold out against continued demands of workers is not obvious. Increasingly, public workers seem to be defying this taboo, and in many cases they are successful.

While it may be true that public administrators do not ultimately control the purse strings, the workers realize that there is usually some budgetary flexibility and that "Peter can be robbed to pay Paul." They also know that public administrators make up the

budgets that are presented to legislative bodies and that if worker pressure on wages is strong enough, administrators will adjust their budget requests, even to the point of making supplementary requisitions to diminish conflict and the threat of work stoppages.

Stenberg of the Advisory Committee on Intergovernmental Relations has summarized the forces¹ moving state and local workers into greater militancy:

1. The inability of individual workers to be heard in a large bureaucracy
2. Growing sentiment among lower level government workers that concerted action is necessary to achieve results
3. Greater application of effective private sector collective bargaining techniques
4. Awareness of union leaders that the public service is a relatively untapped source for organizing success
5. Availability of financial resources and expertise of national unions
6. Aggressiveness of public employee unions, including conservative associations to become more militant
7. Spillover effect of federal executive orders
8. The resistance of many public officials

To this list might be added continued inflation which has severely undercut the purchasing power of the already relatively low pay of many state and local government employees.

¹Carl W. Stenberg, "Labor Management Relations in State and Local Government," Public Administration Review (March/April 1972).

A MODEL PUBLIC SECTOR BILL

The Advisory Commission on Intergovernmental Relations in 1969 recommended a model bill covering labor-management relations at the state and local levels. This bill would provide that management officials be required to "meet and confer in good faith" with representatives of the workers. It also provided for:

1. Authorization for workers to form, join, and participate in union activity, as well as to refrain from such activity
2. Permission for supervisors to form their own associations but without the recognition privileges provided for workers
3. Establishment of a public employee relations agency with the responsibility of determining among other things the bargaining unit, recognition of a union, dispute settlement, prohibition of strikes, designation of management rights, determination of unfair practices, writing of memoranda of agreement on issues permitted by law, fixing standards of conduct

Both the American Federation of State, County, and Municipal Employees and the National Education Association opposed this proposed bill, calling for a stronger law to mandate collective bargaining for public workers at all levels, with a national commission to determine questions of representation and to handle disputes. The commission would provide for mediation and fact finding by an independent agency, as well as written agreement of terms and conditions of work. It would also reduce, although in differing ways, the restrictions against strikes and provide for exclusive bargaining by the recognized union.

The Collective Bargaining Process

The first step in the collective bargaining process is the determination of the collective bargaining unit -- the unit in which an election will be held to determine whether the workers want a union and if so, which one will represent them. In the private sector, where the National Labor Relations Board is involved, it makes the initial determination; although once it is made, the negotiating parties make the decision, expanding or contracting the unit by collective bargaining. In the federal establishment, the Assistant Secretary of Labor for Labor Management Relations now makes the determination. The size and composition of the unit can have a material effect on the outcome of any representation election. At the state and local levels, there is generally no orderly way of making this determination; it has been the relative bargaining power of the parties that makes the determination.

Once the bargaining unit is determined, some means must exist for determining the will of the majority as to which, if any, union will represent them. Unions have often insisted that the collection of membership or signature cards of employees should be used to make the determination. However, workers frequently can be "coerced" or manipulated into signing a card, the significance of which they do not really understand or with which they actually disagree, but because of social pressure will sign. Under such conditions the card does not truly represent their will. If the employer is given the signature cards or petition, there is the possibility that he or she may use them for the purpose of retaliation against the

"rebels." An employer who may oppose unions cannot be depended on to make the determination. A public showing of hands suffers from the same problems. The more sure way for the will of the majority to be determined, if that be the goal, is a "secret ballot" election conducted by a disinterested party or body.

If the majority decides against the union, the question may not be finally resolved, for the union or the workers desiring a union may continue agitation, exploiting every possible situation for the purpose of strengthening the hand of the union in the next election. If the union wins the election, it must negotiate a contract. While the law may permit or require collective bargaining, it does not dictate the terms of the agreement. It only sets the stage for the representatives of the workers and management to negotiate.

If true collective bargaining takes place, each of the constituencies -- the workers and the management -- make up their shopping list of "demands." This term is frequently misunderstood. There are those who look upon the setting forth of "demands" as an attempt to dictate terms of agreement. Dictation only occurs when one party or the other has the overwhelming power. Within the context of collective bargaining the "demands" only constitute the initial position of the respective parties. The list is usually, although not necessarily, only the "asking" price. That is, the party recognizes that it will undoubtedly have to "trade off" some of its demands to reach settlement.

The union list of demands is usually very long, as it is often the result of attempts to placate the disparate elements within the union. Few people outside the union realize the internal conflicts that exist over what the union demands should be. The union is a primary political mechanism for resolving these conflicts before they go public in negotiations with managements. However, frequently conflicts are unresolvable within the union, and the decision is made to let collective bargaining "wash out" the list. Demands may also be used as ploys or purposely included to be bargained away in pursuit of some special demand.

Historically, management has let the union be the aggressor in making demands, with management essentially insisting only on a no-strike clause but maintaining the position that any legal management rights not negotiated away will remain with the employer. This is a generally accepted position. However, management may find it to its advantage to make demands of unions beyond a "no-strike" provision or even a management prerogative clause. Management by having its own "shopping list" of demands will have something to bargain with, giving it greater bargaining flexibility. An increasingly frequent management demand is one relating to increased productivity and related decreased costs.

Each management and each union will develop its own approach to bargaining. In some cases, the parties are "locals." In other cases, the union may involve regional or national union leaders who participate either actively or in an advisory capacity. The same holds true for the management side. Each collective bargaining

relationship will develop its own personality, depending upon the style and personalities of the parties involved as well as the issues that are raised, and such extrinsic factors as the political, social, and economic climates within which the bargaining sessions are conducted. Whether or not there is a taxpayer's rebellion is an important factor in determining the character of negotiating sessions.

Another important element in determining the nature of the negotiating sessions is the attitude of the parties toward each other. For example, if the union representatives "feel" that management does not look upon them as equals in the bargaining process, they may become aggressive and even belligerent in proving that they are equals. The same may be true if the management officials "feel" that union leaders are attempting to completely undermine their authority for managing the operation. Mutual acceptance of the "rights" of the parties can help smooth collective bargaining sessions.

Another important factor affecting the outcome of collective bargaining is the presence or absence of negotiating experience on the part of the collective bargaining representatives. Inexperienced, unwary, and unknowledgeable persons may get themselves into a "box" from which it is difficult to extricate themselves. This deficiency is a special problem in the public sector where there is a shortage of collective bargaining experience.

The Resolution of Conflict

Mutual acceptance does not guarantee agreement. Agreement may not be possible under the restrictions placed on the negotiators. When this happens the negotiators can go back to their principals and either request greater flexibility or a new position, or an impasse results. When parties cannot agree, there must be some means of resolution. While federal and most state laws outlaw strikes, as already shown, public workers are increasingly resorting to the use of this weapon. To avoid strikes requires more than a law outlawing them. There must be some viable alternative. There is some feeling that strikes are becoming more prevalent because of the absence in most jurisdictions of a rational means of resolving conflict short of confrontation.

There are three generally accepted aids for resolving conflicts short of a work stoppage or punishing strikers or their leaders, which action may only exacerbate the problems. These three aids are:

1. Mediation -- If mediation is used, a mutually respected, experienced, impartial third party is brought in to assist, not to dictate terms. The mediator can frequently help interpret the positions of the parties. He or she may be able to help in keeping tempers under control. Suggestions may be made. There are no fine rules for successful mediation -- except impartiality, tact, and nondecision making by the mediator. It is an art requiring great skill and experience and is mostly used in negotiating contracts.

2. Fact finding -- If fact finding is to be successful, the fact finders, at least as a body, must be impartial. Otherwise they will only augment the problems. If partial to one side or the other, their "facts" will carry little weight to the aggrieved party. A fact finding body may be used to make its findings known to a legislative body or higher authorities. Or the body may be required to make its findings known only to disputing parties. The greatest effectiveness probably comes in making its findings public. Although some may disagree, both management and unions must take into consideration public opinion. Without popular support, neither party can long survive. A "public be damned" philosophy will not work for long in this day and age.
3. Arbitration -- In arbitration a third party is brought in for the purpose of determining the facts and then rendering a binding decision. In the private sector this is true. In the case of the federal government, an arbitrator's decision can be overturned by higher government authority, arbitration awards only being advisory, although as a matter of practice probably few are so limited. It is probably true because most arbitration is over the interpretation and administration of a contract already negotiated and agreed to. The arbitrator is therefore not going to be "ploughing a lot of new ground" or placing heavy unanticipated burdens on the public purse.

Arbitration may be either voluntary or compulsory. If voluntary, the parties agree on both the arbitrator and the issues. They agree to accept the decision of the arbitrator except as subject to the review already discussed. The parties may not be happy with the decision but they generally learn to live with it. When one or the other of the parties has pushed a question to arbitration only because it couldn't solve an internal problem, the arbitrator can serve as a "whipping boy" blamed for a "stupid" decision about which nothing can be done.

Compulsory arbitration is being increasingly promoted for use in the case of essential services, including those of government. If the effects of a work stoppage would endanger public health or safety, it may be the most effective technique for minimizing problems. However, it is no panacea, for it raises the same questions as the use of the strike because ultimately the strike is the question. While public management is not politically free to cut off essential services through a lockout, workers cannot be stopped from striking. They may be punished for striking or encouraging a strike, but they cannot be coerced into working. It may be possible to coerce them into showing up for work -- although even that is becoming increasingly difficult -- but if the provocation is great enough, they can find ways to "sabotage" the job, increasing costs more than a settlement.

Where services are nonessential, some maintain it may be well to allow a strike to take place because strikes are not costless to either party, even in the public sector. Certainly it costs the workers, who are going without pay. The longer its duration, the greater the pressure for settlement from wives, children, the public, and creditors. Public officials, too, are put under some pressure -- although not so much as where there are essential services. Political pressures build up for settlement. However, in an age of "taxpayer rebellions," the public may well be willing to resist "excessive" demands by unions in order to "teach workers a lesson."

In a summary of his suggestions for the resolution of conflict in collective bargaining in the public sector, Van Asselt,² of the New England Municipal Center, concludes that:

1. Direct bilateral negotiations without third-party intervention is the most desirable form of resolving employer-employee differences
2. Meaningful collective bargaining in the public sector can occur without the right to strike
3. Mediation and fact-finding hold promise as impasse solution techniques for public sector disputes
4. Compulsory arbitration is receiving a serious trial, and an objective evaluation of the experience with it is essential in the effort to avoid strikes

If compulsory arbitration is to be effective, the two parties must have the mutual right to select the arbitrators.

²Karl A. Van Asselt, "Impasse Resolution," Public Administration Review (March/April 1972).

UNION SECURITY AND UNION DUES

One of the more significant areas of conflict, at least potential conflict, between public administrators and labor unions is over the questions of union security. Historically, the security of labor unions in the United States has been so tenuous, due largely to employer resistance, that unions have felt the need to demand contract provisions requiring some form of union security. There are several kinds of union security which have been negotiated over the years:

1. Closed shops -- The most restrictive form of union security, the closed shop agreement requires that all employees join the union before employment. Outlawed by the Taft-Hartley Act and most state laws, where the employers find it to their advantage such arrangements nevertheless persist. Right to work states also outlaw such arrangements, probably more effectively because of the anti-union tenor of these states.
2. Union shops -- Legalized by the Taft-Hartley Act, this union security provision gives freedom in hiring by the employer but requires new employees to join within a given period of time. Those states with right to work laws generally also outlaw this form of union security.
3. Maintainence of membership -- Also legal under Taft-Hartley but outlawed in most right to work states, under this the least restrictive union security provision employers may hire whom they wish, with no requirement for joining the

union either before or after employment. However, to provide some security to the union, should an employee join the union, he or she may be required to maintain union membership in good standing for the duration of the contract, at which time there may be an exit. Developed in the United States during World War II as a compromise form of union security, this arrangement has proved relatively unstable in tenure. It, too, is outlawed in right to work states.

4. Agency shop -- An agency shop is one in which there is no requirement to join the recognized union but employees are required to pay a regular fee to the union for the collective bargaining services received, usually equivalent to the union dues. This form of union security is legal under the Taft-Hartley Act, yet illegal under most state right to work legislation.
5. Open shop -- The open shop provides for no negotiated union security, the only security being what the union can obtain through its continued organizing activity. In theory, the employee is free either to join or not to join, to remain or not to remain in the union. However, where an employer is dedicated to the elimination of the union, the power usually exists to do so under this arrangement.
6. Dues check-off -- Associated with the question of union security is the union dues check-off. Compulsory check-offs are outlawed by national law, but "voluntary" check-offs, in

which employees under varying degrees of "voluntariness" sign a card authorizing the employer to deduct dues from paychecks and forward the money to the union, are allowed. This greatly enhances the dues collection records and strengthens the unions.

Generally speaking, government agencies have not had to struggle too hard with this issue. It would seem that because of its nature, once government makes the decision to recognize unions and engage in collective bargaining, the former have little to fear by way of either overt or covert action to weaken and destroy them. Especially is this true if there is a "watchdog" agency to guarantee worker rights.

The principal remaining argument from the union point of view for union security is the "free rider" one. Under the national labor law, when a union obtains recognition as the exclusive bargaining agent for the employees in a given jurisdiction, it must represent all workers in that jurisdiction, whether they are union members or not. All benefits won by the union must be extended to all employees, and in grievance disputes the union must represent equally nonunion as well as union members. The unions usually maintain that all persons in the bargaining unit should at least pay "their fair share" of the cost of maintaining the union which represents them.

Unfortunately for the resolution of the problem, two moralities are in conflict. From the union point of view, it is immoral for one to receive services for which he or she has not paid a fair share. From the anti-unionist point of view, it is immoral to require a person to join an organization he or she may in principle oppose,

and it is likewise immoral to require payment for private services he or she may not want or need. The most popular union answer to these two objectives is that the agency shop does not require membership. In fact this form of security frequently exists where there are substantial numbers of persons whose religion prohibits them from becoming members of any organization outside their church, including unions. And to the latter argument, the union reply is that when it is recognized as the bargaining agent for a group of workers, it essentially becomes a quasi-government and should have the limited power to tax by way of dues or fees.

Unfortunately there is no easy answer to this dilemma. One can argue that the government cannot require membership in a fraternal, religious, or political group and therefore should not require membership in a labor union. However, required membership in an economic group is not uncommon -- doctors and lawyers may be required to belong to professional organizations, as might architects, nurses, and engineers. The answer might be that these are professional organizations. Certainly with the resort to collective bargaining by such professional organizations as the National Education Association, the American Association of University Professors, and nurses' associations, the distinction between professional organizations and labor unions has become blurred. Then, too, unions are no longer primarily fraternal or political but essentially are economic institutions as well.

The Effect of Unionization on Micromanpower Planning

The steadily increasing unionization of public service workers will increasingly affect the efforts of the micromanpower planner in

the public sector. Another power source in addition to line management must be taken into consideration as plans are made to recruit, train, transfer, and sever employees.

Consideration of Worker Wishes

The wishes of workers, as formally expressed through union or employee association representatives, must be given serious consideration. In fact, even in the absence of formal organizations, the possibility of such must be taken into account in all that manpower planners do. This consideration can take two basically different forms. The first would maintain the power to initiate policy in the hands of management, with worker representatives maintaining the right to challenge. The second would establish the right of workers to be consulted through their representatives in the formulation and implementation of policy. The first form maintains the initiative with management and if effectively done could ease and shorten the planning process. The success depends on how well planners can gauge worker and union leader reaction. Excessive challenging of management initiatives could cause a breakdown in the system, resulting in greater delays in implementing policy changes than if in the short run the more time-consuming consultation with worker representatives is used. Which form of consideration the management will opt for should be the subject of intense internal consideration. It is to be expected that most worker organizations will likely demand consultation although there may be exceptions, and in the initial stages of unionization, with inexperienced worker negotiators, it may not even be a consideration. Management may opt for the first but be willing to negotiate over the second.

Unionization is neither an unmixed blessing nor an unmitigated curse. For example, those manpower planners whose agencies are involved in developing or extending certification as a means of improving the quality of service will probably find a useful ally in labor unions, although union leaders may insist on participation in such programs. Most craft-type unions have insisted on maintaining high qualifications for membership. This dignifies the occupation. It also restricts the supply of workers, making possible higher wage demands. It may also make possible increased productivity which will give management the wherewithal to grant increased wages without increased per unit costs.

The Seniority Issue

On the other side of the coin, where unions exist, the freedom of management to transfer, promote, and lay off or dismiss workers is usually limited. Manpower planners would usually prefer to base such personnel actions on merit. While line management might as a stated policy agree, they usually demand the unilateral power to make the decisions as to merit. This has frequently meant favoritism in personnel action, something workers and their unions, as well as civil service regulations, have historically been opposed to. The union answer to this problem in most industrial-type situations has been seniority. That is, where the workers are attached to a given employer for most of their worklife, personal security becomes extremely important. Promotions, layoffs, and transfers, if made on the basis of seniority, enhances that security. It usually takes

the form of allowing the senior worker to bid first on a transfer or promotion possibility. If found qualified, he or she would get the bid on job. Layoffs, because of a force reduction, distinguished from a dismissal for cause, would be on the basis the junior worker, or last one hired, being laid off first, with rehiring being in reverse order, the senior men being rehired first.

The union would retain the right to challenge any management action which would be in defiance of this principle. In some contracts, super seniority is provided certain key workers who are essential to production and for whom there is likely no substitute available. In return for such management-requested super seniority, the union usually insists on similar status for key union officers. Where seniority systems are in place, the greatest difficulty is in the subjective decision as to qualification. In practice there are varying degrees of participation of union representatives in making that judgment. In most cases, management would maintain the right to make a unilateral decision, with the union maintaining the right to challenge the judgment through the grievance procedure which would obviate work stoppages over such questions.

Where a seniority system is put into place, it probably becomes especially important to develop rationalized paths to promotion and lifetime careers -- namely career ladders. Without rational, carefully conceived career ladders with wide worker acceptance and preparation, productivity can be negatively affected by seniority promotions. If logically consistent career ladders are developed and accepted, and if senior workers are prepared for the next step

up, or a lateral transfer, the ends of both efficient management and worker satisfaction can probably be maintained. Union representatives, if close to workers, can be useful barometers of worker feelings. The participation of such leaders in the development of career ladders can therefore assist in obtaining worker acceptance. On the other hand, if career ladders are developed in defiance of worker wishes, they may well be a source of continuous conflict.

Career ladders based on seniority can also provide a rational basis for layoffs in reduction of the work force. Each position in the ladder has someone above it who has served in that capacity and knows the job. Therefore that person is prepared, with minimum reorientation, to step down and fill the lower level job, minimizing the negative effect on productivity.

The principle of seniority in layoffs, while widely accepted, is being seriously questioned, especially during periods of widespread production cutbacks found in business recessions. Because of efforts to overcome past practices of racial and sex discrimination, the junior employees are disproportionately female and racial minorities. Therefore in layoff periods, those laid off are disproportionately members of the groups previously discriminated against. Therefore layoff by seniority results in de facto discrimination -- even though unintended. Increasingly these injured groups are challenging in the courts the practice of layoff by seniority. Where seniority is departmental, rather than plantwide or companywide, they are increasingly successful in these challenges.

Frequently the company and the union will sign a consent decree in which they agree to change the seniority system to a plant-wide or companywide basis -- without going through the usual procedure of democratic determination of contract demands. The result is internal union strife as workers, protected under departmental seniority, lose that protection to workers from outside the department or plant. Where career ladders are based on promotion within a department, they will probably be seriously affected by this new type of challenge. Certainly it is a question manpower planners must take into consideration.

The principle of departmental seniority is also being challenged as the basis for promotion. Many unions have sought to put seniority on a plantwide or companywide basis, with management usually preferring to keep it on a departmental basis because of the greater efficiency involved. Departmental seniority has frequently resulted in discrimination in the past when certain groups of workers were relegated to certain departments or career ladders with limited opportunities for advancement. By having seniority on a plantwide basis, workers can more easily shift from dead end or undesirable areas into areas of greater opportunity.

The shift from departmental to plantwide or companywide seniority makes the development of career ladders much more complicated where seniority is used. Promotion on the basis of merit, if true merit, may be the means of resolving some of these problems. There will be two problems: one is convincing workers and their union leaders that true merit is actually being used; the other will be that certain racial groups have still not achieved de facto equality of education

and training opportunities and may still maintain that they are discriminated against in a promotion system based on merit.

Other Issues

While consultation and seniority may be important issues, union concerns do not end there. Space will not allow an extensive treatment of these issues, but manpower planners must be aware that workers are beginning to insist on the right to be heard on those issues which affect their well-being. Some of the more important of these issues afflicting manpower planning are:

1. Wages -- Workers insist that the level of wages and the nature of the wage system itself are negotiable. Public administrators as well as the law historically maintained that wages of public workers were not negotiable. The theory was that budgets were the domain of legislative bodies not administrative officers. However, this theory is collapsing under the onslaught of militant public workers. With this interest, union leaders may be allies in appeals to legislative bodies on budgetary problems.
2. Safety -- Workers are insisting on safe working conditions. The old philosophy that workers accepted the dangers of a job when they hired in is falling by the wayside. Workers are being aided by such federal legislation as the Occupational Safety and Health Act and the federal agency charged with its enforcement. They often also insist on contractual provisions covering the subject. Challenges to safety

conditions can be handled through the grievance procedure. Management will usually find an ally in labor leaders in insisting on observance of safety regulations.

3. Grievance procedures -- As a quid pro quo for giving up the right to strike during the lifetime of a contract, unionized workers generally insist on a formal grievance procedure providing them with an effective and protected form in which to have their complaints heard dispassionately by representatives of the management and the union, with arbitration as the usual last step. Where such a procedure is in place, personnel actions will be subject to intense scrutiny by both management and union officials and must therefore be supportable by recorded facts and data, requiring a reporting and recording system. Such procedures are invaluable aids in the identification of manpower problems and the maintenance of consistent personnel practices by line management.
4. Increased productivity -- While unions are frequently looked upon as having negative effects on productivity, this is not necessarily true. Union leaders can be used as allies in increasing productivity if they are assured that workers will receive their "fair share" and will not be hurt by such increases. Most union leaders will recognize that increased productivity, while at the same time protecting workers, will reward them for their cooperation in putting such improvements into place.

5. Respect workers and their representatives -- Workers and their representatives have come to demand respect -- if not voluntarily by management, then by the pressure of economic sanctions and demonstrated competence in negotiation. Lack of evident respect can frequently result in increased and nonproductive strife.

PART II

A MANPOWER PLANNING SYSTEM

"I do not think planning is an easy and simple matter. Planning is possibly one of the most ambitious things society can undertake . . . one cannot expect instant success."

-- Wasily Leontieff
"Challenge," 1974

PLANNING: A REVIEW OF THE THEORY

In this chapter we review some of the principles of "planning." Our review is based upon material gathered from the literature dealing with national economic planning, city planning, and corporate financial and marketing planning. From the experiences in these different areas some observers have attempted to fashion a theory of planning. This is to be distinguished from theory in planning. The theory of planning deals with processes associated with the form of planning, while theory in planning deals with the construction of principles upon which the content of a plan is based. The theory of planning is thus concerned with such matters as to what the objectives of a plan may be and how they are to be ranked, while theory in planning is concerned with the manner in which a particular objective can be achieved. It would be an egregious error, however, to completely separate the domain of the theory of and the theory in planning. The boundaries between them are often fuzzy. We shall make no consistent attempt to keep them separate.

The premise on which this chapter is based is that manpower planning may be considered as a specific application of planning theory to manpower issues. We would feel much more assured of this assertion if planning theory were well developed. It is not. There seems to be no acceptable body of planning theory. There are no laws or universally accepted principles of planning. For this reason our task will be more difficult and our results less satisfying. Some commonalities in the approach of different theories of planning do exist,

and it is such commonalities that give value to the type of review and applications we make in this and subsequent chapters.

WHAT IS PLANNING?

The word "planning" conjures up a variety of impressions -- to some it implies socialism and the demise of free enterprise, to others a comprehensive or master plan used by local governments in determining land use, and to others the financial planning of corporations. Whatever the impression, the commonality of these impressions is related to the art (or science) or framework for making decisions. (By decision, we simply mean the selection among several alternatives that must precede any action.) Furthermore, planning, we feel, is somehow related to the future. At one level of abstraction the expression "plan for the future" is redundant since planning implies futurity -- we do not plan for the past and we cannot plan and execute the details of a plan for the present. To plan always implies futurity.

To plan implies the necessity of choosing, and choosing requires the existence of alternatives. If a situation occurred that allowed for no alternative courses of action or reaction in consequence of it, there would be no basis for choice in response to it. Planning would be superfluous and that which passed for planning would be an illusion.

Alternative Definitions of "Planning"

Davidoff and Reiner (1962) define planning as a "process for determining appropriate future action through a sequence of choices." The word "determining" is used in two senses: "finding out" and

"assuring." Thus planning includes aspects of obtaining information and controlling certain processes. Planning also involves, in this view, the establishing of appropriate ends, goals, or objectives. The use of the word "appropriate" implies that some criteria for judging among alternative actions must be incorporated within the planning process. Heindensfield (1969), has succinctly termed planning as "a blueprint of activity," while Faludi (1973), borrowing from the literature on systems analysis, defines planning as "the application of scientific method -- however crude -- to policy making." For Faludi a planning agency involves advisers who supply "scientific intelligence" and decision makers who act on the basis of the information. Faludi seems to say that the total activities of "planning" are separated into the activities performed by two distinct groups -- the advisers who supply information and the decision makers who act upon the information.

A slight variation of the preceding analysis is given by Banfield (1959) when he says "Planning is a process by which (the planner) selects a course of action [a set of means] for the attainment of his ends." It is good planning if these means are likely to attain the ends or maximize the chances of their attainment. It is by the process "of rational choice that the best adaptation of means to ends is likely to be achieved." We quote from Banfield's definition primarily because he specifically introduces the terms "ends" and "means" and "rational choice." We shall consider these terms in more depth because of the frequency of their occurrence in the planning literature.

Planning: Ends and Means

Planning is the preparation of action directed toward the attainment of a given end or ends. Examples of some typical ends that are stated in terms of calls to action or commands are "maximize profits," "increase general welfare," "increase highway safety," or "improve efficiency of wastewater treatment plants." Such ends are often vague and nonoperational. What action is required to achieve them is not obvious or self-evident. This may be corrected by making the statement on ends a more direct guide to action by delineating a series of activities that must be undertaken in order that the end be achieved. Thus to increase highway safety, for example, excessive speeds might be eliminated, and to eliminate excessive speeds, it might be determined that more traffic officers are required in some known or determinable numbers. This procedure results in a series, or hierarchy, of ends and means. Alternatively, an "ultimate" objective of the planning unit is achieved by introducing subobjectives, each of which is achieved in a given step of the planning process. Each step is used as an end in itself, and is considered as a means in achieving some higher or more ultimate goal.

Multiple ends or objectives are to be distinguished from hierarchical ends. Multiple ends are normally to be achieved simultaneously, and although they need not have equal weight, they will be at the same level in a given hierarchy. Multiple ends may be consistent or inconsistent with each other. The multiple ends of having more economic growth and more income equality, for example, are considered to be inconsistent by some because many policies adopted to

promote income equality have detrimental effects upon economic growth. Highway safety and increased speed or decreased travel time is another example of possibly inconsistent ends. An example of possibly consistent ends would be increased economic growth and the reduction of unemployment or decrease in vacancy rate and fewer turnovers. Even when multiple ends are consistent, certain policies may serve one end more efficiently than another.

Whenever multiple ends exist some trade-off among them and among the means for achieving them will exist. How such trade-offs are to be evaluated is not entirely a technical matter but contains elements of value judgments as reflected in the preferences of those for whom the planning is being done. For these reasons it is necessary to distinguish between fact and value in decision making -- between positive and normative statements. A factual or positive statement is a statement about the observable world. A factual statement can, in principle, be tested to determine its validity. Such statements describe "what is." A normative statement is a statement about "what ought to be." It is a statement which includes an ethical or value judgment concerning a desirable state of affairs. The ends or objectives of planning are often determined on the basis of normative principles, although they may be tempered by positive principles. That is, what should be achieved should be influenced by what can be achieved.

Planning and Rational Choice

A rational decision is said to have been made when the decision maker lists all of the opportunities for action open to him or her,

identifies all of the consequences of each possible action, and selects the action which would be followed by the preferred set of consequences. Simon (1955) argues that most models of rational behavior require some or all of the following elements: (1) a set of behavior alternatives, (2) a set of consequences, and (3) information concerning the probability that certain of the consequences will occur. These elements of rational choice may be more succinctly expressed as the efficient (i.e., the attainment of maximum values with limited means [Simon, 1957]) attainment of given ends or, as Dahl and Linblom (1953) have said "an action is rational to the extent that it is 'correctly' designed to maximize goal achievement, given the goal in question and the real world as it exists."

We would wish only to adjust the preceding definitions by explicitly acknowledging the role of information in rational action and decision making and the need to define efficiency in more detail. By efficient, we mean maximizing objectives (or benefits therefrom) attainable with a given cost (effort) or achieving given objectives at minimum cost or effort. An action is rational, therefore, if it leads to an efficient method for achieving certain ends, given the information available. Obtaining information is not costless, and as we shall see, it will often be "rational" to make decisions on what is acknowledged to be incomplete information because the costs of obtaining more information are not thought to be equal to the expected benefits of obtaining it.

For someone "to plan rationally" or "to make a rational plan" implies the making of efficient choices in seeking given ends.

Alternatively, the statements could be defined as the use of the most efficient "means" in attaining given "ends." Insofar as efficiency is measurable, one plan may be "more rational" than another if it were more efficient. To be more efficient may mean attaining the stated ends with the use of fewer resources, including time, or achieving more ends with a given allocation of resources. Finally, an efficient or rational plan is one where the benefits of the plan are greater than the costs.

Subsumed within these notions of "rational planning" is a framework based upon the notion of a preference or objective function. Obtaining the greatest value (i.e., optimizing) for this objective function is the principal end of all planning efforts. The existence of a preference or objective function acknowledges that the planning agent, whether it be an individual or an organization, has preferences which act as stimulants to behavior. Furthermore, it is assumed that the planning agent is able to order these preferences and state that he or she prefers one set of objectives to another. The domain over which these preferences may be exercised will in general be constrained or limited by technological, economic, and institutional considerations.

The rote application of the principles of rational choice, as reviewed above, would place great demands upon the planning agent's ability to obtain, digest, and use information. The planner, in this view, must ascertain all possible alternatives and their consequences, rank them according to some preference structure, and choose the most appropriate combination suggested by this structure and allowed by the relevant constraints. The impracticality of executing such

computations under many circumstances has led to some adjustments in the notion of rationality in decision making. One important adjustment has been the replacement of the concept of "optimizing" with what has been called "satisficing" (although some individuals argue that no such replacement was necessary). "Optimization" was taken to imply a complete search over all alternatives and their consequences while "satisficing" implies that the search continues until some predetermined value or condition is attained.¹

Satisficing may also be related to the predetermination of acceptable conditions in a slightly different manner. Within an organization a subdivision may be given a restricted set of preferences and alternatives that allows the planner a limited range over which his or her search procedures are to be conducted. These restricted preference sets may have been the result of either optimizing or satisficing at some higher level in the organization. The subdivision planner may be expected to optimize or satisfice depending upon the expected range of alternatives and the available resources. The impact of the satisficing concept is that it attempts to take direct account of the limited resources available to the planner, and also the limited ability of human agents to engage in certain types of exhaustive search and decision-making processes.

Reasons for Planning

The objections to planning, alluded to at the beginning of this chapter, most often occur when planning is undertaken by political bodies. Summarizing alternative reactions to "planning," Galloway (1941) has written:

¹See Appendix A.

The word "planning" has been widely and loosely used. It has meant different things to different people. To crusaders it has been a Holy Grail leading to the sunlit hills of a better day. To conservatives it has been a red flag of regimentation heralding the dawn of collectivism and the twilight of the old order of free private enterprise and the democratic way of life. But to the humble practitioners of the art, viewing the matter with the cold eye of engineering rationality and a matter-of-fact indifference either to crusades, Red hunts, the class struggle, or the omnipotent state, it has been merely a process of coordination, a technique of adapting means to ends, a method of bridging the gap between fact-finding and policy-making. Planning is the opposite of improvising. In simple terms it is organized foresight plus corrective hindsight.

Few individuals deny the need for some government planning. They differ about the degree of planning and about the areas over which planning is to be exercised. Many objections to planning occur because "planning" is identified with "control" in the sense of a loss of freedom. Although certain definitions of planning exclude control, others assume that the power to implement the plan (i.e., to have control) is an integral part of the planning process. Our position is that a plan does not have to include control to be a good plan -- although knowledge of its efficacy does require its implementation! However, a plan that is not acted upon may, through the interpretation of subsequent events, be judged a possibly superior plan to the one enacted. Such a view of planning accepts Faludi's dichotomy between adviser and decision maker. There is also a suggestion in this that the power to implement does not reside with the planner. A possibly more appropriate term for what the "planner" does is the development of an "information system." We shall say more on this subject subsequently.

The most common arguments used in favor of national economic or social planning are: (1) the presumed undesirable consequences of a free market system, and (2) the increased interdependence of modern society. It is important to emphasize, however, that in economic affairs the existence of a well-functioning market system does not imply the absence of planning. It is usually taken to mean the absence of "significant" or overall government planning -- "significant" being a subjective and relative term. Government planning and interference in the market mechanism are advocated by individuals who see shortcomings in the market-determined allocations of economic rewards. Such shortcomings may be reflected in the presence of monopolies, existing distribution of money incomes, distribution of pollution damages, levels of and distribution of unemployment, or availability of educational opportunities.

The second major reason offered for planning, the increased interdependency of modern society, is a phenomenon that has occurred most rapidly during the last several decades. In the nineteenth century people were more (economically) self-sufficient and isolated, and events occurring in one part of the economy did not have serious repercussions elsewhere. As society became more industrialized and as specialization of economic functions occurred, activity in one part of the economy had repercussions throughout all of the economy. Under such conditions, it has been argued, equity and efficiency demand that planning and control in some degree greater than existed in preindustrial societies is required. Planning in this context usually takes the form of monetary and fiscal policy aimed at

mitigating the effects of inflation, recession, and unemployment. It may also contain more detailed planning to meet capital and manpower needs.

We shall not discuss further the pros and cons of planning other than to offer a brief statement of our own position on the matter. Our position is a moderate one: Planning is both useful and necessary, but it should be conducted with full awareness of certain forces at work in society. Planning should work with and take into consideration those characteristics of the economic and political systems in which the planning occurs.

TYPES OF PLANNING

Planning may be classified in many ways; we shall consider but a few of them. At the most elementary level we might classify planning as formal or informal. If planning is "organized reactions to expected future events," everyone engages in some form of planning. Formal planning is that planning which is purposely engaged in when certain actions are coordinated toward the attaining of a given set of objectives. Informal planning is planning that occurs in reaction to stimulus and no attempt is made to set up an internally consistent program for action. This dichotomy might also be classified as planned decision making (i.e., formal planning) vs opportunistic decision making (i.e., informal planning).

Planning may be classified as to its scope. Thus planning may be comprehensive or partial. Within a given organization a series of ultimate objectives may exist. That planning which attempts to set forth a course of action to achieve all of these objectives would be comprehensive planning, whereas planning designed only to achieve a

subset of these objectives would be partial planning. Such a dichotomy in planning might be useful within an organization that has several divisions, or could be so arranged into divisions. Each division would engage in planning (suboptimization or satisficing) relevant to its immediate objectives. This would be partial planning in the sense that the division management would not have to directly consider those ends for which other divisions are responsible. Overall planning functions in such an institution would establish comprehensive organizational objectives and attempt to orchestrate the various activities of each division.

Planning may be strategic or tactical. Strategic planning is the process through which an organization decides upon its objectives. Tactical planning is concerned about the steps necessary to achieve such objectives.

Planning may be educative or coercive. Educative planning concentrates on clarifying the fundamental issues confronting the organization and suggesting objectives and methods of achieving them, while coercive planning enforces a particular set of objectives and methods for achieving them. Educative planning may be characterized as planning without control; coercive planning is planning with control.

The planning process may be public or private. Private planning is not only by and for private individuals but also by and for private organizations such as corporations and trade associations. Public planning is planning by governmental bodies. The ends of private planning are generally more easily determined than those of public planning. Within the private sector the institution doing the planning is usually, although not always, a voluntary organization of individuals

gathered together for some common interest. Thus a corporation is organized to maximize profits by selling a particular product, while one such as the League of Women Voters is a nonprofit, voluntary entity organized to achieve greater and more informed voter participation in community affairs.

Planning and the Future

We have suggested previously that "to plan" implies some relationship between the present and the future. A classification of planning that emphasizes its time dimension is long-range and short-range planning. Such a classification deals with the length of time for which plans are made, although such definitions do not always specify the number of years that differentiate between long- and short-range planning horizons. Although designations of long-range planning as being five or ten years and short-range as being one or two years may be useful points of reference within an organization, they should not be binding concepts that put a constraint upon planning activity. The time span over which present decisions have effect upon future conditions varies according to the type of decisions and of course the nature of the organization doing the planning.

The differentiation between long- and short-range planning is more appropriately based upon such matters as the ability of the organization to adjust fully or partially to the implications of its present decisions. Long-range planning would then refer to those decisions that affect conditions at such time in the future that the organization can make all of the necessary adjustments to take advantage of the decisions, while short-range planning acknowledges that the time period is so short that certain characteristics of the

organization cannot be changed. Alternatively, we might view short-range planning as that planning which operates under more constraints than does long-range planning. With this notion gradations of time between short- and long-range planning can exist. Such gradations could be based upon the number of operative constraints upon the organization's behavior.

It is also important to emphasize a point made by Drucker (1973) that "long-range planning does not deal with future decisions; it deals with the futurity of present decisions." The question facing an organization is not so much what it should decide to do tomorrow, but rather what it should do today to: (1) affect certain things tomorrow, and (2) be prepared for the uncertainties of tomorrow. Planning thus involves asking the question of what futurity should be present in current activities in order to make good decisions today.

Since planning involves choice among several alternative courses of action to achieve some desired end, some "forecast" or estimate of future conditions and results is necessary. The planner must estimate or forecast the probable effect of implementing his or her plan. This effect will be determined in part by the future environment in which the implementation will be made. We therefore conclude that forecasting is essential, although we emphasize that estimates of future conditions are not held with certainty, but are probabilistic.

PLANNING PROCESS

The planning process is a continuous one. Present decisions should be made in a systematic fashion with as much knowledge of their futurity as resources permit, organizing systematically the efforts

to carry out these decisions, and measuring the results of these decisions against their expected results through organized and systematic feedback mechanisms. Such a scheme may be divided into a series of smaller processes. We cite some examples of these divisions.

Drucker, for example, divides the planning process into eight essential elements: there must be objectives -- an elusive and even metaphysical term but one that exists, whether implicitly or explicitly, in any decision-making process. There must be some assumptions about the environment in which decisions are to be made and effectuated. There must be expectations as to likely or attainable future conditions. There must be alternative courses of action, based in part upon different assumptions and expectations about the environment and future conditions. There must be decisions. There must be a structure of decisions, since there is not such a thing as an isolated decision but rather a chain of decision making. There must be an impact stage, since every decision must lead to action and this action will have impact upon the organization. There must be results which are the intended and unintended effects of the decisions.

Banfield's (1959) division of planning into several processes follows a slightly different route, although many similarities between his and Drucker's methods exist. Banfield divides his process into four areas: The planner must make an analysis of the situation by determining all alternative courses of action that would achieve desired ends, must reduce and elaborate the ends into operational terms and design courses of action to achieve the ends, and must evaluate and compare the consequences of alternative actions.

Planning and Information

In order to plan successfully, certain information is required. At a minimum, information on the appropriate ends of planning and alternative ways of achieving such ends is needed. This requirement in turn suggests that information must be obtained about the relationship among those variables within the planning environment that may contribute to the efficient achievement of stated ends. Thus it is necessary, for example, to know if a decrease in certain taxes will contribute to economic growth and income equality before taxes would be planned for in the achievement of growth and equality. (This is to imply that there must be some theory in planning.) In order to have such information, it must be possible to measure these relationships. Continuing with our example -- it would be necessary to measure the size of the tax change, the effects upon economic growth, and the effects upon income equality. All of this of course assumes that taxes, growth, and equality are definable and measurable terms. Finally, it should be noted that this information should be storable and retrievable if it is to be continuously used.

What we have in effect described in the previous paragraph are the rudiments of what is often called an information system -- a system that denotes those characteristics that are to be measured, measures them in some prescribed way, and has the capacity to store and retrieve the information.

Good planning incorporates facts and theories about the appropriate environment in which the planning operates. It is from knowledge of the past and existing theories about the present and future

that a guide as to what information should be gathered is obtained. Thus (returning to our example of growth and equality) past experiences with growth may provide information on the effects that the tax change has in the past. This experience, plus extant growth theories, provides some notion of what is expected to occur in the future.

As existing decisions often look to the past for pertinent information -- thus relying upon past measurements and storage -- so the planning process itself must look to its own past for its improvement. Planning is a learning process and for many organizations is engaged in continuously. A history of planning information and results is possible if a system is established for storing such material. This information system would include measurements of how successful past planning has been, and with appropriate identification of those reasons for failure, poor performance could be identified and in principle eliminated. Such monitoring requires a theory of planning as a guide to the appropriate information to obtain as well as an ordering of such information.

Management and Planning

Our previous reference to the problem of whether the planning function appropriately contains the power necessary to effect or control the plan is part of a much larger issue. We have used the word "planning" in the title of this book in keeping with traditional usage, although we feel that traditional usage of "manpower planning" is often more appropriately referred to as "manpower management," given many existing definitions of "management." Having said this, however,

we wish to weaken our statement somewhat because of existing ambiguities in the term "management." As Wadia (1966) has observed:

A study of the history of management thought shows that a variety of disciplines have contributed to the ever increasing knowledge of management. Engineers, economists, physical scientists, mathematicians, behavioral scientists, soldiers, politicians, professors, practitioners, and priests have all played a role in the development of administration, both as a science and as an art. Perhaps it is this varied genesis that has led to the development of various schools of thought in management. This variety, in turn, has led scholars, especially in the past decade, to engage in a controversy over which school of thought has the right approach to management, what the proper scheme of classification is, and what would be included in and what excluded from the study of the nature and scope of management.

Perhaps similar things can be said of manpower planning. What follows does, however, seem to be consistent with many alternative "theories" of management.

Five commonly acknowledged functions of management are planning, organizing, motivating, innovating, and controlling. These functions do not occur sequentially, however, but are commonly viewed as being interrelated as illustrated in Figure 9.1. Because of such interrelationships, what some may classify as planning others may classify differently. At one level planning may be viewed simply as listing alternative ways of getting from the present position to some desirable future position. At another level of conception, planning would be involved in determining where the current position is (a measurement problem) and what the future position should be -- a problem not only of values and strategic planning but also of determining attainability. These last observations are not unrelated to problems

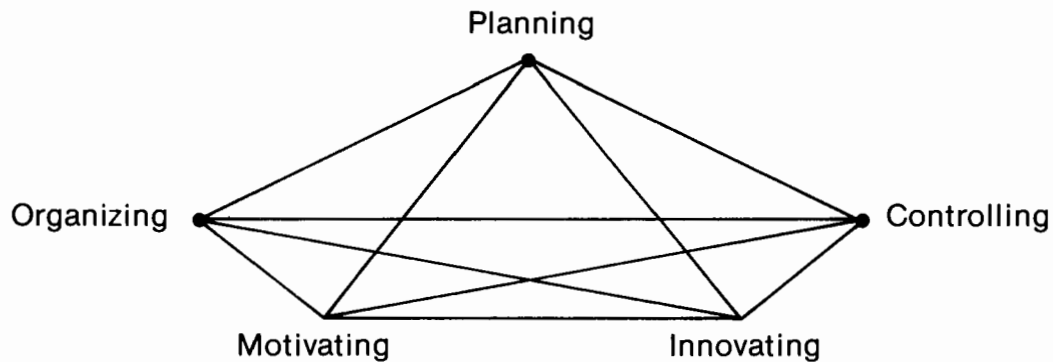


FIGURE 9.1. Interrelationship of Management Functions

surrounding positive and normative decisions. What "ought to be" is, at the practical level, affected by "what can be" or what is attainable.

Because of the nature of the manpower planning process in many areas of the public sector, we shall often be forced to leave the narrower confines of planning theory -- at least as some practitioners may define the function -- to some considerations of the broader concept of management or administration. Our rationalization for doing so can be based upon two observations: (1) what occurs within the

planning function will often depend upon the content of the other functional areas of management, and some of these areas will be the responsibility of a different agency or even a different level of government from that assigned the planning function per se, and (2) the charge given an agency may be referred to as planning, but in the details of the charge what is being proposed is most appropriately referred to as a management or administrative process.

In partial support of the observations in the preceding paragraphs, while at the same time communicating what we feel are important notions about planning and management, we conclude this section by referring to one attempt to develop a general theory of administration. Litchfield (1956), in response to the controversies over what management is, attempted to set out certain propositions that he felt any theory of administration or management should include. This theory was stated in the form of major and minor propositions. His first major proposition was:

The administrative process is a cycle of action which includes the following specific activities:
 (a) decision making, (b) programming, (c) communicating,
 (d) controlling, and (e) reappraising.

Commenting further upon this proposition, Litchfield emphasized that these activities, and the cycle in which they occur, provide the mechanisms by means of which all administrative functions are performed. He states that the series of activities:

. . . is at once a large cycle which constitutes the administrative process as a totality and a series of small cycles which provide the means for the performance of specific functions and subfunctions. In an idealized form it occurs as a logical sequence

in which there is a progression from the making of a decision to the interpretation of the decisions in the form of specific programs, to the communication of that programmed decision, to the establishment of controls for the realization of the decisions, and finally to a reappraisal of the decisions as programmed, communicated, and controlled. In fact, however, the cycle often occurs in abbreviated form. Thus the practicalities of programming a decision may lead to immediate reappraisal, eliminating the steps of communication and control. . . . If individual steps are abbreviated or even eliminated, the cycle is nonetheless complete. In fact, the steps probably are there, even though in quite attenuated form.

Litchfield's first minor proposition that has particular relevance for our investigation is as follows:

Decision making may be rational, deliberative, discretionary, purposive, or it may be irrational, habitual, obligatory, random, or any combination thereof. In its rational, deliberative, discretionary, and purposive form it is performed by means of the following subactivities: (a) definition of the issue, (b) analysis of the existing situation, (c) calculation and delineation of alternatives, (d) deliberation, and (e) choice.

These tasks are not of course unrelated to what we have previously identified as planning -- particularly as we outlined suggested approaches to the planning process.

Planning, Programming, Budgeting, and Control

It is useful to further delineate certain elements of which some practitioners may wish to incorporate in an all-inclusive term "planning" and what others may prefer to list as a separate, although related, function. Making this delineation will also provide a format for mentioning other aspects of planning.

Some of the literature on planning theory differentiate between planning -- such as an assessment of needs, determining objectives,

and so on, and other activities related to the achieving of stated objectives. (To this point in our analysis, we have been guilty of including the three functions to be mentioned below within the general scope of planning.) Those that differentiate, in the manner suggested, use the term "programming" to refer to the act of organizing relative activities according to the objectives they are intended to achieve or serve and presenting them in a "performance and resource use plan" for a given number of years (Peterson, 1972). Programming is followed logically in this scheme by the act of "budgeting," which is the translation of the performance and use plan into more operational plans for the immediate time period. The final functional area is that of "control" of the inputs and outputs of the entire process. Those who wish to differentiate between "planning" as an entire system and planning as only one section of a system usually refer to the latter as a "management system," which of course includes planning.

Webster defines "to control" as "to exercise directing, guiding, and restraining power over" something. Formal discussions of control within business enterprise build upon this basic definition. Thus organization control is often defined as "the distribution of measures used by an organization to elicit the performance it needs and to check whether the quantities and qualities of such performances are in accord with organizational specifications" (Etzioni, 1965). Extending further on this, Haberstroh (1965) has stated that "the problem of control is that of preventing dysfunctional variation in some aspect of the organization's behavior." This introduction of the

term "dysfunctional" introduces the relationship or the dependency of the term "control" upon the concepts of effectiveness and efficiency.

Planning and control can be discussed on at least two levels. One level would recognize that all organizations have control mechanisms, although they may not be effective or efficient. But such control is only over the internal operations of the organization. The second level of discussion goes beyond a consideration of the internal functions to the question of exercising control over external variables that facilitate the execution of the plan. An example of one issue between planning and control would be that of a planner who determines that in order to reduce turnovers in employment, an increase in wages is required and then having "control" over wages in order to implement his or her recommendations. Normally such functions are separated, and we shall adhere to this practice within this book, recognizing that in certain agencies the management and planning functions will reside in the same office or person and hence be of relevant consideration.

There is a third and final aspect of planning and control which is not, in our view, adequately treated in the planning literature. We refer to the concept of "controllability," by which we mean the degree of control that can be exercised on a given factor. An example may clarify: Suppose that it was decided to decrease turnovers in employment and that turnovers were caused by such factors as low wages, poor working conditions, and absence of career ladders. Let us further suppose that the planner only exercised direct control over wages. Then even if knowledge about the relationship between

wages and turnovers were exact, the planner might not be able to reduce turnovers to the desired level because of the effect that other and presumed uncontrollable (or uncontrolled) variables have upon turnovers.

If the manipulation of the three factors -- wages, working conditions, and career ladders -- could maintain turnovers at the desired level, then turnovers would be controllable. If the manipulation of wages alone could not maintain the desired turnover rate, it would not be controllable from the planner's direct point of view because of his or her limited span of control. In many cases a particular process is not fully controllable because of the imposition of events beyond the manipulation of the effected organization. This situation introduces probabilistic elements in control and planning.

SUMMARY

The preceding material represents a brief overview of that which many of the leading thinkers in the area of planning, whether public or private, have said about the planning process. In this section we summarize this material in a manner that helps to place our own imprint upon it. Much of what is contained in the previous sections can be reviewed in a manner that both clarifies and amplifies the material by appealing to a geometrical representation of the planning process. Our representation requires some familiarity with coordinate systems -- a familiarity we presume our readers to have.

We illustrate a coordinate system in Figure 9.2 where along the x and y axes we measure actual and desired characteristics of an organization. Point A, with values of the two characteristics x and y noted as x_a and y_a , denotes the actual condition or position of the organization, while point B with characteristics x_b and y_b denotes the desired position. Point A is discovered through measurement, while point B is determined by some process that may be external or, in some cases, internal to the type of planning process under review. In commonly held concepts of management, it would be the responsibility of some office in the organization outside the "planning office" to present to the planners the objective point B. In other contexts (i.e., tactical planning) the efforts of the planning office may help determine where position B "should" be. The position B may also represent the planner's interpretation of the organization's objectives in quantifiable terms.

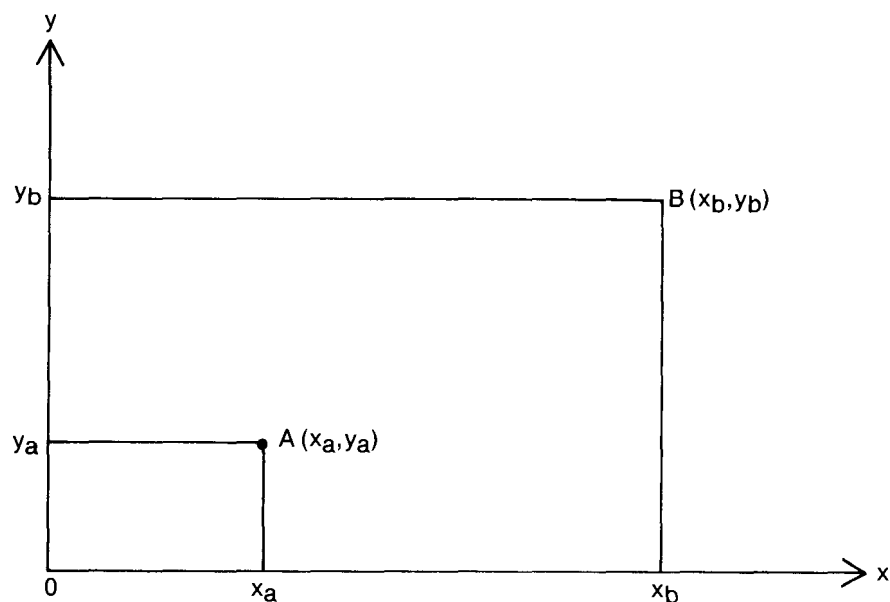


FIGURE 9.2. Coordinate System

The planning process may be described as that process which provides the necessary information for determining the path by which an organization may (and should) move from its present position (A) to the desired position (B). Thus planning is concerned not only with attaining some given position but also the way in which some position is obtained. It can also be said, in terms of the material in Figure 9.2, that planning is concerned with proceeding along a trajectory of intended states. In order to reach B from A, a given path (trajectory) will be followed. Good planning will delineate the most efficient path. Furthermore, in moving from A to B, other configurations of x and y will be achieved. These also should be an integral part of the plan.

The importance of time in the planning process should not be minimized. One of the elements that constitutes a position such as point B in Figure 9.2 is time. An organization's objective statement may include a time dimension in the sense of wishing to attain a desired position by a given date or, alternatively, within a stated period of time. In terms of Figure 9.2 this aspect of planning may be illustrated by measuring time along the x axis. Such a practice, in this two-dimensional representation, would indicate that the objective was to increase the value of y from y_a to y_b within a length of time denoted by the line segment $(x_b - x_a)$. Such an objective statement might be classified as including a "fixed time" objective component. Other alternatives are available, as will become evident below.

We characterize another aspect of the planning process -- determining alternative ways of getting from A to B -- in Figure 9.3 in which we have depicted three alternative paths from A to B. To choose from among these paths some notion of "best" is required. Sometimes this is a management decision, although if the manager's criteria are given to the planner, he or she may determine the best path(s). We may assume that each path is technically possible, but that they differ according to such things as the cost or time of getting from A to B. The paths may differ for a variety of other reasons. For example, there may be a learning process involved in whatever the planning process represents. In such cases one path may allow all existing personnel to work on the project and remain employed throughout; this path is noted as number 3. Such a path may be a slower route than number 1. Though path 1 may be faster than path 3, the staff of whatever is being planned for may have to be increased drastically during the initial stages and reduced in later stages. This may have undesirable consequences about which the planner may have to make judgmental decisions unless they are entered explicitly into the relevant objective function.

Paths 1 and 3 exhibit some other characteristics that are possibly undesirable under certain circumstances. Along each of these paths one objective is obtained at a different rate from the other. Only along path 2 are both objectives attained at the same rate (i.e., along a straight line between points A and B). In some contexts such a situation may be undesirable, even if other paths are less expensive, somehow measured, or faster. All of the preceding

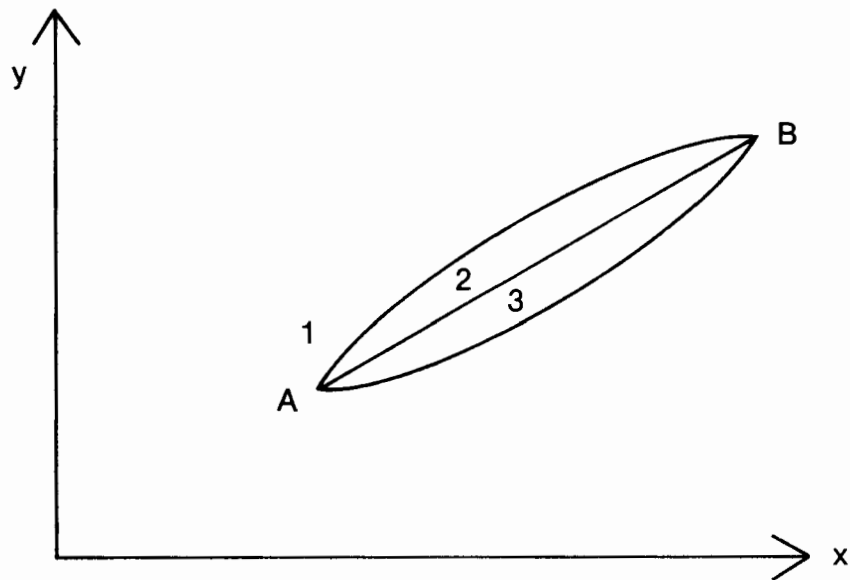


FIGURE 9.3. Alternative Paths

indicates that some criteria or objective function, possibly complex, is needed in order to choose among alternative paths. Other complications might arise, only one of which we shall note below. It is chosen because of its prominence in other problems upon which certain techniques of planning have been applied.

A given organization may find itself at position A, but when looking forward may realize that it does not so much want to achieve an objective but would be equally satisfied with attaining one from among a continuum of alternative positions. Such a continuum would indicate the trade-offs the organization would be willing to accept among specific objectives. (Sometimes this is referred to as having a multidimensional objective function.) We illustrate such a possibility in Figure 9.4. The initial position A is a point, but the surrogate for position B is now a continuum of alternative points

noted by the curved line $B'B'$. Each point along $B'B'$ is equally desirable. This indicates that the planner is willing to trade, at a rate reflected in the slope of $B'B'$, some of objective y for more of objective x , or vice versa. Thus it may be that the planner will move from A to some point along $B'B'$ in a manner that minimizes a cost structure or maximizes some other aspect of the planning process not explicitly captured in this diagram. Points along $B'B'$ such as B_1 and B_2 could be alternative end points to alternative paths that differed according to the money and time costs of the decision.

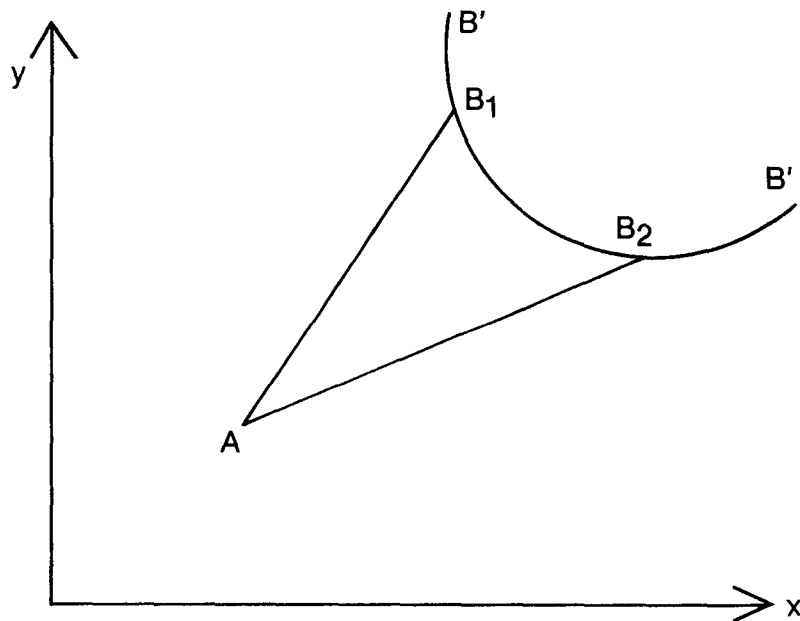


FIGURE 9.4. Continuum of Alternative Positions

Each of these examples requires that the planner determine where the organization is currently located with respect to those items for which it wishes to plan. That is, it must determine where point A is. The planner must also determine the organization's objectives and translate them into measurable terms. That is, he or she must determine the location of a series of B points, and he must devise programs that will enable the organization to get from A to B -- from where it is to where it wants to be.

This geometrical representation of the planning process helps to emphasize the various tasks individual planners will have to undertake. They will have to determine, through appropriate measurement techniques, the organization's current position and that position the organization would attain if current practices were continued. They will have to determine what the organization's objectives are for the present and the future and translate them into measurable terms. Planners will then have to decide upon what measures are necessary to attain the stated objectives. This will also involve the elimination of existing or expected future impediments to achieving a desired position. Finally, they will have to monitor the success the organization is experiencing in attaining its stated ends and make whatever corrections are required to place the organization back on its optimal trajectory.

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MICROMANPOWER PLANNING PROCESS:
THE INFORMAL THEORY

In chapter 9 we reviewed some of the general principles of planning. In this chapter we direct our attention to the issue of manpower planning.

Even though manpower planning is an "emerging" field of study and practice, there already appears to be general agreement on the broad outlines of what constitutes the manpower planning process. As we have established previously, any planning function involves giving attention to the future. Planning is undertaken to detect and, it is hoped, avoid future problems or, to achieve some predetermined objectives. Manpower planning does all of this for the specific area of manpower. In brief, the manpower planner's function is to facilitate the elimination of current manpower problems, to design programs and action steps to forestall future manpower problems, and to determine what programs are required to achieve specific manpower objectives that are not necessarily stated in problem terms.

Our purpose in this and the next several chapters is to build upon these generally accepted notions. We begin by establishing the broad outlines of our approach in an informal and intuitive manner. In subsequent chapters we introduce more detail and develop a specific manpower planning process.

One of the most difficult aspects of any assignment is to begin it. Developing and explaining the rudiments of manpower planning is no exception. Furthermore, reasonable persons may differ on how or where to

begin. We prefer to begin by appealing to simple and obvious principles, gradually introducing more complex aspects of the process. We adopt as our focus of exposition the problems confronting someone recently hired as the manpower planner for a public agency.

THE MANPOWER PLANNING FUNCTION WITHIN THE AGENCY

Someone newly appointed to the position of manpower planner for a public organization will have certain questions about his or her responsibilities and how these responsibilities are related to those other administrators within the organization. (Many of these questions in all likelihood will have been raised before employment was accepted.) Clearly such an individual would seek answers to such questions as: By whom is the manpower planning being done? For whom is the manpower planning being conducted? What are the general objectives of the organization and how do these translate into specific manpower objectives? Who determines these objectives? What resources are available for manpower planning? What are the organization's procedures for implementing manpower plans?

Who Does the Manpower Planning?

The first question of who does the manpower planning for the agency is not an idle one. The newly appointed manpower planner must be aware of his or her relative position within the organizational structure with respect to the scope of the manpower planning responsibilities and authority. In chapter 9 we identified planning as one element in the managerial process and indicated that planning may be broadly or narrowly proscribed. In large agencies with a clearly defined organizational structure, the planning process may be one of providing information to

others. When such conditions exist, the manpower planner functions within what we have previously identified as a management information system. Specific objectives are given to the planner by the agency chief, with little opportunity for input or control by the planner. In other agencies the work load may be so small, or the organizational structure less clearly defined, that broad managerial functions are assigned to the planner. When such is the case, the manpower planner might find himself or herself having powers of control and implementation in addition to those of planning.

The intention behind these observations is to indicate that although in the theory of planning the act of planning might be identified as a separate function within the managerial process, such divisions may not always be closely or clearly defined by job description for the manpower planner. Such descriptions may have been made by someone unskilled in such matters. Furthermore, within many organizations the dimensions of a specific position are dependent upon the abilities or personality of one who occupies it. However, we shall comment only infrequently on such issues.

For Whom is the Manpower Planning Done?

The manpower planner must determine for whom the planning is being done. This includes not only the aspect of the job as discussed above (to whom does the planner report?) but includes those individuals who are the direct beneficiaries of the planner's efforts -- the present and future employees of the organization, the agencies, bureaus, or other subdivisions. The organization's "customers" should also not be forgotten.

It is not enough to accept the notion that all manpower planning follows the same form and has the same general objective. There will be some differences at the operational level, for example, between manpower planning for the private firm (the objectives for which are derived from the firm's desire to maximize profits) and manpower planning for the non-profit public organization. Each of these organizational forms may call for a different emphasis in manpower planning at the operational level, even though the specific content of the planning techniques would be derived from the same general principles as outlined in chapter 9. Our immediate concern is for a specific type of manpower planning in the public sector -- a vague term upon which we need to elaborate more in conjunction with answering for whom the manpower planning is being done. The planner needs to understand the nature of the "planning constituency."

The manpower planner to whom we are addressing our comments will be employed in the public sector rather than the private sector of the economy. "Private" and "public" may be loosely differentiated by the presence or absence of the profit motive. Though we may wish to differentiate between public and private on the basis of ownership rather than motives or objectives, more insight into behavior patterns, as they affect manpower planning, will be obtained if the differentiation is made on the basis of motives.

Planners employed with public agencies will be working within what Niskanen (1971) has defined as a "bureau." A bureau is defined as an organization in which:

1. The owners and employees of these organizations do not appropriate any part of the differences between revenue and costs as personal income

2. Some part of the recurring revenues of the organization derive from other than the sale of output at a per unit rate

"In a single sentence," Niskanen says, "bureaus are nonprofit organizations which are financed, at least in part, by a periodic appropriation or grant" as distinguished from firms who acquire funds from the sale of goods and services. It is toward such nonprofit organizations that our principles of manpower planning are directed. There will be some exceptions to this general rule but not of sufficient magnitude as to deter us from taking Niskanen's definition of a bureau and using it whenever we refer to public sector agencies.

The measure of success for manpower planning within a public agency will differ from those of the private firm. The rewards for success may also differ. In the private sector, where the contribution of good manpower planning to increased profits is in principle measurable, the resources committed to planning will tend to increase to the point where the incremental benefits of doing so are equal to the incremental costs. In the public sector a similar rule is appropriate, although more difficult to measure and therefore to effect.

It is natural to assume that nonprofit organizations replace the profit motive with the objective of achieving some level of "output" at minimum cost -- that is, to produce a given product or provide a given level of service as efficiently as possible. Although such motives are undoubtedly an important ingredient in such organizations, a motive so stated ignores the "human element" in social and organizational behavior. It ignores many of the relevant incentives and constraints to purposive behavior. In the private firm the returns to

management are often directly related to the profit earned by the firm. Such a relationship suggests a high degree of consistency between the individual's and the firm's motives. At the same time, management is constrained, not only by the relationship of cost to revenues, but also by the action of actual or potential competitors.

In the public sector the relationship of profits to salary is nonexistent, the costs of various activities are not always adequately perceived, and in many instances there is no competition. Thus the motives of the individual may be at variance with those that guide the organization. Consider, for example, the salary of someone employed to direct a large municipal wastewater treatment plant. Clearly that salary is not related to the profit of the plant, for there is none. It may be related to the size of the plant (i.e., some surrogate for responsibility), and incentives may be adopted to encourage the minimization of costs. But such costs are only direct costs and do not, for example, preclude the possibility (aside from legislation to the contrary) of emitting a lower quality effluent to diminish direct costs while at the same time imposing higher social costs on downstream users of the water. Finally, there is clearly an absence of behavior modification imposed by the actual or potential behavior of competitors.

Referring to the head of a bureau as a bureaucrat, in a non-pejorative sense, we need to inquire as to what it is that such an individual attempts to maximize. As with any other individual, we suppose the bureau chief would attempt to maximize personal welfare. It has been shown that in private profit-seeking firms, personal satisfaction (welfare maximization) and profit maximization are consistent

goals -- seeking one assists in attaining the other. Niskanen argues with considerable persuasion that budget maximization provides a similar function in the public sector. Recognizing that several factors may contribute to personal satisfaction -- income, perquisites, public reputation, power, patronage, and so on -- Niskanen argues that most if not all of these are positively and directly related to size of the bureau's budget.

This is not the place to continue with a detailed review of the literature dealing with bureaucratic motives and decision making. We introduce this material because we think it an important area and because it is related to our suggestion that the manpower planner come to know in some detail for whom the manpower planning is being conducted. The preceding material only emphasized, however, the administrative or managerial branches of the organization. The manpower planner must go beyond these to the operational areas. This will require that the planner come to know the characteristics of the organization's employment, particularly as to the type and number of employees and the conditions under which they work. The planner will need to know the sources from which employees are obtained and the dimensions of such sources. This will require him or her to become knowledgeable about the labor market in which one must operate and the various services other organizations might supply. The planner must also understand the agency's line functions, its methods, procedures, and practices.

Manpower Planning at the Labor Market

We have previously noted in chapter 3 that the labor market may be characterized in a variety of ways -- each having some counterpart in

the public sector. On the basis of geographical characterization, we may think of manpower planning in the public sector as occurring for areas that are coterminous with the political subdivisions of the country. The manpower planner may be responsible for the planning within one or more of these political subdivisions and for one or more occupations. Another way of dividing the labor market might be by functional areas such as water quality, air pollution control, police protection, drug abuse detection, or aircraft traffic control. Some of these areas may be combined as in "environmental control," for example, or transportation. Further classification of functional areas could be made according to geography. Thus we may have a state manpower planner responsible for all occupations in water quality, or a local or state manpower planner responsible for all occupations within one geographical area. Cross-classifications might be organized on the basis of expected work load, although it is doubtful that enough inter-agency or intergovernmental cooperation will be available to accomplish this. Furthermore, we should not expect that on the local government level, except for large cities, it would be efficient to have a manpower planner whose single responsibility is, for example, manpower in a local drug abuse program.

The labor market might be classified by occupation, although this would be efficient for only very specialized occupations with relatively small numbers over large geographical areas. The labor market may also be classified on the basis of the enterprise in which employment is found. In the private sector, for example, there might be manpower planning for an individual firm that may have more than one plant, or for an industry

which is an organization of several firms. In the public sector, one public agency may be responsible for several "plants" (i.e., places of employment), while others may have only one such place. Often such arrangements are divided along local and county, local and state, or state and national lines. For example, a state highway patrol has the responsibility of providing police services throughout the state, and to accomplish this has established several branch offices throughout the state, plus a headquarters agency in the state capital. In such a situation, a manpower planner would have responsibility for the entire state if the manpower planning function was organized on the basis of the public agency. On the other hand, if the manpower planning function was organized on the basis of the function -- police protection -- then such a manpower planner might have responsibility not only for the highway patrol but also for the police of the various local governmental units and other police functions as might exist in such other areas as juvenile bureaus, drug abuse programs and airport safety.

Clearly these alternative ways of categorizing the labor market, and indirectly the manpower planning constituency, could be extended by further refinement and cross-classification. Each classification has practical appeal in only a subset of what would be most reasonable criteria for selecting the appropriate (i.e., most efficient) way of organizing the manpower function. If the manpower planning function was to be organized on the basis of efficiency, some planning functions should most probably be done geographically and some occupationally. In addition, some mechanisms through which certain information is to be shared among planning areas would be required. We do not live in

such a world, however, and it is therefore only reasonable to expect that manpower planning functions will be organized in a manner that roughly parallels existing government institutions and not on the basis of some overall design based upon principles of efficiency. Thus we would expect that manpower planning activities would generally be organized on the basis of existing political subdivisions or on the basis of existing areas of functions.

The previous conjecture implicitly contained some judgments of facts and some assessment of the role of control and influences as they impinge upon the planning process. It is clearly possible for some national agency, for example, to engage in educative, as contrasted with authoritative, manpower planning specifically directed toward helping some local organization. Such planning, if done well, would be of value irrespective of who did it. What should be recognized, however, is that resources devoted to planning will be wasted unless the planning output becomes input into the agency's decision-making processes. Thus an "appropriate" location of the planning function should take into consideration the ability of the planner to have the results of his or her planning activities used for those purposes for which the planning was ultimately designed to serve.

We should also include within our purview the public planning for private employment. This is particularly important if: (1) the public sector has responsibility for the training of those hired by the private sector, and (2) the private and public sectors demand similarly trained workers and those trained for employment in the public sector are captured by the private sector -- not an uncommon occurrence. This type

of planning could be similarly divided geographically, occupationally, or functionally, as suggested previously. It also raises some possibly different aspects of organization motives, for it describes a situation where a nonprofit organization is planning "for" a profit-seeking organization.

PLANNING OBJECTIVES:
THEIR DETERMINATION AND SATISFACTION

As a part of the "managerial team" responsible for manpower planning, the manpower planner should know what the total managerial objectives are, how these translate into manpower planning objectives, and what resources are available to achieve them. Some organizational objectives may already be expressed in terms of manpower objectives, although much of this translation from general to manpower objectives will be accomplished by the manpower planner.

General Objectives

In the private sector, we have identified the overall objective of the firm as that of maximizing profits. We have purposely been less adamant, and only suggestive, of the possible motives for the public sector agency. In order that profits in the private sector be at a maximum, certain conditions have to be satisfied: Prices must be charged, wages paid, specific quantities of goods and services produced, and specific combinations of workers and equipment employed. From the overall objective of maximizing profits, therefore, other objectives are derived. Some of these objectives refer directly, while others only indirectly, to employment and its various characteristics. Subsidiary objectives derived from the goal of profit maximization may encompass

certain expectations about possible future events. Thus a firm might expect that when they introduce a new product before their competitors do, they will need to produce it at a certain rate so that this rate will tend to diminish as their competitors bring their new product onto the market. This changed rate of production will require additional manpower of specified types. The manpower planner's task would be to estimate what the needs are.

The derivation of manpower objectives in the public sector cannot proceed from the agency's objectives in so direct and generally acceptable manner as they are in the private sector. The equivalent body of accepted theoretical and empirical knowledge that exists for the private sector is not available for the public sector. This is to imply that "budget maximization," as developed by Niskanen, for example, does not have the wide acceptance as an overall motive as does "profit maximization" for the private sector. For this reason we do not wish to suggest, at least so overtly, that, manpower planning objectives are or should be derived entirely from the aspects of budget maximization. We shall rather travel a slightly different route, keeping in mind the possible consequences to behavior that might be suggested by the budget maximization framework. Our approach to manpower planning objectives will be one that is consistent with some of the private sector objectives.

At the most general level, we have taken as the objective of manpower planning the previously introduced statement that manpower planning was intended to "ensure that the right number of people are in the right place at the right time doing that work for which they are most economically qualified." Clearly this is so general that few could quarrel

with it. It applies equally to public or private manpower planning. It is not an operational concept, however, and tends to ignore important aspects of planning. We might say, that the primary activities of the manpower planner will be to see that this objective is satisfied and that he or she will do this by the elaboration of alternative manpower development and training plans. But all of this is rather vacuous, and a more operational approach is required.

We noted in chapter 9 that the essence of rational choice is the comparison and subsequent choice from among alternative means of achieving some objective. Such a comparison should take into account the relative costs of alternative methods. Thus the essential elements of rational choice may be outlined as follows:

1. There must be objectives which consist of statements of the aims of the agency with respect to manpower.
2. There must be a determination of what alternative methods there are for achieving the objectives.
3. There must be criteria which determine the choice of one alternative rather than another.

The third aspect, the need for criteria, was not emphasized in our discussion of planning because it has traditionally been the case that the act of planning ended when the costs of alternative methods of achieving a given set of objectives had been determined. (Management was then presumed to choose.) We have chosen a different emphasis in our approach because: (1) the manpower planner in many cases will bring expertise to the task of determining appropriate criterion that is absent in other areas of the organization, and (2) the charge to the manpower planner may include not only the objectives but also the determination of the criterion.

Clearly for this type of systematic analysis to be conducted, the general objectives given to the manpower planner must be transferred into operational manpower terms. It is open to question whether this is the manager's or the planner's responsibility. The planner should have the expertise to translate general, often vaguely stated, organization objectives into operational manpower objectives. Even to use the general statement of manpower goals as a guiding principle, some information on what constitutes "right number" and "right type" must be determined. This is not so much a job of the manpower planner as of those engaged in human factors engineering. Such information can most often be provided in the form of staffing guides and job specifications as discussed in chapter 4. Other aspects of the general manpower planning goal are provided by the management. We have in mind particularly the issue of time within which certain objectives are to be achieved. For one type of problem, it is clear that the right number and right type ought to be on hand at all times; but in some instances when there is an unexpected and substantial change in manpower needs, an immediate manpower response is either not possible or not appropriate. Often a given target should be approached less than immediately.

Manpower Planning and Rational Choice

The essence of rational choice requires that we go farther than simply defining the right type and the right numbers for which the manpower planner must plan. There must also be, at one level of discourse at least, some indication of the structure of the management's objective function. Since different paths may require different resources, budgetary limitations do not always allow sufficient time or

resources to achieve every aspect of some stated objective. The manpower planner will therefore need information on the rate at which trade-offs among the multiple objectives can be made. This is not easy information for management to develop. It requires, for example, that management be able to say in quantifiable terms that it is willing to settle for fewer personnel if they are better trained, or more personnel who are less trained. Thus management's objective function might imply that 90 percent of the right number, where 70 percent of them have the appropriate training, is equivalent in management's view to having 70 percent of the right number with 90 percent of them well trained.

Such a scheme requires that management have a weighting scheme by which it ranks alternative combinations of those elements that appear in its objective function. After some experience with manpower in the organization, the manpower planner should develop information and certain judgmental insights into the operation of the organization that can be of value in helping the management determine such weights. It is not to be expected that this will come easily, however.

In many government agencies with which we are most familiar, the type of systematic analysis described in the previous section as being the elements of rational choice is not followed. What is often adopted is one of two systems: the "requirements approach" and the "priorities approach." Each of these approaches, while appearing commendable, has some disturbing elements connected to it.

The requirements approach is structured in the following manner: Within an agency a particular problem is investigated, and a plan which appears to solve the problem on the basis of need is designed. The planned design is tested to see if it is feasible (i.e., is it possible

to achieve some design specifications?) and so forth and if so, the plan is adopted. The next step is to acquire the necessary budget. What is absent from such a procedure is the explicit consideration of the costs of alternative methods of solving the problem. The deficiencies of the requirements approach can be seen by borrowing an example from Hitch and McKean (1966):

Suppose a consumer mulls over his transportation problem and decides, "on the basis of need alone" that he requires a new Cadillac. It is "the best" car he knows, and besides Jones drives one. So he buys a Cadillac, ignoring cost and ignoring therefore the sacrifices he is making in other directions by buying "the best." There are numerous alternative ways of solving the consumer's transportation problem . . . and a little costing of alternatives prior to purchase might have revealed that the purchase of "the best" instrument is not necessarily an optimal choice. Perhaps if the consumer had purchased a Pontiac or a secondhand Cadillac, he would have saved enough to maintain and operate it and take an occasional trip. Or if he had purchased a Chevrolet he could have afforded to keep his old car and become head of a two-car family. One of these alternatives, properly costed and computed, might have promised a far greater amount of utility for the consumer than the purchase of a new Cadillac "on the basis of need alone." Or the exercise might have reassured the consumer that the new Cadillac was indeed optimal. While expensive unit equipment is not necessarily optimal, in some cases it can prove to be.

The priorities approach is one in which the agency makes a list of what it would like to achieve and lists each in order of decreasing priority. When such a list has been made, it is not clear from observed practice what the decision-making rule is for expending a specific budget on the priority list. Confronted with unlimited budgets, the agency sees that there would be little problem -- all items on the list could be obtained. In the face of limited budgets (limited in the sense that all of the priorities cannot be achieved), some choices must be made. How much of the first-listed item should be taken? Should all of the

budget be spent on one aspect of the manpower problem? At which point should funds be switched from the first-ordered item to the second? At best, the priority list method provides information regarding the order that resources would be expended but not the relative amounts. It is not unrelated to the weighting scheme (mentioned earlier) when multiple objectives exist. We shall have more to say on these issues in chapter 15.

Quantification

So far in our discussion the manpower planner has in effect been doing those things that will give her or him some familiarity with the organization in which, or for which, she or he is doing the planning. The tasks now ahead of the planner are those that require an integration of personal knowledge of labor economics, human factors engineering, and training practices as discussed in chapters 2 through 8.

The types and sources of employment that the organization provides and its specific manpower planning objectives are most usefully defined in such terms that enable them to be quantified. We do not mean to suggest that all characteristics of the organization can be quantified, only that some can and should be. Which ones be quantified or, more correctly, which ones should be investigated to see if they can be quantified, depends upon the specific manpower planning objectives, the nature of the labor market in which the organization operates, and the type of occupations and employees for whom the manpower planning is being conducted. Quantification should be sought for another broad reason -- some objectives of manpower planning will be to eliminate existing (and expected) manpower problems, and before such problems can be eliminated, they must of course be identified. Much of this identification will

depend upon the planner's ability to measure (and later analyze and determine the cause of and remedy for) certain employment characteristics.

All of the preceding is somewhat premature, since we are appealing for measureability before discussing what should be measured. Manpower problems are not always self-evident, and to state that a particular manpower problem exists implies the existence of some framework for determining what constitutes a problem. In addition, elements other than solution of problems enter into the objective function. Much of what we have discussed in chapters 2 through 8 provide the basis for understanding the nature of manpower problems and the nature of those other elements most likely to be included in the objective function. A thorough understanding of that material is essential for manpower planners who aspire to do their job well.

Clearly manpower planners are concerned about the functioning of the labor market as it impinges upon the manpower issues of their own organization. Examples of such concerns are reflected in many of the questions for which they should seek answers. Are the recipients of planning services able to hire as many people as they wish? Are they able to employ those people that have the requisite skills? If neither of these functions are being satisfied, in what form are they being violated? Do positions remain vacant for undesirable lengths of time? What is an "undesirable" length of time? Are people hired who later separate themselves, either voluntarily or involuntarily, from the organization with "abnormal" frequency? Do vacancies and turnovers exist because the wage structure is not competitive, or are they related to such working conditions as unpleasant jobs or lack of career ladders associated with the job?

The manpower planner will also be interested in and make estimates related to, although not necessarily be directly involved in, matters related to training. What is adequate training for a given position? Which type of training should the organization engage directly in and which should it encourage other institutions to establish? Are existing or proposed training programs necessary? Has a relationship between training and the operation of the organization been sufficiently established to warrant allocation of funds for training? It may prove difficult to answer many of these questions. An important reason for this is that the output of many public sector organizations is difficult to quantify and thus to relate changes in output to changes in the allocation of training resources may not be possible. At best they will be different.

All of the preceding, although an incomplete list of those items with which a manpower planner will be concerned, provide ample reason why the planner will have to measure certain employment characteristics. Such measurements provide information on the actual manpower state of the organization. It will also be required that the planner compare such measurements with the intended manpower position of the organization.

These measurements will involve not only the current value of employment characteristics but also estimates of their expected future values. Given the futurity of planning, the planner will provide input for decisions whose effect will be in the future. Thus the planner will be required not only to measure what is occurring today but project or forecast what he or she expects to occur over some future time period. Such forecasts would implicitly include what would occur in the absence

of planning and the adoption of manpower programs. These forecasts therefore estimate the difference between where the organization is today and where it will be in the future if no new activities are adopted. The difference between the expected actual and the intended future states of the organization determines the kind and magnitude of the manpower programs that will be recommended.

Data Storage and Retrieval

The task of measuring current employment characteristics and forecasting future employment characteristics will be a cyclical one, the frequency of which will depend upon the nature of the organization and the occupations employed therein. In general, an annual cycle is desirable. This will require that annual measurements and forecasts would be required. Thus each year measurement of current employment characteristics would be made, and forecasts of such employment characteristics would be made for each year within the planning horizon. Such practices will quickly develop an inventory of manpower data that should be stored in such a way that it facilitates later retrieval. The measurement and forecasting tasks will generate data that will be useful not only for the immediate period and purposes but also for other periods and purposes. As we shall explore in greater depth subsequently, the manpower planner will at some future date be measuring as a current employment characteristic which she or he had previously forecasted. If past forecasts are stored properly, the planner could retrieve them and compare the accuracy of the forecasts with her or his measurements.

The task of storing and retrieving manpower data is one that manpower planners need not literally do themselves. Their function would

be to determine what data should be stored, the form in which it should be displayed upon retrieval, and possibly the type of computer programs they might wish to have made available in order to permit certain types of analysis to be conducted.

In many instances the amount of data to be collected and the uses to which it will be put will require the use of a digital computer. Such is not always possible, however, particularly in the initial periods of manpower planning efforts when resources may be meager or top-level management skeptical of the value of manpower planning. On the basis of a judgment that few computer services will initially be available to the manpower planner, we shall not discuss the computer formats for storing data. In chapters 11 through 16 we present detailed tabular examples of suggested data formats. These tables have the advantage of providing a framework for those who have computer facilities, for they suggest a form in which the data should be stored and the type of programs manpower planners will need in order to retrieve and analyze the data. Such forms can be shown to the organization's computer personnel who can convert them to maintain storable and retrievable formats.

Uses of the Data

The generation of manpower data is not an end in itself. The data's value is derived from its use. The intended uses of the data determine the type of data that should be collected. The uses the manpower planner should expect to make of the data are as aids in forecasting future manpower conditions, as a basis for assessing current and expected manpower problems, and as a basis for measuring the performance of the manpower planning process. This implies that the data

should not only describe important aspects of current employment, but also they should contribute to the forecasting of future employment characteristics and the detection and analysis of manpower problems.

How manpower planners determine what specific data are to be collected will depend upon their knowledge of their organization and the framework within which they approach the manpower planning process. The first is rather obvious, the second not quite so. To illustrate, consider an organization known to have a problem with maintaining a given level of employment. Several reasons might exist for this: poor working conditions, low wages, absence of career ladders. A framework for manpower planning that included such areas as economic and human factors engineering, labor economics, and so forth would seek data on working conditions, wages and career ladders that would enable the planner to determine which if any among the several possible causes existed. A framework that ignored the economic factors, however, would not collect wage data and would thus not compare agency wages with wages in similarly structured occupations. In other words, what data are collected and how they are used is determined by what is considered to be important, and what is considered important depends upon the framework of analysis the planners bring to their position. We have argued in this text that many disciplines contribute to the manpower planning process, and to slight any of them is to court disappointment in the efficacy of the manpower planning effort.

The amount of data collected and the uses to which they are placed will be determined by the level of resources devoted to the planning function. Data collection and usage should proceed to that point where

the (incremental) benefits of such activities equals their (incremental) costs. This is admittedly a difficult point to measure. We shall assume that for most manpower planners such a point will not be reached within the relevant future. This is to imply that the total resources committed to manpower planning will be too small to fully do all the planning tasks. With given and limited budgets, the planner must allocate resources carefully among the various manpower planning activities.

Analysis of Manpower Planning Problems

Primary uses for the data in addition to forecasting future manpower needs are the determination and analysis of manpower problems and the institution of a performance control mechanism. Many solutions to a finite number of manpower problems are possible, although the resources to solve such problems may be limited. In the face of such constraints, the number of problems identified must be limited and the number of problems that one expects will be solved may have to be severely limited. In order to execute the necessary allocations, the manpower planner will have to make some assessments concerning what the most serious problems are. This will require a blend of theory and empirical work -- theory to identify possible problems and empirical work to assess their magnitude -- and considerable personal judgment. The empirical work will often go beyond the measuring and forecasting of current and future employment conditions. It will involve such matters as trying to determine if there is a relationship between turn-overs and vacancy rates with deficient wages or in relating recruitment

difficulties to career ladders. It may also require some consideration of the priorities as seen by the operating departments.

It is unlikely that much of this type of analysis would be achieved in the early years of any manpower planning effort. Such analysis will require considerable data and experience, not to mention analytical abilities. During the early years of the planning effort, some of these skills may be sought outside the immediate manpower planning office. In addition, manpower planners may, in the absence of their own data and analysis, conduct inferential analysis from the data and experiences of other manpower planners. It will be advantageous for individual planners to continuously keep abreast of manpower activities and the functioning of the labor market in which they operate. In the absence of their own generated data, it would be of some importance to be knowledgeable about studies dealing with problems similar to their perceived manpower problems or even to know of research that is related to what are likely to be their more serious manpower problems. Such inference is not always accurate, since the response of vacancies in one organization to an increase in wages, for example, may not be of the same magnitude in other organizations because of different occupations, location, or working conditions, and so on. But in the early period of manpower planning, judgment and common sense can generate much useful insight from such sources.

Limited resources can impose other difficulties that are related to the providing of information to the organization's management. Suppose, for example, that the manpower problems that have been identified can be solved only through the expenditure of certain funds and that

such funds are not large enough to support all of the programs that are "needed" to eliminate the problems. Some choice has to be made as to where the resources are to be allocated. These choices should be made upon the basis of the expected payoffs from their solution. Very elaborate procedures have been developed for solving budgeting problems, but it would be unreasonable for us to expect that many manpower planners will be able to engage in them. Those planning offices that come to the planning function with certain skills may conduct such budgeting analysis by themselves, or those planners working in an organization that has, for whatever reason, allocated many people of varying skills to the planning office may have the resources to make such analysis. For the average manpower planner this will not be the state of affairs, and second best methods will have to be employed.

The seriousness of the lack of this type of skill in the planning office is mitigated somewhat by the fact that making such decisions, or even making such a list, is on the borderline between the planning and the management function. Insofar as this is the case, such decisions may have been made for the manpower planner or at least her or his range of choice may have been restricted. Nevertheless, the planner should be aware of the relevant issues and attempt to develop an office, either through self-improvement or in the hiring of relevant staff, to be able to function in this area.

Performance Control

As we have mentioned before, the process of manpower planning is best viewed as a cyclical one. In being cyclical, it can also be adaptive. Many of those tasks that individual manpower planners will do in

the performance of their job they will do on a periodic basis -- they will periodically measure and forecast employment characteristics and analyze problems. The process is adaptive in the sense that as certain tasks are repeated, it is to be expected that the execution and results of such a task would be improved. Alternatively, we may say that because the process is periodic, it can be adaptive. The reoccurring nature of many tasks allows the planners to improve upon them. To do this, however, they must establish a procedure whereby they monitor or measure their own performance. This is made possible of course by the storage and retrieval of the relevant data. Such data are not only that which the planners have collected from external sources, but also that generated by their own planning process.

For the planning process to be adaptive, it is not only required that the process be periodic, but also that individual planners have some framework in which they can evaluate their own performance. Purposeful adaptation cannot be made if there exists no criteria, either internally or externally imposed, which can be used to judge or evaluate when changes are "improvements" or "detriments." In addition, for the process to be adaptive, data generated by the process must be reliable. Such data as is generated in one period are used in subsequent periods. We refer to this as the existence of a "feedback mechanism."

A well-functioning feedback mechanism supplies the manpower planner with information on how the organization performed in the previous period. It will also indicate those areas in which the organization failed to meet its stated objectives. On the basis of this information the planner can adjust previous programs in such a way as to improve the overall planning process. In many cases such adjustments will only

be partial because the cost of adjusting fully to any unfulfilled objective may not be permitted within the agency's monetary and time constraints. Since this feedback mechanism exists after every cycle of the planning process, many deficiencies will in time be eliminated, or at least mitigated. There will be a continuous need for a feedback mechanism, however, because the organization will have to respond to random disturbances or shocks both internal and external that will occur to the system. These disturbances will generally be of such a nature as one should not expect them to be accounted for by the forecasting techniques used within the organization.

Under certain conditions the performance control mechanism of the organization may have a feed-forward mechanism. This would include those aspects of the planning process that could anticipate the occurrence of certain events, either internal or external to the organization, and deduce the probable effect upon certain manpower characteristics of the organization.

Both feedback and feed-forward control mechanisms place considerable stress upon the manpower planner's analytical abilities. In feedback mechanisms the manpower planner will have to explain what certain things occurred, or didn't occur, and why programs introduced in the past didn't perform as expected. If feed-forward mechanisms are employed, the manpower planner must have the ability to relate expected future events to certain manpower issues and devise programs to help the organization adjust to them.

SUMMARY

This and the preceding chapter have reviewed certain elements of planning in general and manpower planning in particular. One implication from the preceding paragraph is that the planning process is a cyclical one. This has been emphasized by many writers in the area of planning whether it be planning for stabilization, land use planning, or previous discussion of manpower planning. The cyclical process is illustrated in Figure 10.1. There is no unique beginning for entering this process. Planning involves the act of determining the organization's objectives and from such objectives determining the desired or intended position that the organization would like to attain in the current and future time periods. A beginning also includes having some model of the organization and some analytical techniques. These are the techniques reviewed in those chapters dealing with labor economics, human engineering, and public administration. These techniques (or model of organization) will be used in determining certain objectives, in analyzing certain problems, and in determining appropriate courses of action. A beginning is also required in measuring characteristics of current employment and forecasting future characteristics. Measurements deal directly with ascertaining not only the actual state of the system at some future time but the desired or intended state in future time periods.

A comparison should be made between the actual state of the organization with respect to its manpower conditions and its intended state. Decisions based upon information obtained from that comparison may then be made as to what action should be taken. These actions

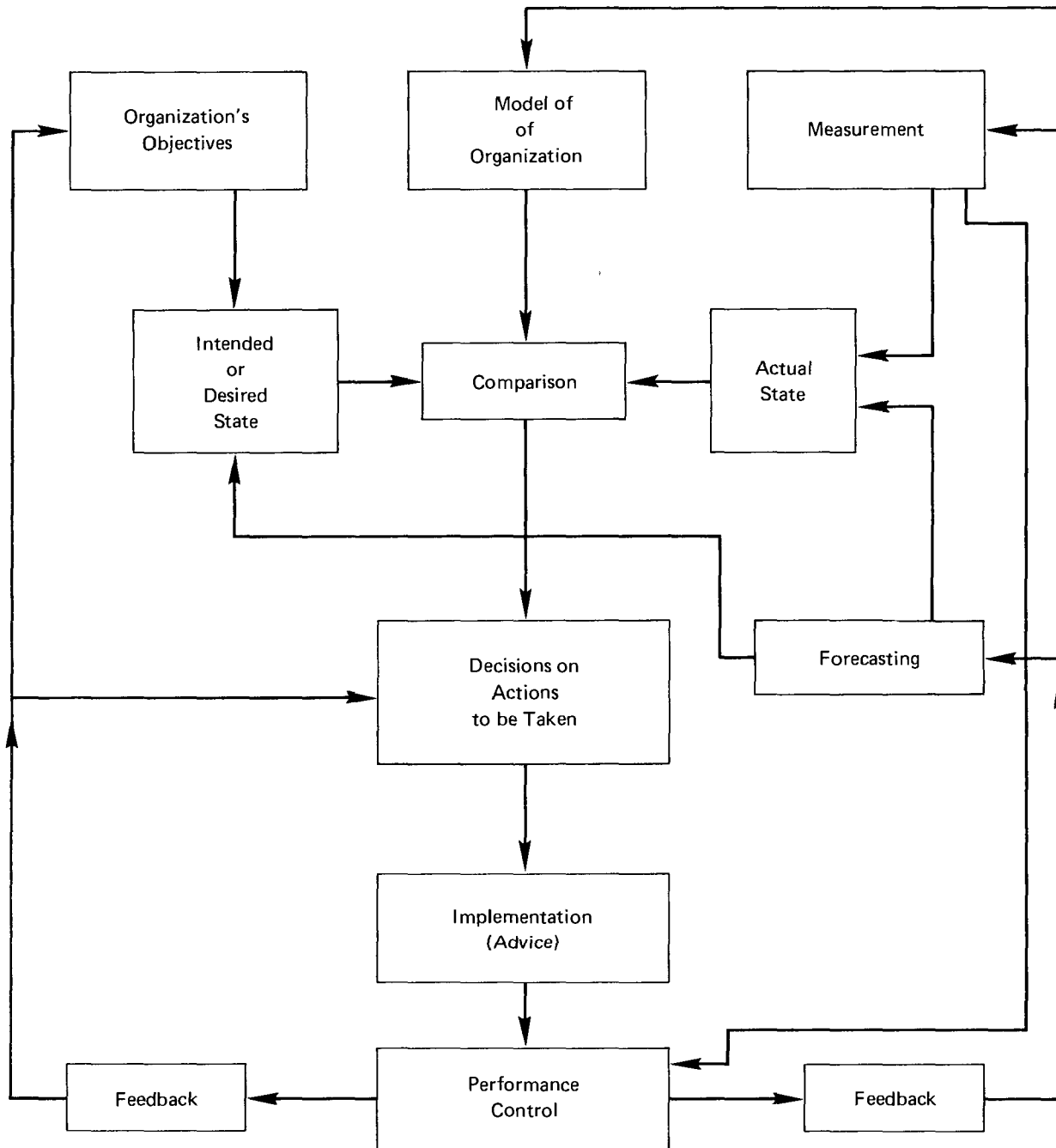


FIGURE 10.1. Schematic View of Planning Process

should then be implemented with the aid of the manpower planner, although all of them may not be directly under his or her control in those circumstances where he or she serves only as an adviser to others. Following this, there must be some process that deals with controlling the performance of the planning process and providing information that is fed back into the system on which to base intended improvements in the system. Information as to the nature of this performance control is also obtained in the measurement process, as indicated again by this schematic view.

What we have attempted to accomplish in chapters 9 and 10 is to sketch planning processes viewed in general and planning processes viewed in particular for manpower. Although we do not wish to emphasize the necessarily sequential nature of manpower planning, nevertheless it is necessary to talk in sequential terms when explaining in detail how such planning may be undertaken. For purposes of exposition in subsequent chapters and as a guide to those engaged in manpower planning, we have divided the manpower planning process into six steps. There is nothing sacred about these steps, or what others may prefer to call tasks, and fewer or more steps can be obtained if certain practices are compacted or spread out. The six steps we offer at this point are as follows:

1. Describe the manpower dimensions of the agency or industry and ascertain its manpower objectives.
2. Measure current employment characteristics.
3. Forecast future employment characteristics.
4. Identify and analyze manpower problems.

5. Develop alternative action steps in response to current and anticipated manpower problems.
6. Develop a performance control mechanism.

In the next several chapters we shall present considerable detail on these various steps or tasks that the manpower planner must perform. To some individuals the concept of "planning steps" is one that implies a concept of sequence. For the most part, such implications are intended and warranted by discussion and the consequent ordering of the manpower planning steps. We expect that performing them sequentially in the order given will result in an effective, efficient, and rational manpower plan. We are aware, however, that in the day-to-day practice of manpower planning, there will occur much movement in various activities, and perhaps for this reason the six manpower planning steps should more appropriately be referred to as tasks. Such terminology will free some readers of having to accept the implication of following the sequence of activities proposed here. In light of these considerations, we find it necessary to emphasize that we do not view these steps as sacrosanct nor do we view their ordering as such. We readily admit to the possibility and feasibility of rearranging, consolidating, or further dividing them as the work loads and tastes of the particular manpower planner dictate. While we do not wish to place undue emphasis upon the use of the word "step" and might just as well use the word "task" or "activity," we personally would put slightly more emphasis upon the ordering of these tasks as "steps."

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DESCRIPTION OF THE ORGANIZATION

In this chapter we discuss manpower planning step 1: Describe the manpower dimensions of the agency or industry and ascertain its manpower objectives. This manpower planning step can be divided into two substeps: The first deals with describing the sources and types of employment within the industry, while the second is concerned with the specific manpower objectives that the organization may adopt. We shall consider these substeps seriatum.

In this and subsequent chapters on the applied aspects of manpower planning, we shall introduce several tables and charts, the purpose of which is to serve as vehicles for collecting, storing, and analyzing manpower data. Although our intent in this volume has been to appeal to a broad spectrum of public agencies, when we come to the point of introducing specific tables, our generality must of necessity give way to specificity. In most of our examples we shall use descriptions that are found within a dominant part of the water quality control field -- the wastewater treatment plants sector. Such tables and charts as we introduce should be easily adaptable to the particular descriptions of other agencies.

DESCRIBE THE MANPOWER DIMENSIONS
OF THE ORGANIZATION

The purpose of executing this step is to have manpower planners become familiar with the employment characteristics of the organization for which they are conducting the planning. They must have a firm knowledge of many facets of the organization which affect its

manpower dimension. While the degree of such knowledge may vary from one aspect of the organization to another, a general overview is nevertheless required. Manpower planners should know the structure of the agency from its administrative head through all of its places of employment, even though they may never engage in planning for certain segments of this organizational hierarchy. One way of obtaining this information is to study or construct, should one not be available, an organizational flow chart. An understanding of the structure of the agency would at least be an introduction to an understanding of the managerial process of the organization. Often such processes are difficult to quantify beyond that found in organizational flow charts, and much of the process may depend upon the personalities of those occupying a particular position within the organization. The manpower planner should not ignore the nuances of these immeasurable influences, although it is difficult to suggest what weight should be attached to such matters. As we have previously suggested, in many aspects of planning good judgment and common sense have few substitutes.

With respect to the organizational flow chart -- individual manpower planners should of course understand and appreciate the strengths and weaknesses of their position within the agency. They should realistically assess their relative position within the agency and also understand and appreciate how other individuals within the organization may view their position. Although much of the manpower planning literature with which the planner may deal constantly stresses the importance of manpower planning, this will not be a view shared by all people in the organization. Improvement in these poor attitudes toward manpower

planning could be made if the planners can in time, through their good work, illustrate the importance of their many functions. In any event, a personal dedication to manpower planning should be tempered by the realization that it is a dedication not necessarily shared by others and one whose merits may have to be initially and periodically supported within the organization.

The most important areas of understanding that manpower planners should obtain of their organization are those related to the sources and type of employment found within the organization. To this should also be added information on training programs and personnel advancement. Each manpower planner should obtain an inventory of the sources of employment -- a term we shall refer to as "plant" -- and types of occupations found within the plant.

The specific and quantifiable tasks to be accomplished as a minimum in fulfilling the first part of Step 1 are to construct an organizational flow chart for the agency, take an inventory of existing sources of employment, take an inventory of training resources, and construct a profile of current personnel.

Organizational Flow Chart

Within many public agencies most of the manpower planning is expected to occur at the state and local levels -- the local level planning would occur in large municipalities that can support such activities. At the state level the organizational flow chart often takes on the characteristics of the example from the environmental field which is illustrated in Figure 11.1.

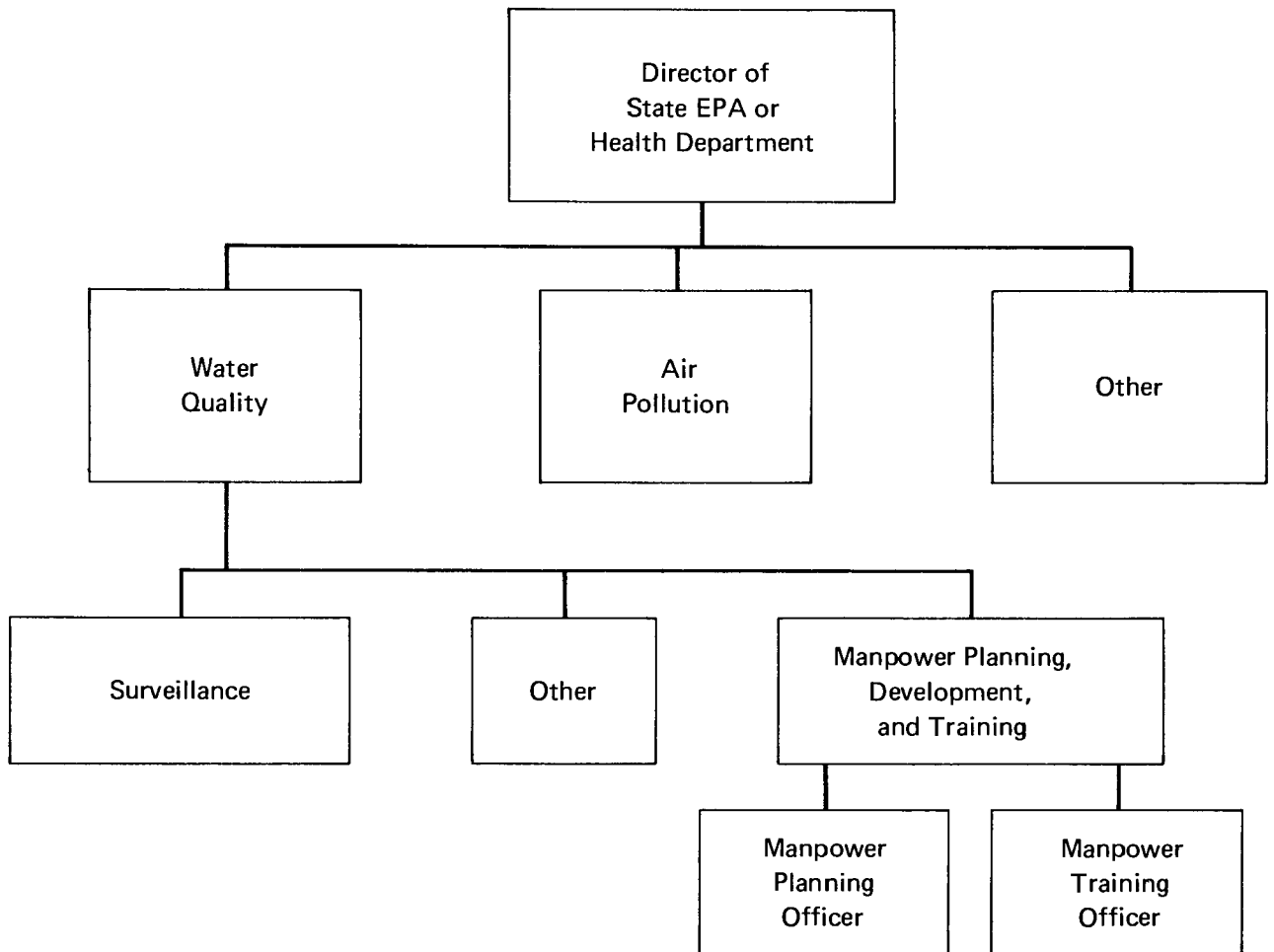


FIGURE 11.1. State Organizational Flow Chart

Although we have indicated a separation of manpower planning and training functions, in many states this will not be the case, especially in the initial period when such programs are being developed. The separation of the manpower planning and training offices will also be a function of the relative work loads within the state. In any event, in our analysis in this book we have implicitly assumed that the manpower planning officer will be primarily responsible for planning, while a separate person will be responsible for the detailed aspects of the state or local organization's training efforts.

Inventory of Sources of Employment

To inventory the sources of employment within their organization manpower planners should document the number and location of such sources, differentiating them according to the size or type or any other characteristic that is deemed important for understanding its employment dimension. They should also document the number and types of occupations that are found at each source and note any regularities that might exist between the type and size of employment source and the type and number of occupations. In the field of wastewater treatment, such information has been obtained by first completing at the state level an inventory of wastewater treatment plants in a format similar to that depicted in Table 11-1.

TABLE 11-1

Inventory of the State's Wastewater Treatment Plants

PLANT NUMBER	LOCATION	CODES			SIZE IN MGD ^b	TREATMENT	
		COUNTY	SMSA ^a	BASIN		CODE	NAME

^aSMSA - Standard metropolitan statistical area

^bMGD = million gallons per day

These data were further displayed according to type and size in the format illustrated by Tables 11-2 and 11-3. From these examples it should be clear how for any organization an inventory of sources of employment can be obtained. For many organizations in the public sector the degree of detail would not be so large as these illustrated for wastewater treatment plants. In general, however, the greater the degree of detail that can be constructed, the greater the benefits for later analysis.

TABLE 11-2

Inventory of the State's Existing Plants by Type and Size

TYPE OF TREATMENT	SIZE OF PLANT BY AVERAGE DAY CAPACITY MGD						TOTAL FOR GIVEN TYPE
	UNKNOWN	0 001- 0 999	1 000 4 999	5 000- 24 999	25 000- 99 999	100 000+	
20 PRIMARY-SETTLING TANKS							
21 PRIMARY-SEPTIC TANKS							
22 PRIMARY-IMHOFF TANKS							
23 PRIMARY-MECHANICALLY CLEANED							
24 PRIMARY-PLAIN, HOPPER BOTTOM							
29 PRIMARY-OTHERS AND UNKNOWN							
30 CHEMICAL							
41 SECONDARY-ACTIVATED SLUDGE							
42 SECONDARY-EXTENDED AERATION							
43 SECONDARY-BIOLOGICAL							
44 SECONDARY-BIOLOGICAL							
45 SECONDARY-SAND FILTER							
46 SECONDARY-LAND DISPOSAL							
47 SECONDARY-LAGOONS							
48 SECONDARY-BIOLOGICAL							
49 SECONDARY-OTHERS AND UNKNOWN							
TOTAL PLANTS FOR GIVEN SIZE							

TABLE 11-3

Inventory of the State's Existing Plants by
General Type of Treatment and by Size

TYPE OF TREATMENT	SIZE OF PLANT BY AVERAGE DAY CAPACITY IN MGD						TOTAL PLANTS FOR GIVEN TYPE
	UNKNOWN	0 001- 0 999	1 000- 4.999	5.000- 24.999	25.000- 99.999	100.000+	
PRIMARY							
SECONDARY							
TERTIARY							
TOTAL PLANTS FOR GIVEN SIZE							

Once an inventory of the places of employment has been made, an inventory should be made of the types and occupations that are found in these various sources. Again we use an example from wastewater treatment plants. This inventory consisted of two important dimensions: On the one hand the title and occupation description were obtained and a list of the desired levels of employment by size of plant, type of plant, and occupation was also obtained. These desired levels of employment have been called levels of "recommended employment," a concept that we shall say more about in our discussion of step 2. In any event, the occupational descriptions and the levels of recommended employment were obtained on the basis of staffing guides that were constructed for a variety of different size and type of plants. Such staffing guides

were discussed in chapter 7, which dealt with human engineering. Although it is not the responsibility of manpower planners to actually engage in those activities that generate the staffing guides and occupational descriptions, nevertheless, it is their duty to see that whenever possible and wherever needed such staffing guides and occupational descriptions are obtained.

In Table 11-4 we illustrate an inventory of occupations and levels of recommended employment that varies according to the size of the wastewater treatment plant.

For each occupation an occupational description should be obtained. Such a description tells what tasks the employee must perform and what educational achievements and skills are required. Once again this is a job for the human factors engineer. An example of an occupational description for an Operator I within a wastewater treatment plant is displayed in Figure 11.2.

Training Inventory

The manpower planner must know what the current capacity of his agency is. (In some cases, a separate training officer may exist within the agency, and much of what we suggest that the manpower planner obtain may be supplied by the training officer. What we suggest the manpower planner do with training issues are those we feel he or she should do at a minimum and in the presence of a training officer. Should a separate training officer not exist, the manpower planner will be called upon to do more than we have suggested in this area.) One way of indicating certain aspects of this capacity is to document the training effort of the recent past. Such an inventory

TABLE 11-4

Staff Complements to Wastewater
Treatment Plants

Example No. 1^a

Occupation Title	Plant Average Day Capacity in mgd									
	1	3	5	10	20	35	50	65	80	100
	Estimated Number of Personnel									
Superintendent			0.5	1	1	1	1	1	1	1
Assistant superintendent						1	1	1	1	1
Clerk typist				1	1	1	1.5	2	2	2
Operations supervisor										1
Shift foreman								1	1	1
Operator II	1	1	1	1	2	3	6	6	7	8
Operator I	3	4	5	4	4	5	6	6	8	8
Auto. equipment operator						1	1	1	2	2
Maintenance supervisor										1
Mech. maintenance foreman								1	1	1
Maintenance mechanic II				0.5	1	1	1	2	2	2
Maintenance mechanic I					1	1	1	1	2	2
Electrician II					0.5	1	1	1	1	1
Electrician I							0.5	0.5	1	1
Maintenance helper				1	1	1	2	2	3	4
Laborer		0.5	1	1	2	4	4	5	5	7
Painter										0.5
Storekeeper								1	1	1
Custodian							1	1	1	1
Chemist									0.5	0.5
Laboratory technician				1	1	2	2	2	2	2
TOTAL staff complement	4	5.5	7.5	9.5	14.5	22	29	34.5	41.5	48

^a Plant components included in this example are

<u>Liquid Treatment</u>	<u>Sludge Treatment</u>	<u>Other Plant Components</u>
Raw wastewater pumping	Primary sludge pumping	Yardwork
Preliminary treatment	Sludge digestion	Laboratory
Primary sedimentation	Sludge drying beds (b)	Administration and general
Chlorination	(1, 3 and 5 mgd plants)	
	Sludge lagoons (c)	
	(10 mgd and larger plants)	

^b Sludge removed from plant site by plant personnel

^c Sludge removed from plant site under contract.

can be obtained by completing, at a minimum, a table such as that illustrated in Table 11-5. Further information on training, particularly the types of training, was presented in chapter 4.

OCCUPATION DESCRIPTION	
Title	OPERATOR I, WASTEWATER TREATMENT PLANT
<i>JOB DESCRIPTION</i>	
Assists Operator II in performance of any combination of following tasks pertinent to controlling operation of plant or performs various tasks as directed. Operates treatment facilities to control flow and processing of wastewater, sludge, and effluent. Monitors gages, meters, and control panels. Observes variations in operating conditions and interprets meter and gage readings and test results to determine processing requirements. Operates valves and gates either manually or by remote control; starts and stops pumps, engines, and generators to control and adjust flow and treatment processes. Maintains shift log and records meter and gage readings. Extracts samples and performs routine laboratory tests and analyses. Performs routine maintenance functions and custodial duties. Operates and maintains power generating equipment and incinerators. Classified by title such as Pumping Station Operator I or Digester Operator I when performing specialized activities only.	
<i>QUALIFICATIONS PROFILE</i>	
1. Formal Education	High school graduate or equivalent training and experience.
2. General Requirements	<ul style="list-style-type: none"> a. Ability to learn operation of plant processes and equipment. b. Ability to maintain and evaluate simple records. c. Ability to maintain working relationship with other shift workers.
3. General Educational Development	<ul style="list-style-type: none"> a. Reasoning <p>Apply common sense understanding to carry out written, oral, or diagrammatic instructions. Deal with</p>

FIGURE 11.2. Occupation Description

FIGURE 11.2 (cont.)

- problems involving concrete variables in or from standardized situations
- b. Mathematical
Perform ordinary arithmetical calculations
 - c. Language
Ability to comprehend oral and written instructions, record information, and request supplies and work materials orally or in writing.
4. Specific Vocational Preparation
On-the-job training from date of employment. Completion of an operator training course highly desirable
Previous experience as laborer or equipment operator in wastewater treatment plant also desirable.
5. Aptitudes—Relative to General Working Population
- a. Intelligence)
 - b. Verbal)
 - c. Numerical)
 - d. Spatial) Lowest third excluding
 - e. Form Perception) bottom 10 percent
 - f. Clerical Perception)
 - g. Motor Coordination)
 - h. Finger Dexterity)
 - i. Manual Dexterity) Middle third
 - j. Eye-Hand-Foot Coordination) Lowest third excluding
bottom 10 percent
 - k. Color Discrimination) Middle third
6. Interests
Preference for activities of a routine, concrete, organized nature, dealing with things and objects.
7. Temperament
Worker must adjust to situations involving a variety of duties and evaluation of information against measurable criteria.
8. Physical Demands
Medium work, involving climbing, balancing, stooping, kneeling, crouching, reaching, handling, fingering, talking, hearing, visual acuity, depth perception, and color vision.
9. Working Conditions
Both inside and outside. Exposed to weather, fumes, odors, and dust May be exposed to toxic conditions
Definite risk of bodily injury
- ENTRY SOURCES Graduates of operator training courses, treatment plant laborers or equipment operators, general public.

PROGRESSION TO Operator II.⁵

in Table 11-5. Further information on training, particularly the types of training, was presented in chapter 4.

TABLE 11-5
Inventory of Training Capacity

Occupation	Type of Training	Location	Duration	Sponsored By	Source of Funding

Demographic Data

It is obvious that the data thus far obtained fall short of supplying certain types of information that would be useful in determining training and hiring programs that are necessary to meet the needs of many public agencies. The manpower planner must know certain characteristics of the workers as individuals. Among the more important types of such information is concerned with the education, training, and occupational backgrounds of its current employees. To acquire this information, the planner should see that every employee completes a personal data form. In Figure 11.3 we display such a form as was used for wastewater treatment plants in the state of Michigan.

If this form were used universally, exit interviews would not be necessary because the completion of this information would pick up all transfers between plants within the industry. The information obtained from these forms can then be aggregated, or a scientific or random sample can be taken of the completed forms, so that the planner will have meaningful information about transfers, education, training, certification, experience, and so forth. If the information is to be developed on a plant-by-plant basis, aggregation is probably necessary at that level; if it is to be developed on a statewide or national basis, sampling might be sufficient. A table patterned after Table 11-6 might be used to aggregate employee data into a more succinct format.

Several other aggregate data forms should be compiled from the personal information form. Since future separations may be significantly affected by the age composition of the work force, a table similar to Table 11-7 should be developed from the personal data forms.

TABLE 11-7
Age Composition

Occupation	Mean or Average	Maximum	Minimum	Less than 25	25 to 44	45 to 64	Over 64
				Number Percent	Number Percent	Number Percent	Number Percent

PAGE 1

**WASTEWATER TREATMENT PLANT EMPLOYEES
PERSONAL INFORMATION FORM**

SOCIAL SECURITY NUMBER		NAME (Last, First, Middle Init)	
HOME MAILING ADDRESS		POST OFFICE	STATE
ZIP CODE	HOME PHONE NO (Include Area Code)	BIRTHDATE	SEX 1 <input type="checkbox"/> MALE 2 <input type="checkbox"/> FEMALE

PRESENT EMPLOYMENT (Fill in below):

NAME OF PLANT _____

PLANT MAILING ADDRESS _____

POSITION TITLE _____ STATUS
1 ☐ FULL TIME 2 ☐ PART TIME 3 ☐ SEASONAL

WASTEWATER TREATMENT PLANT CERTIFICATE (Fill in below).

1 <input type="checkbox"/> CLASS A Year _____ Number _____	2 <input type="checkbox"/> CLASS B Year _____ Number _____	3 <input type="checkbox"/> CLASS C Year _____ Number _____	4 <input type="checkbox"/> CLASS D Year _____ Number _____	5 <input type="checkbox"/> NOT CERTIFIED
--	--	--	--	---

WATER TREATMENT CERTIFICATES (Fill in below):

1 <input type="checkbox"/> F 1	2 <input type="checkbox"/> F 2	3 <input type="checkbox"/> F 3	4 <input type="checkbox"/> D 1	5 <input type="checkbox"/> D 2	6 <input type="checkbox"/> M	7 <input type="checkbox"/> T
--------------------------------	--------------------------------	--------------------------------	--------------------------------	--------------------------------	------------------------------	------------------------------

PROFESSIONAL STATUS (Fill in below).

1 <input type="checkbox"/> ENGINEER REGISTERED 1 <input type="checkbox"/> YES 2 <input type="checkbox"/> NO REGISTRATION NO _____ WHERE _____	2 <input type="checkbox"/> SANITARIAN REGISTERED 1 <input type="checkbox"/> YES 2 <input type="checkbox"/> NO REGISTRATION NO _____ WHERE _____	3 <input type="checkbox"/> OTHER REGISTERED 1 <input type="checkbox"/> YES 2 <input type="checkbox"/> NO REGISTRATION NO _____ WHERE _____
--	--	---

MILITARY STATUS:

VETERAN 1 ☐ YES 2 ☐ NO DRAFT CLASS _____

IS POSITION UNDER CIVIL SERVICE? 1 ☐ YES 2 ☐ NO

I hereby certify that the information contained herein is accurate and complete

Signature

Date

FIGURE 11.3. Wastewater Treatment Plant Employees
Personal Information Form

EDUCATION AND TRAINING – DIVISION I						PAGE 2
GRAMMAR SCHOOL (Circle highest grade you completed in Grammar School)						1 2 3 4 5 6 7 8
HIGH SCHOOL	COURSE OF STUDY	CIRCLE HIGHEST GRADE COMPLETED		Date From Mo – Yr	Date To Mo – Yr	DID YOU GRADUATE?
NAME		9 10 11 12				1 <input type="checkbox"/> YES
LOCATION						2 <input type="checkbox"/> NO
NAME		9 10 11 12				1 <input type="checkbox"/> YES
LOCATION						2 <input type="checkbox"/> NO
IF YOU DID NOT GRADUATE FROM HIGH SCHOOL, HAVE YOU OBTAINED A STANDARD HIGH SCHOOL EQUIVALENCY G E D. CERTIFICATE?				1 <input type="checkbox"/> YES		IF YES – DATE
				2 <input type="checkbox"/> NO		EARNED (Mo – Yr)
JUNIOR COLLEGES, COLLEGES AND UNIVERSITIES YOU HAVE ATTENDED (List below)						
NAME	MAJOR	DATES ATTENDED		NAME OF DEGREE		
LOCATION	MINOR	From (Mo - Yr) To (Mo - Yr)		YEAR OF DEGREE		
NAME	MAJOR	DATES ATTENDED		NAME OF DEGREE		
LOCATION	MINOR	From (Mo - Yr) To (Mo - Yr)		YEAR OF DEGREE		
NAME	MAJOR	DATES ATTENDED		NAME OF DEGREE		
LOCATION	MINOR	From (Mo - Yr) To (Mo - Yr)		YEAR OF DEGREE		
HOW MANY HOURS CREDIT HAVE YOU OBTAINED FROM AN ACCREDITED COLLEGE (Fill in below)						
NOTE Term credits are obtained in a school offering 3 twelve-week periods from September to June Semester credits are obtained in a school offering 2 or 3 sixteen-week periods annually If you attended more than three colleges, use additional sheets of paper and attach						
UNDERGRADUATE SEMESTER CREDITS	GRADUATE SEMESTER CREDITS	UNDERGRADUATE QUARTER HOUR CREDITS	GRADUATE QUARTER HOUR CREDITS			
WHAT BUSINESS, TRADE, OR OTHER SCHOOLS HAVE YOU ATTENDED (Including courses while in military service)						
NOTE Include any extension or correspondence courses you have completed List in sequence from earliest date to present Give name of school or sponsoring agency, location, course title or subject material, beginning and ending dates of attendance, and hours in class per week For correspondence courses, check proper box Include such courses as "Gull Lake Laboratory Course," but do not include short duration activities such as, "Wastewater Plant Operator Fall Training Session "						
NAME	COURSE TITLE OR SUBJECT	DATES ATTENDED		HOURS IN CLASS PER WK		
LOCATION	CORRESPONDENCE COURSE <input type="checkbox"/> YES	From (Mo - Yr) To (Mo - Yr)				
NAME	COURSE TITLE OR SUBJECT	DATES ATTENDED		HOURS IN CLASS PER WK		
LOCATION	CORRESPONDENCE COURSE <input type="checkbox"/> YES	From (Mo - Yr) To (Mo - Yr)				
NAME	COURSE TITLE OR SUBJECT	DATES ATTENDED		HOURS IN CLASS PER WK		
LOCATION	CORRESPONDENCE COURSE <input type="checkbox"/> YES	From (Mo - Yr) To (Mo - Yr)				
IF YOU HAVE ATTENDED MORE THAN THREE SPECIAL STUDIES COURSES, USE ADDITIONAL SHEETS OF PAPER AND ATTACH						
IN WHICH APPRENTICESHIP PROGRAMS HAVE YOU BEEN ENROLLED?						
NAME		DATES ATTENDED		COMPLETED		
LOCATION		From (Mo - Yr) To (Mo - Yr)				
NAME		DATES ATTENDED		COMPLETED		
LOCATION		From (Mo - Yr) To (Mo - Yr)				

FIGURE 11.3 (cont.)

PAGE 3

EXPERIENCE –DIVISION II

YEAR ENTERED WORK IN WASTEWATER TREATMENT PLANT _____ NUMBER OF YEARS OF EXPERIENCE IN 1 PRIMARY TREATMENT _____ 2 ACTIVATED SLUDGE _____ 3 TRICKLING FILTER _____ 4 LABORATORY _____ 5 DIGESTERS _____ 6 VACUUM FILTERS _____ 7 INCINERATOR _____ 8 RAPID SAND FILTER _____	AREAS IN WHICH YOU ARE MOST KNOWLEDGEABLE 1 <input type="checkbox"/> PRIMARY TREATMENT W / DIGESTERS 2 <input type="checkbox"/> ACTIVATED SLUDGE 3 <input type="checkbox"/> TRICKLING FILTER 4 <input type="checkbox"/> LABORATORY 5 <input type="checkbox"/> MECHANICAL WORK 6 <input type="checkbox"/> ELECTRICAL WORK 7 <input type="checkbox"/> VACUUM FILTER 8 <input type="checkbox"/> INCINERATOR 9 <input type="checkbox"/> OTHER _____
--	--

EMPLOYMENT RECORD, WASTEWATER TREATMENT INDUSTRY (Fill in below)

NOTE Beginning with your present or last employment and continuing in reverse time order, list and describe in detail in the spaces provided, and on additional sheets if necessary, every position which you have filled since the beginning of your wastewater treatment plant work experience, including that while in the military service. If you have held two or more positions for the same plant or different levels of responsibility or with different duties list and describe them separately the same as though this had been for separate employers

PLANT LOCATION			POSITION TITLE 1 <input type="checkbox"/> SUPERINTENDENT 2 <input type="checkbox"/> ASST SUPERINTENDENT 3 <input type="checkbox"/> SHIFT SUPERVISOR 4 <input type="checkbox"/> OPERATOR	5 <input type="checkbox"/> CHIEF CHEMIST 6 <input type="checkbox"/> LAB TECHNICIAN 7 <input type="checkbox"/> MECHANIC 8 <input type="checkbox"/> ELECTRICIAN 9 <input type="checkbox"/> OTHER _____
DATE From (Mo - Yr)	DATE To (Mo - Yr)	No. Employees Supervised by you _____		
DESCRIPTION OF DUTIES (Be Specific)				

PLANT LOCATION			POSITION TITLE 1 <input type="checkbox"/> SUPERINTENDENT 2 <input type="checkbox"/> ASST SUPERINTENDENT 3 <input type="checkbox"/> SHIFT SUPERVISOR 4 <input type="checkbox"/> OPERATOR	5 <input type="checkbox"/> CHIEF CHEMIST 6 <input type="checkbox"/> LAB TECHNICIAN 7 <input type="checkbox"/> MECHANIC 8 <input type="checkbox"/> ELECTRICIAN 9 <input type="checkbox"/> OTHER _____
DATE From (Mo - Yr)	DATE To (Mo - Yr)	No. Employees Supervised by you _____		
DESCRIPTION OF DUTIES (Be Specific)				

PLANT LOCATION			POSITION TITLE 1 <input type="checkbox"/> SUPERINTENDENT 2 <input type="checkbox"/> ASST SUPERINTENDENT 3 <input type="checkbox"/> SHIFT SUPERVISOR 4 <input type="checkbox"/> OPERATOR	5 <input type="checkbox"/> CHIEF CHEMIST 6 <input type="checkbox"/> LAB TECHNICIAN 7 <input type="checkbox"/> MECHANIC 8 <input type="checkbox"/> ELECTRICIAN 9 <input type="checkbox"/> OTHER _____
DATE From (Mo - Yr)	DATE To (Mo - Yr)	No. Employees Supervised by you _____		
DESCRIPTION OF DUTIES (Be Specific)				

PLANT LOCATION			POSITION TITLE 1 <input type="checkbox"/> SUPERINTENDENT 2 <input type="checkbox"/> ASST SUPERINTENDENT 3 <input type="checkbox"/> SHIFT SUPERVISOR 4 <input type="checkbox"/> OPERATOR	5 <input type="checkbox"/> CHIEF CHEMIST 6 <input type="checkbox"/> LAB TECHNICIAN 7 <input type="checkbox"/> MECHANIC 8 <input type="checkbox"/> ELECTRICIAN 9 <input type="checkbox"/> OTHER _____
DATE From (Mo - Yr)	DATE To (Mo - Yr)	No. Employees Supervised by you _____		
DESCRIPTION OF DUTIES (Be Specific)				

A knowledgeable person should translate "description of duties" into "Operator I or II, Mechanic I or II," etc

UNION MEMBERSHIP

Do you belong to a union? 1 ☐ YES 2 ☐ NO

If YES, what union? _____

How long a member? _____

FIGURE 11.3 (cont.)

EXPERIENCE – DIVISION II				PAGE 4
PLANT LOCATION			POSITION TITLE 5 <input type="checkbox"/> CHIEF CHEMIST 1 <input type="checkbox"/> SUPERINTENDENT 6 <input type="checkbox"/> LAB TECHNICIAN 2 <input type="checkbox"/> ASST SUPERINTENDENT 7 <input type="checkbox"/> MECHANIC 3 <input type="checkbox"/> SHIFT SUPERVISOR 8 <input type="checkbox"/> ELECTRICIAN 4 <input type="checkbox"/> OPERATOR 9 <input type="checkbox"/> OTHER _____	
DATE From (Mo – Yr)	DATE To (Mo – Yr)	No. Employees Supervised by you _____		
DESCRIPTION OF DUTIES (Be Specific)				
PLANT LOCATION			POSITION TITLE 5 <input type="checkbox"/> CHIEF CHEMIST 1 <input type="checkbox"/> SUPERINTENDENT 6 <input type="checkbox"/> LAB TECHNICIAN 2 <input type="checkbox"/> ASST SUPERINTENDENT 7 <input type="checkbox"/> MECHANIC 3 <input type="checkbox"/> SHIFT SUPERVISOR 8 <input type="checkbox"/> ELECTRICIAN 4 <input type="checkbox"/> OPERATOR 9 <input type="checkbox"/> OTHER _____	
DATE From (Mo – Yr)	DATE To (Mo – Yr)	No. Employees Supervised by you _____		
DESCRIPTION OF DUTIES (Be Specific)				
GENERAL EXPERIENCE OTHER THAN WASTEWATER TREATMENT INDUSTRY (Fill in below)				
List and describe in detail in the spaces provided, and on additional sheets if necessary, your work experience other than in a wastewater treatment plant, but which provides a background of experience which has contributed significantly to your work in the wastewater treatment field. List in reverse time order.				
EMPLOYER			ADDRESS	
DATE From (Mo – Yr)	DATE To (Mo – Yr)	No. Employees Supervised by you _____	POSITION TITLE	
RESPONSIBILITY AND DESCRIPTION OF DUTIES (Be Specific)				
EMPLOYER			ADDRESS	
DATE From (Mo – Yr)	DATE To (Mo – Yr)	No. Employees Supervised by you _____	POSITION	
RESPONSIBILITY AND DESCRIPTION OF DUTIES (Be Specific)				
EMPLOYER			ADDRESS	
DATE From (Mo – Yr)	DATE To (Mo – Yr)	No. Employees Supervised by you _____	POSITION	
RESPONSIBILITY AND DESCRIPTION OF DUTIES (Be Specific)				
MACHINE OR MECHANICAL EQUIPMENT WHICH YOU CAN OPERATE SKILLFULLY (Fill in below)				
1		2		
3		4		

FIGURE 11.3 (cont.)

TABLE 11-6

Summary of Selected Demographic Characteristics

Characteristics		Superintendent	Assistant Supervisor	Operations Supervisor	Shift Foreman	Operator II	Operator I	Maintenance Supervisor
Total number								
Male								
Female								
Age	Less Than 20 years							
	20-24 years							
	25-34 years							
	35-44 years							
	45-54 years							
	55-64 years							
	Over 64							
Present status	Full time							
	Part time							
	Seasonal							
Certificated								
Registered								
Schooling completed	Less than 12 years							
	12 years							
	Some college							
	College graduate							
	Some tech. school							
	Apprenticeship							
Last previous experience in wastewater treatment	Same level, same occupation							
	Same level, different occupation							
	Lower level, same occupation							
	Lower level, different occupation							
	Same industry, same state, different plant							
	Same industry, another state							
	Same plant							
Years of pre-vious exper-ience in wastewater treatment plant	Different plant, same metro. system							
	Less than 1 year							
	1-4 years							
	5-10 years							
	11-20 years							
Years of pre-vious exper-ience in present occupation	More than 20 years							
	Less than 1 year							
	1-5 years							
	6-10 years							
	11-20 years							
	More than 20 years							

Another aspect of personal background of importance to manpower planners is the educational background of present employees, providing information which may be translated into future educational programs as well as overall manpower planning. The base of formal education is that in which are usually included: grade school, high school, junior college, technical college, community college, and university work. The general education development (GED) diploma is frequently considered an equivalent of a high school diploma and can be included. This information can be compiled from the personal data form and summarized in a table similar to Table 11-8.

TABLE 11-8

Extent of Formal Education

Occupation	Number in Occupation	Years Completed							
		Less than 8	8	10	12	14	16	Over 16	GED
		No. Percent	No. Percent	No. Percent	No. Percent	No. Percent	No. Percent	No. Percent	No. Percent

Training may involve many areas unrelated to the occupation; therefore it may be desirable to summarize training of employees only in those areas related to the occupation or to preparation for it. What is to be considered as "related training" must be determined by the planner with the help of the training officer and then summarized in a table similar to Table 11-9.

Since certification and licensing of personnel is becoming increasingly more important, information related to such factors may

TABLE 11-9
Training in Areas Related to the Occupation

Occupation	Hours of Training						
	0	1 to 20	21 to 50	50 to 100	101 to 200	201 to 500	More than 500
	Number Percent	Number Percent	Number Percent	Number Percent	Number Percent	Number Percent	Number Percent

be summarized from the personnel data forms in a format similar to that shown as Table 11-10.

TABLE 11-10
Extent of Certification and Licensing

Occupation	Number in Occupation	Certified		Licensed	
		Number	Percent	Number	Percent

Previous work experience is important both for the purpose of planning the training and of determining probable sources of future employees. The information can be taken from the personal data form and summarized in a table similar to Tables 11-11 through 11-13.

TABLE 11-11

Previous Years of Experience in Wastewater Treatment Industry

Present Occupation	Number in Occupation	Previous Years of Service					
		0	Less than 1	1 to 5	6 to 10	11 to 15	More than 15
		Number Percent	Number Percent	Number Percent	Number Percent	Number Percent	Number Percent

TABLE 11-12

Previous Experience by Occupational Group

Present Occupation	Previous Occupational Group							
	Skilled	Unskilled	Construction	Plumber	White Collar	Engineer	Machine Mechanic	Other
	No. Percent	No. Percent	No. Percent	No. Percent	No. Percent	No. Percent	No. Percent	No. Percent

TABLE 11-13

Previous Experience by Industry

Present Occupation	Previous Industry ^a

^a Experience will dictate which industries are important.

A picture of transfer patterns of present employees can be developed by the preparation of tables similar to Tables 11-14 and 11-15.

TABLE 11-14

Experience in Present Job and Grade

Present Occupation	Years of Experience									
	Less than 1		1-5		6-10		11-15		Over 15	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent

TABLE 11-15

Last Previous Job in Wastewater Treatment Industry

Occupation	Last Job ^a

^aSee same jobs on left-hand column.

Continuity of service may be dependent in some measure upon the civil service status of employees. The coverage of the various occupations by civil service can be summarized as in Table 11-16.

TABLE 11-16
Coverage by Civil Service

Occupation	Total	Covered by Civil Service	
		Number	Percent

One other piece of desirable information is the extent of unionization. If the worker feels that union membership is acceptable to the employer, she or he will answer questions on the personal data form pertaining to any union membership. On the other hand, if the employee feels that security or future would be impaired by such information, she or he will seldom admit membership.

State manpower planners will want to know the extent of unionization of the plants in the state, the unions that are involved, and the nature of the collective bargaining that exists. Because of the sensitivity of the unionization question, it may therefore be necessary to have an anonymous questionnaire administered which is similar to the personal data form section on union membership. It would also be helpful for state manpower planners to have copies of all existing or potential union agreements or contracts, along with all information possible about the unions involved. Information should also be collected pertaining to past and current negotiations on new contractual relationships, as well as changes in existing ones. Data comparing union and nonunion plants can then be developed.

Some skilled workers, especially in the absence of an industrial-type union -- such as the American Federation of State, County and Municipal Employees -- may belong to craft-type unions such as operating engineers, electricians, machinists, and the like. Therefore information about these unions is also desirable. Included in this information should be data about apprenticeship programs, wage scales, and so on.

Career Ladders

Closely related to information on training is the documentation of existing and desirable career ladders. A career ladder provides an opportunity for advancement and defines the path that such advancement is most likely to follow. Whether such ladders exist will play an important part in manpower planning. The manpower planner should document the presence or absence of career ladders, determine what is a desirable career ladder, and undertake the necessary steps to bring the actual in compliance with the desired. An example of a career ladder within a particular type of wastewater treatment plant is illustrated in Figure 11.4.

The completion of the preceding tables and figures and an understanding of the material contained within them would provide the manpower planner with information regarding the physical dimensions of the source of employment found within an organization. The exception is that which we might refer to as the headquarter staff of the organization. In some organizations information similar to that illustrated in the aggregate tables and figures would exist, although perhaps in a different format, and may be stored on computer tapes.

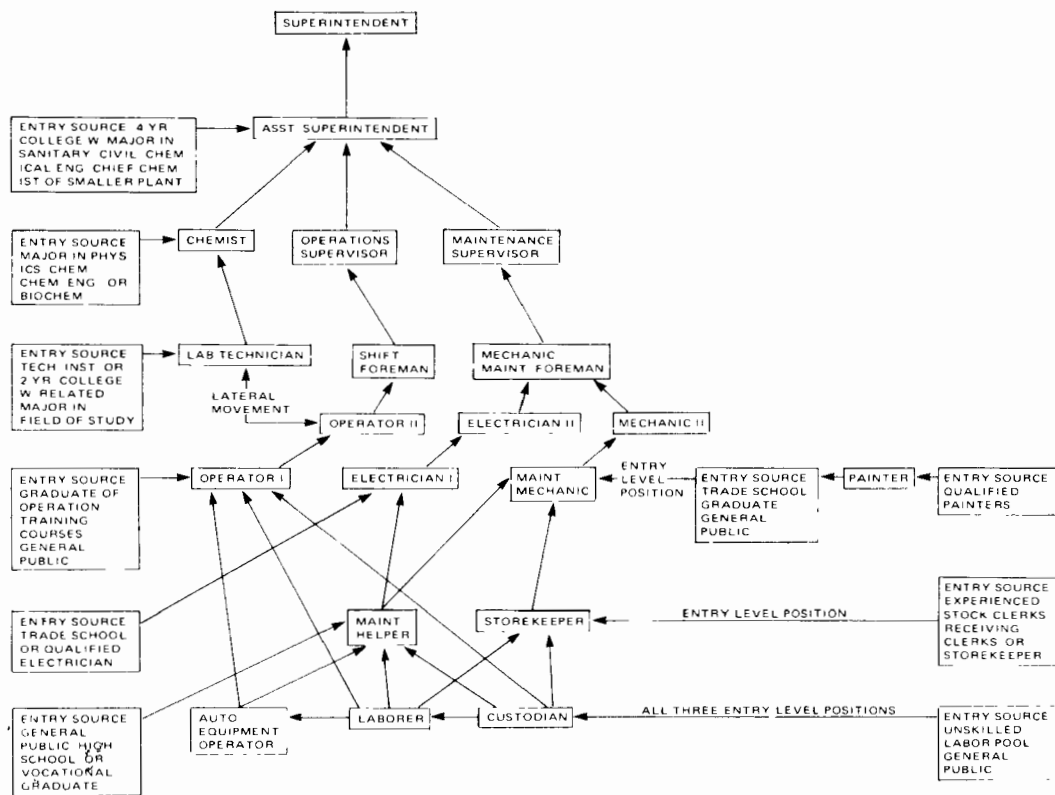


FIGURE 11.4. Career Ladder for a 50 to 100 mgd Wastewater Treatment Plant

It may also be nonexistent, and in that event the planner will have to obtain it. In many cases information might be obtained by circulating some appropriately designed questionnaires listing the information (see Figure 11.3). It is conceivable that for certain types of public sector organizations a questionnaire cannot be circulated because it is not known with the appropriate degree of certainty where the places of employment within the organization are. Such occurrences would depend to a considerable extent upon how the manpower planning function was organized at the state or local level.

Such difficulty, as we have previously described, would most often occur when the manpower planning function is organized on an occupational rather than a functional basis. Should some local community establish a manpower planning function divided in some way by occupation, it is conceivable that the person employed as the manpower planner would not know where all people employed in that particular occupation are located. Certainly at the national level, exact information is not available on where all the economists or solid-fuel rocket engineers are employed. This would seem to indicate that planning organized on occupational structure would cause a modification in this planning step. Rather than the detailed inventory, what seems more appropriate is to simply list the type of organizations that would employ the occupations for which the planning is being done. It would, however, be desirable to obtain an inventory, even if based on sampling procedures, if resources permit.

It is quite possible, when we think further about the organization of the manpower planning function, that if it is organized on an occupational structure, the detail of many of the steps that we are about to expound upon will differ from one in which a planning function is organized on a functional basis. This is simply another variation of what we have said before: The weights attached to different steps in the manpower planning process will vary according to the type of manpower being planned for.

Another important aspect of the organization with which the manpower planner must be familiar is based upon the observation that the demand for labor (manpower) is, as we have mentioned before, a

derived demand. It is derived from the demand for the organization's "output." What is the organization's output? How does employment in the organization relate to such output? In many cases the output is a service or, if it is a physical good, it is one that is not often conveniently measured. Furthermore, the product may not be sold and revenues will come from a budgetary process. The manpower planner should understand this process both in its current form and also in its historical dimensions.

The question of what the organization does produce or what the functions of the organization are will to many manpower planners be obtained by past experiences in the organization. This source of information is not likely to be sufficient, however, for it may too narrowly prescribe the information available to the planner. Other sources of information, possibly much broader than that obtained internally in the organization, is required. Should the planner be working with a crime prevention organization such as a state highway patrol, for example, it would not be detrimental to the performance of his or her job to study both internal and external sources of information. The planner may find considerable profit in reading monographs or articles that discuss the causes of crime, the role of incarceration in the prevention of crime, and the relationship of poverty to crime. For someone planning for the various offices in local government, knowledge of their increasing financial problems and the intergovernmental relations would seem to be of use to such a planner. In the area of water quality control, knowledge of the effects of different pollutants, which goes beyond knowledge of the

technical aspects of wastewater treatment, would be of use. In short, the manpower planner should consider himself or herself a part of the organization's management team and should therefore become knowledgeable about the broader aspects of the organization.

With respect to the immediate manpower planning functions -- the individual manpower planners should have a feel for the history of employment in the organization. If manpower planning has been done prior to their doing it in the organization in any way that resembles what we describe in this book, then planners will be able to examine data collected in the past for such information. They should understand the dimensions of past union and management relationships within the organization. They should understand the relationship between employment in their own organization and employment in the relevant labor markets and the availability and relevance of other manpower services upon which they may draw. They should know whether they operate in a local labor market with respect to their occupation or whether they must draw from a national or state market. They should know if, given the nature of the people who may work within the organization, whether the services of other manpower departments are available to them. Can other manpower planners whose primary objective is the placement of the disadvantaged be of assistance to them? Can local training institutions provide them with information on the training aspects of their functions?

Much of what we have described in this substep are activities that may not need to be repeated on a regular basis because in some cases the information obtained is a once-and-for-all proposition.

If the organization is a dynamic one, however, this will not entirely be the case. It will clearly be a periodic activity if the organization is dynamic or if the interface with other organizations is important. In general, however, much of the preceding has large elements of a nonrepetitive-type activity.

DETERMINE THE ORGANIZATION'S OBJECTIVES

The purpose of this substep is to have the manpower planner come to an understanding of the objectives of the organization and how they relate to or influence the manpower objectives. Implicit in the presence of this step is the view that the manpower planner is a part of a "management team" who will both receive instructions from other (higher) members of this team (the "manager") and provide input useful to the team effort. The planner may be required to translate organizational objectives into manpower objectives or may receive direct and operational manpower objectives from management. In the latter case, planners will of course be required to act on such objectives, although in those cases when they feel such objectives are poorly developed, for whatever reason, they should in some appropriate way communicate such reservations to those who developed the objectives.

In some cases the manpower objectives in the public sector, at least in their broadest manifestation, are determined by the content of the enabling legislation for the organization in question. (This is particularly the case in many of the environmental areas.) The planner should thoroughly understand such legislation. In other cases the intent of the legislation will be general and vaguely stated

thus requiring the planner to translate them, or assist in their translation, to more operational objectives. The point of all this is simply that even in what to some might be the easiest sector in which to do good manpower planning, the movement from general organization objectives to operational manpower objectives is not an easy one.

In some respects the transition mentioned above is more difficult in the public than in the private sector. An important reason for this, even when all of the requisite skills are available to measure returns to alternative employment configurations, is the absence of certain benefits, whether they be cost minimization, increased effectiveness, or others. Without the discipline of profitability, or the operational guide of cost minimization, or some definite measures of change in efficiency, other objectives are often sought. One often ill-conceived goal in the public sector is to eliminate all production bottlenecks regardless of cost. It is unfortunately the case that many aids to occupational definitions are often devised on assumptions that are not in general warranted by the criterion of efficient operation.

In some cases past and present manpower efforts ought to be questioned on the basis of the preceding arguments. For example, staffing guides are most often based entirely upon engineering data, with no allowance for trade-offs among the alternative occupations. This is a particularly egregious error in eliminating the role of input costs in determining such staffing guides. If taken as guides, they are of value; but if taken as absolutes, they may introduce

inefficiencies into the operation of the organization. Objectives that rely upon them must be tempered accordingly.

Moving from the organizational objectives to operational manpower objectives is not an easy task. It will require certain skills and considerable judgment. Even in the private sector where the organization's motive is the deceptively simple sounding maxim -- maximize profits -- much difficulty can be experienced in obtaining manpower objectives. What would be required within a private firm is that staff and occupational mix that maximizes profits. But such a task requires all the costs and benefits from a given complement of employees be measured.

Attempts, for example, to remove all production bottlenecks, although a seemingly rational manpower objective, may not be optimum insofar as the costs of removing it may outweigh the benefits. This is not an uncommon aspect of private markets when some congestion or seemingly nonoptimization is in fact optimal. Thus in certain cases, allowing -- or requesting -- current employees to work overtime may be more efficient than temporarily hiring new and additional workers. Alternatively, given the considerable investment made by some firms in certain of their employees, the firm may be reluctant to lay them off in slack times for fear that these employees may find other and more permanent work. For this reason some firms will "carry" certain employees, which to the uninitiated may appear to be nonoptimization.

Manpower planners should engage in various search procedures in an attempt to discover the nature of the organization's objective function. By this we mean that they should obtain information from

various sources that would indicate to them the trade-offs that management appears to have among the various elements of its objective function. Such a search can be accomplished by direct questions of the management sector or, believing in the adage that actions speak louder than words, in the programs and budgetary allocations within the organization, wherever relevant. Given limited budgets and staffs manpower planners may not be able to do all that they feel is necessary, and certain priorities and trade-offs should be established. They should determine, for example, whether their efforts should be equally divided between assessing current problems and projecting future problems, or whether projections carry more weight in the objective function than measurement. They should determine how important to the manager's objectives is the analysis of manpower problems as compared to accurate projections of future manpower needs. All in all, manpower planners should attempt to estimate these trade-offs and priorities. Exact numerical weights will not be available, but some rank orderings may be possible in selected cases. Ordinal rankings might be obtained by analysis of current programs and their status in the organization, as partially judged by their budgetary allocations. Such information should be adjusted, however, on the basis that the cost of performing certain functions vary and that a large budgetary allocation does not necessarily imply high priority but may simply imply a necessary but expensive function.

Closely associated with the issue of determining the order of priorities is that of determining the time frame within which certain objectives are expected to be achieved. To achieve many objectives

in a shorter rather than a longer period of time will require increased resources. In addition, many objectives are of necessity of a sequential rather than simultaneous nature -- that is, one must be completed before another can be. Thus to place a time constraint upon achieving one objective implies a time constraint upon achieving another.

The specific action the manpower planner should take in compiling this step would include tracing the legislative authority and mandates for his or her agency, determining the objectives of the agency, translating these objectives into general and specific manpower objectives, determining manpower priorities, and determining the time frame within which objectives are to be attained.

At this point in the execution of this substep, it is necessary for us to display in tabular form some concepts that we have not yet introduced or fully developed. Rather than disrupt what we consider to be the logical flow of our analysis, we shall, however, mention certain items that the manpower planner should document that involve concepts that are to be developed later.

In order to obtain a feeling for the dimensions of the organization's commitment and past experience with manpower planning, the planner should document the budgetary history of the organization obtaining as much detail on this history as is possible. Such information as would be desirable is displayed in the suggested format contained in Tables 11-17 and 11-18.

Trends in these data, or their absence, would suggest an increasing, constant, diminishing, or random commitment to manpower

TABLE 11-17

Organization's Budgetary History
(Millions of Dollars)

	1969	1970	1971	1972	1976
FEDERAL SHARE					
STATE SHARE					
LOCAL SHARE					
TOTAL					

planning, as would any changes in the allocations of the total budget among the various activities of planning and training. Some caution should be exercised in using these absolute figures as an index of the organization's past and current commitment for they should most appropriately be expressed as a proportion of the organization's total budget. Expressing such numbers as a proportion of the total budget would indicate changes in the relative commitment of the organization toward manpower planning and development activities.

Another important aspect of developing information concerning the organization's objectives as they pertain to manpower is some documentation of specific employment characteristics that either the management has dictated that the manpower planner should seek to attain or that, in conjunction with management, the manpower planner has determined would be an appropriate objective. Such objectives may have to do with target levels of actual employment to be attained in the organization or some targeted level of shortfalls, vacancies,

TABLE 11-18

Analysis of Past Organization Budgets

Year	Budget for Manpower Development and Training Functions	As a Percentage of Organization's Total Budget	Budget for Manpower Planning	As a Percentage of Organization's Budget	As a Percentage of Manpower Development and Training Budget
1970					
1971					
1972					
1973					
1974					

turnovers, or a variety of other employment characteristics that emerge from the measurement of current employment and forecasts of future employment.

A precise determination of an organization's objectives will not, under normal conditions, be made until information on those characteristics which the organization wishes to enter into its objective function has been obtained. Thus an objective might eventually be stated in terms of reducing an employment shortfall in a given occupation by 50 percent of what it currently is or to some absolute number expressed as a percentage of current employment. In order to have such an objective, however, it is necessary to know what the current shortfall rate is. For this reason the exact determination of objectives will have to be done sequentially and would follow the measurement of current and the forecasting of future employment characteristics. For this reason there is some logic in having the manpower planner determine the organization's objectives after the measurement and forecasting of future employment tasks have been completed. We prefer, however, to cover the determination of objectives in some detail in this step.

The problems associated with needing yet-to-be-obtained information for determining specific objectives is somewhat reduced when the repetitive nature of the manpower planning process is acknowledged. If such repetition occurs, general outlines of the organization's objectives will usually remain stable from one year to another, and only the specific targeted levels of whatever is being planned for will be included. Furthermore, knowledge about objectives is valuable

in determining what measurements and forecasts are to be emphasized in subsequent steps.

Examples of the type of objectives and the format in which they can be displayed are illustrated in Tables 11-19 and 11-20.

SUMMARY

A thorough knowledge of the organization for which the planning is being conducted is indispensable if its manpower issues are to be approached in a rational manner. Such knowledge will not be easy to obtain. This is especially true when manpower planning is first introduced into an organization. The initial completion of this step will be a difficult and time-consuming activity. As the planning cycle is repeated, however, many of the activities associated with this step will be in the form of updating previously obtained information.

If an efficient data storage and retrieval system is developed and maintained, the annual task of updating the information relevant to this and succeeding steps will be made much simpler. Most of the tables and figures that we have presented in this chapter, and will present in subsequent chapters, are intended to serve not only as an immediate aid in consummating a particular step but also as a system for storing specific data. In certain organizations now, and in many organizations in due time, it is possible to store information upon computers. This will not be a task that the manpower planner will need to do personally. The planner will be required, however, to provide information to computer programmers regarding how he or she would like the information stored. The suggestions we have provided

TABLE 11-19

Specific Manpower Planning Objectives
for 1975

Occupation	Desired Employment Level	Desired Vacancy Rate	Desired Quit Rate	Desired Discharge Rate	Desired Number Trained	
					Upgrade	Update

TABLE 11-20

Alternative Specific Manpower
Planning Objectives

Occupation	Percentage Change					Desired Number Trained	
	Employment Level	Desired Vacancy Rate	Desired Quit Rate	Discharge Rate		Upgrade	Update

in this chapter, as embodied in the various tables and figures, should provide ample instruction to the programmers on these matters.

SELECTED REFERENCES

Michigan Department of Natural Resources. Manpower Planning for Municipal Wastewater Treatment: Michigan 1972-1976. Municipal Wastewater Division, Bureau of Water Management, Michigan Department of Natural Resources, (March 1974).

New York State Department of Environmental Conservation. New York State Manpower Study for Municipal Wastewater Treatment. New York: New York State Department of Environmental Conservation, (August 1974).

Wright, Colin, et al. Manpower Planning for Wastewater Treatment Plants. Washington, D.C.: Office of Water Programs and Operations, Environmental Protection Agency.

MEASUREMENT OF CURRENT EMPLOYMENT CHARACTERISTICS

In this chapter we discuss the issues related to the execution of step 2 in the manpower planning process: the measurement of current employment characteristics. The purpose of completing this step is for the manpower planner to obtain information concerning the dimensions of current employment (or staffing) within the organization. Measurements conducted in the execution of this step are to be used as a basis for estimating future manpower requirements, for assessing current and expected manpower problems, and as a data base for performance control.

It would seem only logical that if the purpose of a particular activity is to assess current and future manpower problems and requirements, the process begin by an assessment, both in numbers and quality, of current personnel. This task can be viewed as consisting of two parts: (1) obtaining an "inventory" of current personnel, and (2) measuring such current employment characteristics as employment shortfalls, vacancies, and so forth.

INVENTORY OF CURRENT PERSONNEL

The inventory would obtain information on the occupations of current personnel within the organization and the basic skills required to perform adequately in those occupations. It will be useful to obtain similar information on the people in each occupation. The purpose of such data would be to see, for example, whether those occupying a position have the qualifications demanded by that position.

Other information that may also be collected in such an inventory would be the age and sex of those occupying the particular position. The age is of particular value in estimating certain aspects of future employment, since retirements in many organizations may be an important aspect of employment that gives rise to the necessity of recruiting new employees.

Obtaining an inventory of current personnel could, in a somewhat ideal sense, serve as a basis for measuring the performance of current personnel. Thus if we can measure the output of the organization and relate it to the characteristics of the current personnel, we might in the future be able to improve such performance by hiring individuals having different characteristics. This is a difficult process, however, because in many aspects of the type of manpower planning in which we are engaged we are not producing something that is equivalent or analogous to that of a production line, which has a tangible product and experiments with the qualities of personnel that can make measurable changes in the output. Not only is it difficult to measure performance and thereby assess how to improve it, but in many cases external forces impinge upon those things that the public sector does. Thus, for example, in a production line the external forces are in many ways, although not completely, controlled. If, however, we were to consider crime protection as output, it would be affected not only by the number of police officers employed, a controllable event, but also by changes in those external forces which might tend to increase crime such as poverty, for example, that is not controllable by the agency in question -- the police department.

We have assumed that the basic data relevant to determining the inventory of current personnel have been collected in the completion of step 1. What is required in step 2 is to display certain aspects of that inventory in a meaningful way for both the determination of specific objectives and for the solution of possible manpower problems. What we suggest in this step is that certain comparisons between the desired and actual characteristics of employment be made. Although there are many comparisons that could be made between what current personnel are like and what an ideal composition of personnel would be, we emphasize only one for purposes of illustration. What we choose is that which seems to be the most important for the majority of public organizations: extent of training or general job preparation.

Each employee should be identified according to the extent of her or his preparation. We shall consider only training in this category, although other dimensions are possible. The level and type of actual training should be compared with desired training. We should be mindful, however, that written descriptions do not always adequately reflect the ability of individuals to do the job in which they are employed. Thus we may find individuals who have the necessary training and who do not do the job well and also people without training who do as well. In the absence of concrete measures of employee efficiency, judgmental factors will enter and other imperfect measures adopted. For our purposes and at the present time we deal with some quantifiable aspects of these measures and therefore suggest a format similar to that expressed in Table 12-1.

TABLE 12-1

Training Deficiencies of Current Employees

Name of Employee	Occupation	Type of Plant	Type of Training Received	Type of Training Desired	Training Deficiency
John Doe	Operator I	5	None	OJT.1	OJT.1
Jim Smith	Operator I	7	C.1	OJT.1, S.2	S.2
George Kutz	Operator I	4	I.1	OJT.1, S.2	None

The illustrative information shown in the table assumes that the manpower planner, in conjunction with the training officer and with the help of occupational descriptions, can make certain quantitative comparisons among different training programs. It assumes, for example, that a given employee can, according to the general skill she or he brings to the occupation, be identified according to the type of training that she or he should receive to efficiently occupy her or his current position. The table also presupposes that records exist from which information can be obtained as to the amount of training each employee has actually received. Finally, it is assumed that the required and actual training can be identified by courses and that quantitative comparisons be made.

In Table 12-1 we have provided some sample data with abbreviations for the types of training. These training types are spelled out in more detail in Table 12-2 with Table 12-1 using abbreviated notations. For example, OJT.1 refers to on-the-job training program of type 1, while S.2 refers to the second type of special training programs. There is a presumption that in the case, for example, of Jim Smith, the difference between OJT.1 and S.2 (the desired training) and C.1 (the actual training) is S.2. This is to imply that some judgment has been made that C.1 and OJT.1 are equivalent under those circumstances reflected in Jim Smith's personnel record. Making such judgments will be a difficult task and one that will require input from the training officer.

The information on training deficiency for each individual should subsequently be aggregated so that the total training needs can be

TABLE 12-2

Training Required for Current Operators I

[illegible]

displayed in a format suggested by Table 12-2. This information, and more yet to be obtained, provide the basis for determining the organization's training effort. Much more will be said on this point when we discuss step 4.

Measurement of Employment Characteristics

Another aspect of ascertaining the dimensions of current employment is to measure the levels of the different types of employment that may exist within the organization and their various dynamic elements. In many respects this is a function similar to that of conducting an inventory, although for reasons that will become obvious subsequently, we wish to keep these two subfunctions separate in our explanations and analyses. In many organizations there are three general types of employment that the manpower planner could measure: (1) recommended employment, (2) budgeted employment, and (3) actual employment. Recommended employment is that employment delineated by staffing guides or manning tables and in general may be defined as that level of employment that has been suggested (through consultation, as discussed in the material in chapter 7 on human engineering) as being necessary for the efficient operation of the functions under examination.

As we have mentioned previously, there are shortcomings in such a concept insofar as it ignores the effect of wages on the relative combinations of inputs used in the production process. The bases for these shortcomings are illustrated in Figure 12.1. In this figure we display wages and quantity of labor on the axes as we did in our discussion of the demand and supply of labor in chapter 3.

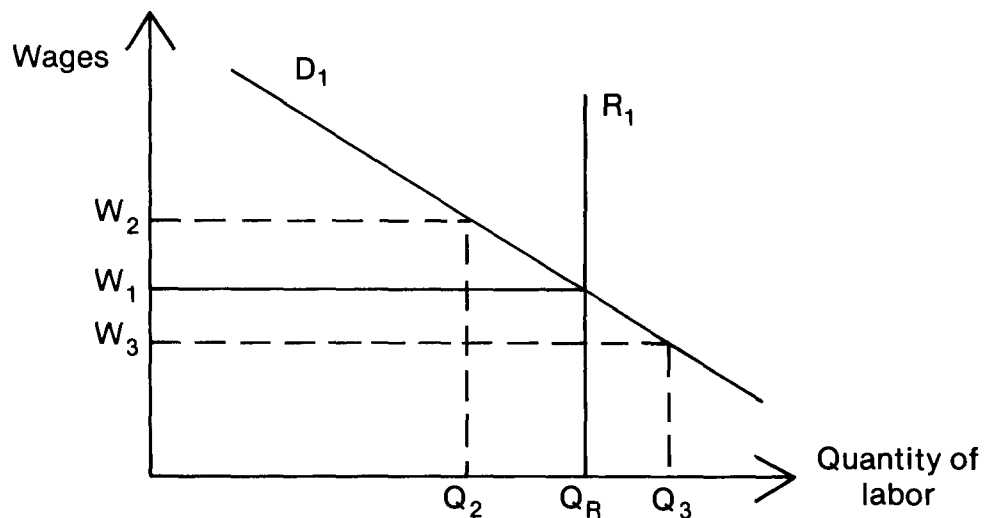


FIGURE 12.1. Illustration of Recommended Employment

The level of recommended employment we have illustrated as resulting from the demand curve is noted as R_1 . Note that the quantity demanded is independent of the wage rate; that is, the same quantity is recommended (sometimes the terminology is "required") regardless of what the wage happens to be.

If the "normal" or "effective" demand curve were D_1 (i.e., the demand that will actually be in force if the organization adheres to the principles of efficiency as discussed in chapters 3 and 10), then the effective demand for labor and the recommended level of employment will be equal only when the wage is W_1 . At higher wages such as W_2 the quantity of workers demanded would be Q_2 , smaller than the recommended level. For smaller wages than W_1 , such as W_3 , a larger number of workers -- or Q_3 -- would be demanded.

Notice that in the preceding analysis we have said nothing about the supply of labor. This complication, in the presence of recommended employment, will be introduced subsequently.

A second employment concept is budgeted employment. This concept refers to that level of employment provided for in the organization's budget. Such budgets may exist in one of several ways. There may be an allocation of an aggregate dollar amount to employment, leaving some discretion to the manager as to its allocation among several occupations as determined by his or her perceived needs and the prevailing wage rate for certain classifications of employees. In other cases both the budget and wage may be predetermined for each occupation. This latter method thus defines the maximum number of "budgeted positions." When the wage is not specified, as in the former case, then the relationship between the level of budgeted employment and the wage is as depicted in Figure 12.2. The curves are rectangular hyperboles which have the characteristic that all of its subtended rectangles are of equal area. Thus at a wage of W_0 the quantity Q_0 could be employed, while at W_1 the level Q_1 could be employed, with W_0Q_0 equaling W_1Q_1 . The curve labeled B_1 is for an aggregate budget of, say, \$100,000. The curve labeled B_2 is for a larger budget, say \$200,000.

If the wage had been predetermined, we would have an illustration such as the one displayed in Figure 12.3. Note that the axes are labeled differently -- the change being in the substitution of "size of budget" for "wages paid." In this diagram angle α_0 denotes the wage rate. Thus if α_0 represents wage rate W_0 , the

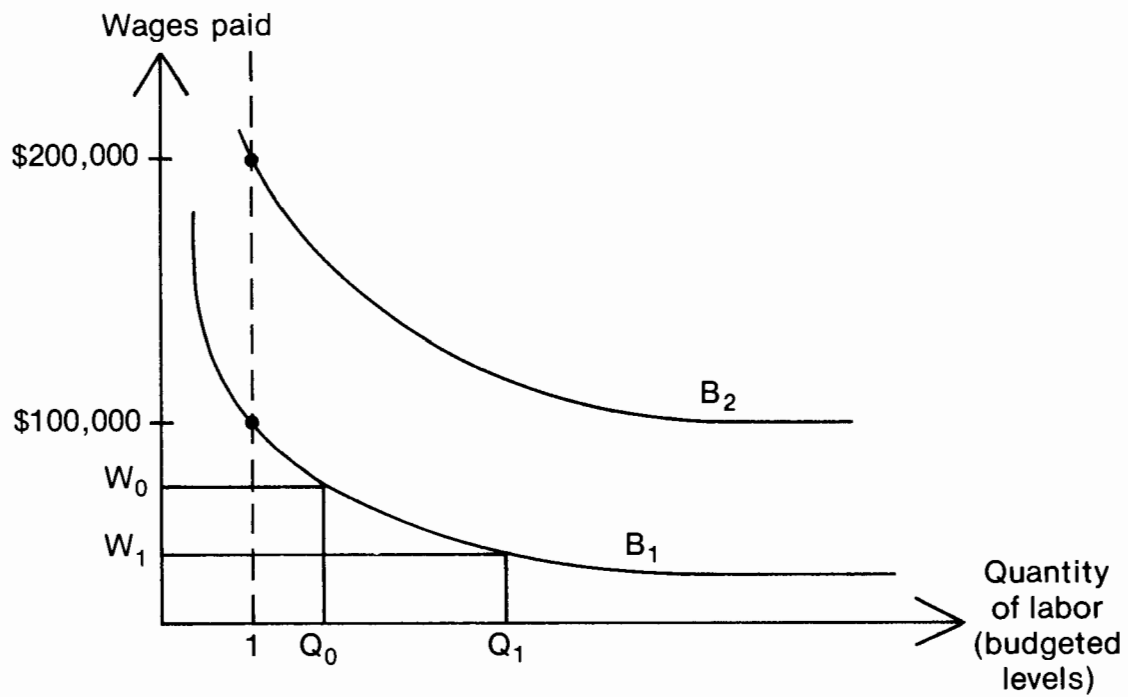


FIGURE 12.2. Levels of Budgeted Employment as Determined by Wages Paid

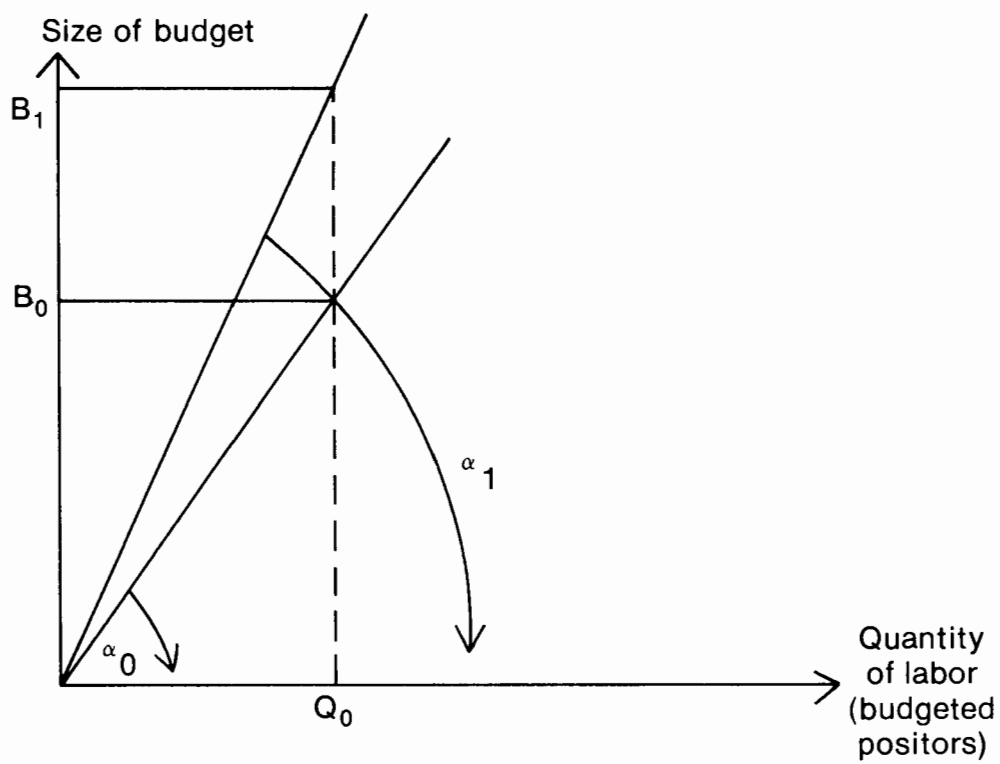


FIGURE 12.3. Budgeted Employment When Wages Are Fixed

graph tells us what size budget is required to employ a given quantity of labor. Thus if Q_0 is required, the budget must be B_0 . For a larger wage, noted by angle α_1 , a larger budget, B_1 , is required if Q_0 is to be the budgeted quantity.

It is often the case that budgeted employment differs from the recommended level of employment. One function of the manpower planner is to ascertain why such differences exist. Do the differences exist because of the allocation determined by the manager, based upon disagreement or dissatisfaction with those levels of employment recommended in the staffing guides? Or is it simply a matter of inadequate aggregate funds or the incorrect wage that is required to attract the desirable type of personnel? In some cases the staffing guides are only suggestive and allow for some margin of difference, but the relevant question should be whether the budgeted employment falls within this margin of error. If so, then it is truly a guide. If not, then the manpower planner must look elsewhere for an explanation.

The third type of employment is actual employment and is simply the number of people employed within the organization. This level is that which under normal conditions is determined by the intersection of the supply and demand curves as illustrated in chapter 3. In other circumstances, it will be that level determined by the interaction of budgetary and supply factors, as we shall illustrate shortly.

The difference between recommended and budgeted employment we refer to as a shortfall and particularly as a budgeted shortfall.

The difference between budgeted employment and actual employment is also a shortfall, but we shall refer to it as a vacancy. The sum of the budgeted shortfall and vacancy can both be used as some measure of existing problems, depending upon the nature of the objectives, or may be stated as problems the objective of which manpower planning is to overcome. In many cases the absolute value of the shortfall is misleading, and therefore the expression of such shortfalls in proportional terms is advocated.

In those cases where only the budgeted amount is given and the wage is not set by the budgetary process and the resulting rectangular hyperbole becomes a form of an effective demand curve. We illustrate this, with its implications for the possible differences between budgeted and recommended employment, in Figure 12.4. Given supply function S_1 , which depicts the number of individuals offering their services at alternative wage rates, a budget of B_1 allows Q_B units of labor to be employed with Q_R the recommended employment level. Difference $(Q_R - Q_B)$ is the "budget shortfall."

The situation becomes slightly more complicated when the budgetary process fixes both the wage and the budget, thereby fixing a given number of budget positions. We illustrate one such situation in Figure 12.5. The wage and quantity fixed by the budgetary process are noted as W_B and Q_B respectively. Demand curve D_1 is that which would be in effect if the organization were being run on the basis of the principles of efficiency as discussed in chapters 3 and 10. If the "free play of market forces" were allowed, the wage would be W_1 and the quantity employed Q_1 . At wage W_B , quantity Q_A

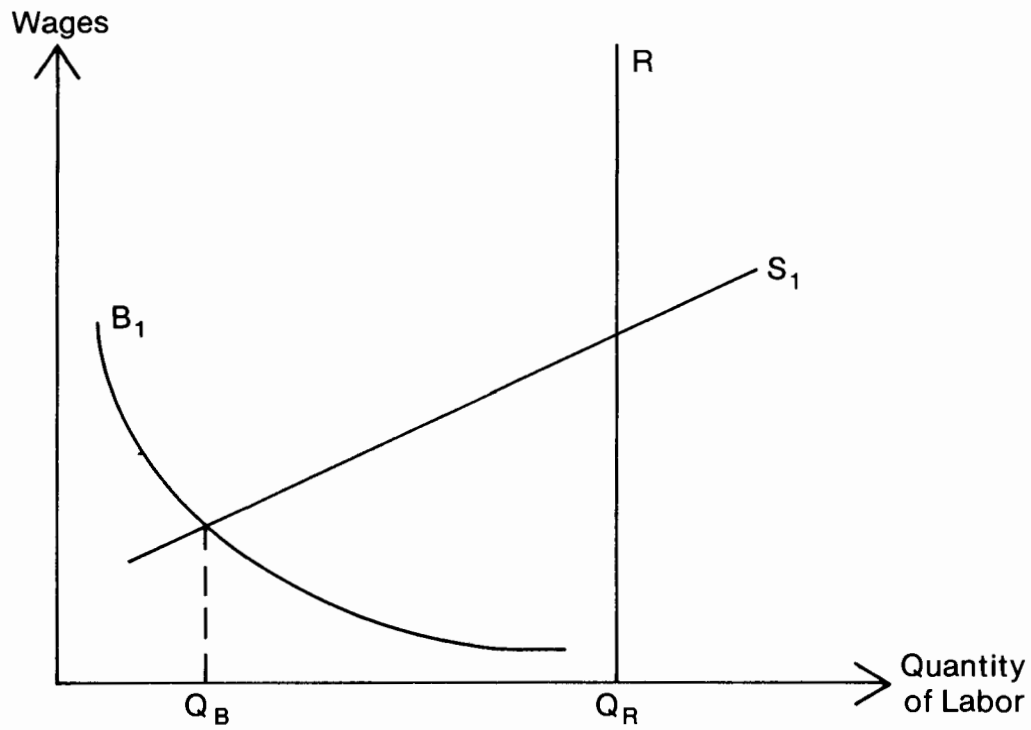


FIGURE 12.4. Relationship between Budgeted and Recommended Employment

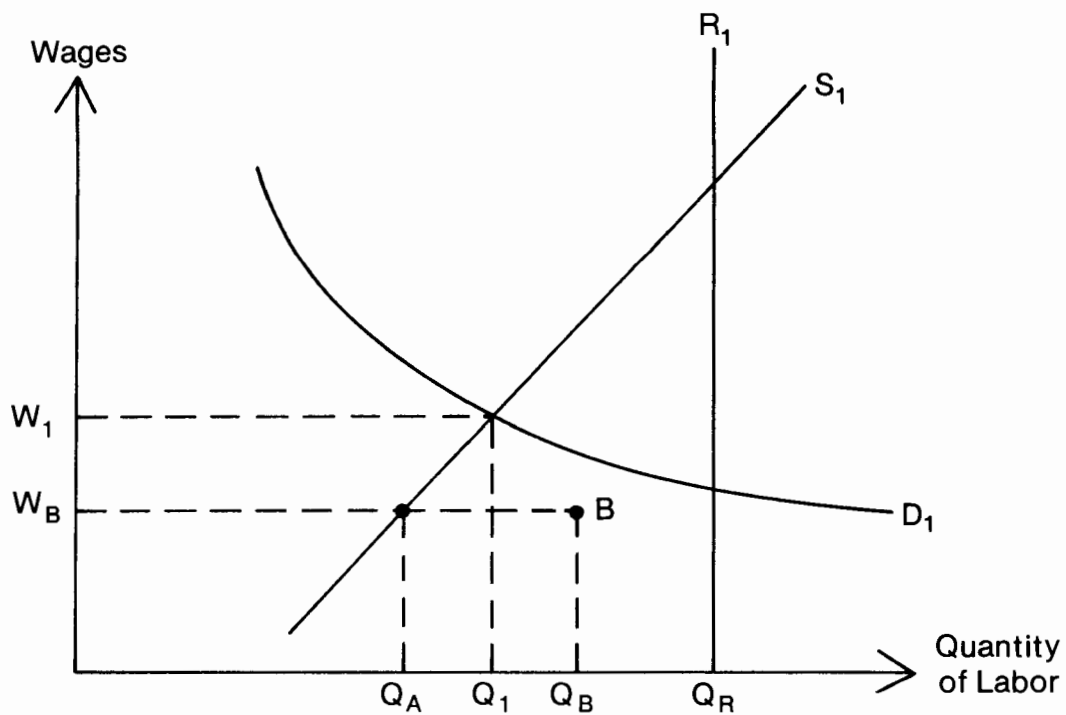


FIGURE 12.5. Relationship between Vacancies, Budget Shortfall, and Employment Shortfall

could be hired (we are keeping constant the presumed quality of the employee). Difference $(Q_B - Q_A)$ would be vacancies and difference $(Q_R - Q_B)$ budgeted shortfall. Their sum, $(Q_R - Q_A)$, is the employment shortfall.

Position B in Figure 12.5, the point determined by fixed budget and fixed wage, could of course be located elsewhere in the figure. If it were on line R_1 , there would be a situation where budgeted and recommended employment were equal and there would be no budget shortfall. If point B were on supply curve S_1 , there would be no vacancy but there would be a budget shortfall. If B were to the left of S_1 , not only would there be no vacancies but there would be more people seeking work than there were budgeted positions -- a condition of "excess supply" of labor.

Further economic analysis of these different employment concepts could be undertaken but at considerable risk of obfuscation. We shall desist from our graphical analysis for the time being. We shall have an occasion to expand upon the preceding in chapter 14 when we discuss the analysis of manpower problems.

DYNAMIC ASPECTS OF EMPLOYMENT: TERMINATIONS AND ACCESSIONS

Another important aspect of the measurement of employment is to capture the dynamic aspects of employment. Within the employment process of most organizations few things are static. Employees come and go for a variety of reasons. A twofold general classification of the dynamic aspects of employment would be terminations and accessions. Terminations are simply the number of employees that

leave a particular occupation within a given period, while accessions are the number of people that enter a particular occupation within the period. Terminations consist of several components. Individuals leave a particular occupation because of death, retirement, discharge, promotion, transfer, or quits.

Accessions, which measure the sources from which new employees are recruited, also have several components. An individual may come to a particular job from what we have referred to as an "external" labor source. Employees in a particular occupation may come to that position from elsewhere in the organization -- from the "internal" labor market. This change in occupation we refer to as a transfer. Transfers may be further delineated according to whether they are an upgrade or downgrade transfer, defined either as to the skills required or to the salary paid, or horizontal transfer where the person has similar skills, similar merit system classifications, or similar salary. A schematic view of these dynamic aspects of employment is shown in Figure 12.6.

In delineating the functions that fall within this step, we have decided to separate it from that function that occurs in a later step, namely the projecting of future employment characteristics. To some the separation may be artificial, for they would view the measurement and projection as part of the same step. We prefer, however, to separate the acts of data collection and measurement of current employment and include within this step the gathering of those data that will be used later as a basis for projecting future characteristics.

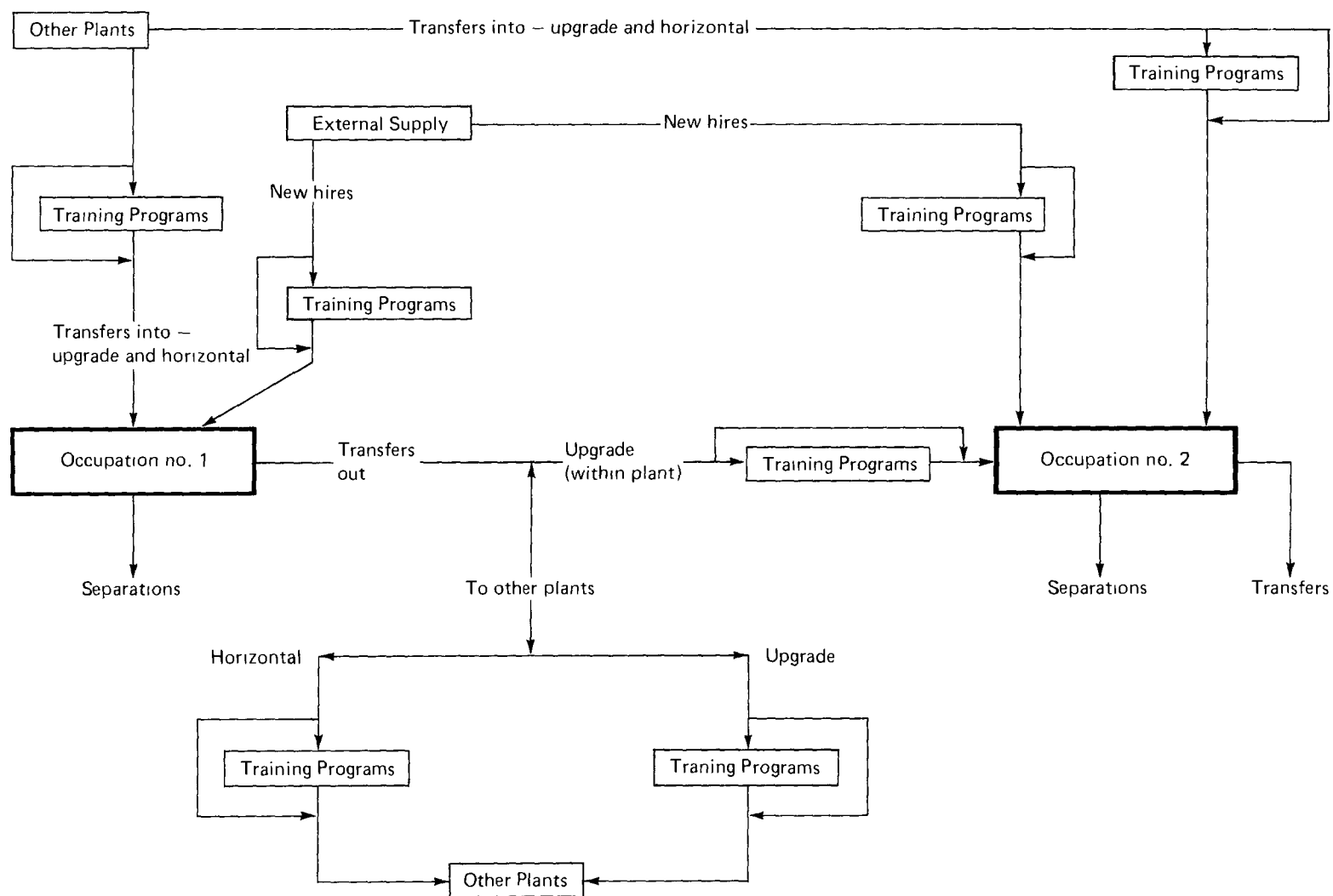


FIGURE 12.6. Termination and Accession Processes

From the general knowledge individual planners have of the agency (obtained from executing step 1), they will have some general and specific notions of what factors affect future manpower requirements. Whenever possible (i.e., when such information is quantifiable), this information should be collected as part of the data collection process by which the current employment characteristics are measured. The special tasks that the planner will have to undertake in measuring current employment will be to decide which data to collect, how to collect the data, and the format in which the data will be collected and stored.

MANPOWER DATA COLLECTION

We have already provided considerable information in our chapters on training, labor economics, and human engineering to guide manpower planners in determining the data that should be collected -- or, alternatively, the characteristics of current employment that they should measure. At a minimum they should collect data on levels of employment, including recommended, budgeted, and actual. Since part- and full-time employment might exist it will be necessary to convert total employment into full-time equivalent employment. When training needs are estimated, the organization will often wish part-time employees to have the same training as full-time employees; hence such data should be collected and maintained. This information should be collected for each occupation and type of employment within a public agency. The planner should also collect data relevant to employment terminations and accessions. The components of these

general classifications have also been defined previously. Wage structure data should be collected. Due to the problems of obtaining accurate information, it will be necessary to obtain minimum, maximum, and average wages.

Methods of Data Collection

All of the information can be collected on a survey instrument the general nature of which is illustrated by a questionnaire data form used in manpower planning programs for wastewater treatment plants. This instrument we illustrate as Table 12-3. Note that in addition to the preceding information to be collected, information on the source of employment is also required. Thus wastewater treatment plants differ according to their type of treatment, their size, population group served, and so on; all of this information is collected on the survey instrument or plant data form.

The number of employment sources will to a great extent determine how employment information is to be collected. If the sources of employment are large in number and widely dispersed, a questionnaire mailed to the administrative head of that employment center might well be the only method the manpower office's budget allows. In many organizations this is not a particularly efficient method because of the poor return rate. At the other extreme are personal visits by the manpower planner if the number of plants is small and not widely dispersed. Intermediate between these two extremes, and a method that could be used in conjunction with them, is the telephone survey method. When a large number of employment sources exist, only a sample, as compared to the universe, could be asked to complete

12-19

TABLE 12-3

Wastewater Treatment Plant Data Form
(1972)

[illegible]

12-20

TABLE 12-3 (Continued)

[illegible]

the data form questionnaire. The planner should seek advice on the appropriate sampling procedures¹ to follow by consulting a statistician within the organization or a textbook that covers sampling techniques.

Completion of the plant data form provides information on the levels of employment, terminations, accessions, and wages for each source of employment. This information should be accumulated on an organizational basis. In many cases the relevant area will be coterminous with that of the state; thus, after each source of employment within the agency has been obtained, this information should be compiled on what we might refer to as a "state data form." Such a form would be identical to the plant data form, except for the absence of those data which identify the type and location of the plant. Upon completing the aggregation just suggested, the manpower planner will have obtained a picture of the staffing pattern for the state system.

For greater clarity in exposition, we shall divide the previously introduced data form into two parts and provide numerical examples. The first part is that dealing with levels of employment, while the second deals with the turnovers in employment.

Levels of Employment

Columns a, b, and c in Table 12-4 show that the level of recommended employment for operators is 1,100. This level consists of nine hundred full-time and two hundred part-time (not specifically

¹See "supplementary information" at end of chapter.

TABLE 12-4

State Wastewater Treatment Plant Personnel Data Form
(December 31, 1974, Example B)

1. ESTABLISHMENT NO.					2. STATE CODE		3. STATE NAME							
7. TYPE OF TREATMENT CODE					8. TYPE OF TREATMENT NAME						9. POPUL			
11. NAME AND ADDRESS OF ESTABLISHMENT														
OCCUPATION	LINE NUMBER	RECOMMENDED	RECOMMENDED FULL-TIME	RECOMMENDED FULL-TIME EQUIVALENTS	BUDGETED TOTAL	BUDGETED FULL-TIME	BUDGETED FULL-TIME EQUIVALENTS	ACTUAL EMPLOYMENT	ACTUAL FULL-TIME	ACTUAL FULL-TIME EQUIVALENTS	ACTUAL EMPLOY- MENT YEAR AGO	ACTUAL FULL-TIME EMPLOYMENT YEAR AGO	ACTUAL FULL-TIME EMPLOYMENT EQUIV- ALENT YEAR AGO	
		a	b	c	d	e	f	g	h	i	j	k	l	
TOTAL (ALL OCCUPATIONS)	01													
SUPERINTENDENT	02													
ASSISTANT SUPERINTENDENT	03													
OPERATIONS SUPERVISOR	04													
SHIFT FOREMAN	05													
OPERATOR II	06													
OPERATOR I	07	1100	900	1000	950	800	880	900	750	820	850	750	780	
MAINTENANCE SUPERVISOR	08													

shown) operators, constituting an addition of one hundred full-time equivalents (not specifically shown), for a total of one thousand full-time equivalent Operators I. Table 12-4 does not show the number of part-time employees. If two hundred workers are working on the average of half time, this would constitute one hundred

full-time equivalents. Two hundred workers working on the average of one-third time would constitute about 67 full-time equivalents, and so on.

However, while these numbers are recommended totals, budgetary limitations have been assumed to be effective, as seen in columns d, e, and f. In these columns we see that the total number of budgeted positions is 950. This level consists of eight hundred full-time and 150 part-time operators, constituting eighty full-time equivalents, for a total of 880 full-time equivalent Operators I.

In our exposition, by using hypothetical data, we have assumed that 1975 is a year in which, while there are labor surpluses in many occupations, we have not been able to fill all of the budgeted positions with qualified personnel. This implies that actual employment as of December 31, 1975, was (as shown in columns g, h, and i) nine hundred Operators I, of which 750 were full time, and 150 part time, constituting seventy full-time equivalents, for a total of 820 full-time equivalent Operators I.

We have determined that the actual employment for the previous year was 850 Operators I, consisting of 750 full-time, and one hundred part-time operators, constituting thirty full-time equivalents for a total of 780 full-time equivalent Operators I. These figures are shown in columns j, k, and l.

Turnovers in Employment

In Table 12-5 we show the turnover data from the state data form. In 1975 we note thirty terminations for the state, consisting of twenty separations from the plants and ten transfers out. Of the

TABLE 12-5
Terminations and Accessions
(1974)

OCCUPATION	LINE NUMBER	TERMINATIONS						ACCESSIONS							
		TOTAL	SEPARATIONS				TRANSFERS OUT	TOTAL	NEW HIRES	TRANSFERS INTO			MINIMUM WAGE	MAXIMUM WAGE	AVERAGE WAGE
			TOTAL	QUITS	DISCHARGES	DEATH/ RETIREMENT				TOTAL	UPGRADE	HORIZONTAL			
		e	f	g	h	i	j	k	l	m	n	o	p	q	
TOTAL (ALL OCCUPATIONS)	01														
SUPERINTENDENT	02														
ASSISTANT SUPERINTENDENT	03														
OPERATIONS SUPERVISOR	04														
SHIFT FOREMAN	05														
OPERATOR II	06														
OPERATOR I	07	30	20	10	4	6	10	25	15	10	6	4	\$2.50	\$3.50	
MAINTENANCE SUPERVISOR	08														
MECHANICAL MAINTENANCE															

twenty separations, ten were quits, four were discharges, and six were deaths or retirements.

In columns s through w, we note that there were 25 accessions, consisting of fifteen new hires and ten transfers from elsewhere.

The ten transfers consisted of six workers who were being upgraded from a lower level position and four who were transferred horizontally from a different occupation of the same grade level.

Measurement of "Transfers"

There is a major problem in the definition of the term "transfer." To the supervisor of a single plant, the term will most likely mean a movement within the plant. An upgrade will consist of movement from, say, Operator I to Operator II within the plant, while a horizontal transfer will be movement from one occupational grouping to another, but at the same grade or pay level. If, for example, a Mechanic I is considered to be the same grade as that of an Operator II, if the former should become an Operator II, it would be a horizontal transfer.

While these are the definitions which the supervisor of a single plant might normally have in mind, the supervisor of a highly coordinated multiplant system (such as in a large city) might look upon the term "transfers" as including in addition to intraplant movement, personnel movement from one plant to another within the system, whether horizontal or upgrading.

The problem becomes more complex with an areawide system, which is the concern of the state manpower planner. Actually, in most states, a statewide coordinated system does not exist, rather there are a number of independent plants and system. From the state's point of view, with its own training implications, a transfer would probably be looked upon as movement not only within a plant and between plants within a highly coordinated city or metropolitan system,

but also a movement -- whether horizontal or upgrading -- among individual systems and plants throughout the state. Also from the state's point of view, this is the most appropriate definition. To come up with an aggregate state figure of transfers that is meaningful, however, the separate plants and systems must, in completing their plant data forms, use the expanded definition; namely, that a transfer refers to both intra- and interplant movements. (From the point of view of national manpower planners, even this last expanded definition is inadequate. To derive meaningful national aggregate figures on transfers, the definition of "transfer" needs expanding to include movement between plants in any location in the country.)

If meaningful aggregate figures are to be developed, there must be common definitions of "occupations," "promotion ladders," and "grade classification." This also means that the supervisors of individual plants must accept or at least apply these commonalities as they complete their data forms. They must also have the expanded definition of the term "transfer" and be able to apply it . . . which may pose some difficulty. What it requires is that some attempt be made to keep records on where each worker who "separates" finds new employment. Does one leave the industry altogether, or merely move to another plant? And what grade does one move to? A record must also be maintained of where each new hire comes from occupationally. What was the individual's occupation and grade before being hired? The last named task could, of course, be readily accomplished at the time of employment, but the former task of determining where a

"separatee" will go is much more difficult and requires some form of follow-up in which individual plant managers would have little interest. Unless the expanded definition is used, however, there will be gross misstatements of transfers within the state or national system.

Wage Data

Referring again to the data shown in Table 12-5 -- we observe that the minimum wage was \$3.50 per hour, while the maximum was \$4.50 per hour. As more employees were closer to the upper end of the scale, the average wage turned out to be \$4.25 per hour. The aggregate average wage for the state could be computed by multiplying plant averages by the number of Operators I employed in each plant, adding the resultant figures for all plants, and dividing by the total number of Operators I. An illustration of such a process for three plants is shown in Table 12-6.

TABLE 12-6
Averaging of Wage Data^a

Plant	Average Wage	Number of Operator I	Total Wage
A	\$4.00	6	\$24.00
B	3.75	5	17.75
C	4.25	7	<u>29.75</u>
			\$71.50

^aState average wage is \$3.97.

ALTERNATIVE MEASURES OF EMPLOYMENT

While Table 12-3 has data on total, full-time, and full-time equivalent employment, we shall limit our consideration here to total employment. The three alternative measures of total employment are seen in Table 12-7. Under an ideal situation, all of these would be equal. We should budget for and hire the recommended total. In practice, these measures are seldom equal. From columns a, d, and g of the state data form in Table 12-3, we can determine the appropriate aggregate totals.

TABLE 12-7

Alternative Measures of Employment
(1974)

Occupation	Recommended	Budgeted	Actual
Total (all occupations)			
Superintendent			
Assistant superintendent			
Operations supervisor			
Shift foreman			
Operator II			
Operator I	1,100	950	900
Maintenance supervisor			

The process of recommending, budgeting, and filling positions can be a complicated one. Manufacturers of equipment and consulting engineers may come up with recommended staffing guides for given equipment or processes with given capacity. Plant superintendents or other government officials are not necessarily bound by these guides, however, and may alter them to conform more closely to local experiences and administrative realities. Recommended employment

is often a figure agreed upon by several governmental bodies that are involved with the work of the organization. The recommended number of employees shown in plant data forms will probably consist of such adjusted figures which are in turn adjusted further by the funding authorities who determine the level of budgeted employment. Budgeted positions are usually less in number than recommended positions because of budgetary restraints which are normal to most public operations.

Actual employment may be more or less than the budgeted positions. In a time of manpower shortages, all budgeted positions may not be filled; this might be especially true of highly skilled workers. In the absence of certification requirements, it will be easier to fill positions, although there would be a temptation to fill them with unqualified personnel. On the other hand, in times of labor surplus, there is increased likelihood that budgeted positions will be filled, and with qualified personnel. In fact, some workers may be overqualified for their position. It is also possible that budgeted positions may be cut below actual employment in a period of budget restraint, with the understanding that some people will be laid off or fired, or where job security is so strong that natural attrition will take care of current expenses, eventually reducing actual employment to budgeted employment.

SHORTFALLS AND SHORTFALL RATES

From the data in Table 12-7, the planner can determine the extent to which the organization is falling short of certain goals, as illustrated by the three shortfall concepts: budget shortfalls,

vacancy, and employment shortfalls. The budget shortfall measures how far below the recommended figures the budgeted positions fall and is determined by subtracting the number of budgeted positions from the recommended positions; i.e., 1,100 minus 950, or 150. Vacancies consist of the budgeted positions not filled, and employment positions are determined by subtracting actual employment from the number of positions budgeted; i.e., 950 minus 900, or 50. The employment shortfall measures how far short actual employment is from recommended employment; i.e., 1,100 minus 900, or 200. An alternative way to compute this last figure is to add budget shortfalls and vacancies (150 plus 50). These calculations are summarized in Table 12-8.

TABLE 12-8
Shortfalls and Vacancies
(1974)

Occupation	Budget Shortfall	Vacancies	Employment Shortfalls
Total (all occupations)			
Superintendent			
Assistant superintendent			
Operations supervisor			
Shift foreman			
Operator II	150	50	200
Operator I			
Maintenance supervisor			

When absolute numbers at different scales of magnitude are compared, a "scale effect" obscures the meaningfulness of the comparisons. To illustrate: The difference of "1" unit when dealing with

a magnitude of "10" is much more important than the difference of "1" when dealing with a magnitude of "1,000." To eliminate this scale effect, we can convert absolute numbers into rates by using a common base or denominator. The most appropriate base for our purposes in computing shortfall rates in actual employment which, it will be recalled, is assumed to be nine hundred.

For later analytical purposes, we want to compute three rates: budget shortfall, vacancy, and employment shortfall. To obtain these rates, we divide each of the absolute shortfall figures on Table 12-8 by nine hundred; i.e., $150 \div 900$ (budget shortfall rates), $50 \div 900$ (vacancy rate), and $200 \div 900$ (employment shortfall rate). These are summarized in Table 12-9.

TABLE 12-9

Shortfall and Vacancy Rates,
with Actual Employment as a Base
(1974)

Occupation	Budget Short- fall Rate	Vacancy Rate	Employment Shortfall Rate
Total (all occupations)			
Superintendent			
Assistant superintendent			
Operations supervisor			
Shift foreman			
Operator II			
Operator I	16.7	5.6	22.2
Maintenance supervisor			

TERMINATIONS AND ACCESSIONS
AND THEIR RATES

As already mentioned, it is important to the state manpower planner that he or she has a sense of the dynamics of employment. The detail of some of the more relevant dynamic aspects of employment is furnished by an understanding of terminations and accessions. Terminations consist of separations from and transfers out of a given occupation or position. Accessions consist of new hires and transfers into a given occupation or position. The relationships of these items are summarized in Table 12-10.

TABLE 12-10

Terminations and Accessions
(1974)

[illegible]

The figures from the state data form are easily transferred, columns m through r being moved into their respective termination columns in Table 12-10, and columns s through w being transferred into their respective accession columns. No additional calculations are needed for this step, unless individual plants are not expected to furnish figures for the totals columns (m, n, s, u), in which case these computations would be made by the state manpower planner.

As already discussed, the use of absolute numbers sometimes creates problems when used for comparison purposes. Therefore it is useful to convert these figures into rates, using a common base such as current actual employment, i.e., dividing each number by nine hundred. This is summarized in Table 12-11.

Additional bases could be selected by the experienced manpower planner, depending upon what he or she is looking for. The most useful alternative base would be to use total terminations and accessions, thereby allowing the components of each of these to be expressed as a percentage of their total. Performing this type of calculation results in the data that are shown in Table 12-12. Thus quits, for example, represent 33.3 percent of terminations, while upgrades represent 24 percent of accessions.

DISAGGREGATED TABLES

The tables constructed thus far deal with state aggregates. These are useful in comparing with other state or national aggregate rates. However, as manpower planners become more sophisticated in their analysis of manpower problems, they will want to disaggregate the totals into meaningful subcategories. For example, they

TABLE 12-11

Termination and Accession Rates,
With Actual Employment as a Base
(1974)

1. ESTABLISHMENT NO		4. COUNTY CODE		5. SMSA CODE		6. BASIN CODE											
7. TYPE OF TREATMENT CODE		POPULATION GROUP SERVED				10. MILLION GALLONS PER DAY											
11. NAME AND ADDRESS OF ESTABLISHMENT																	
OCCUPATION		LINE NUMBER	20. ALLEN 21. YL 22. AGO	TERMINATIONS				ACCESSIONS									
				TOTAL	SEPARATIONS				TRANSFERS OUT	TOTAL	NEW HIRES	TRANSFERS INTO			MINIMUM WAGE	MAXIMUM WAGE	AVERAGE WAGE
					TOTAL	QUITS	DISCHARGES	DEATH/ RETIREMENT				TOTAL	UPGRADE	HORIZONTAL			
				3	4	5	6	7	8	9	10	11	12	13	14	15	
TOTAL (ALL OCCUPATIONS)		01															
SUPERINTENDENT		02															
ASSISTANT SUPERINTENDENT		03															
OPERATIONS SUPERVISOR		04															
SHIFT FOREMAN		05															
OPERATOR II		06															
OPERATOR I		07		33	2.2	1.1	0.4	0.7	1.1	2.8	1.7	1.1	0.7	0.4			
MAINTENANCE SUPERVISOR		08															
MECHANIC MAINTENANCE																	

TABLE 12-12

Components of Terminations and Accessions
Expressed as Percentage of
Total Terminations and Accessions
(1974)

Occupation	Terminations				Accessions		
	Quits	Dis-charges	Death/ Retirement	Transfers Out	New Hires	Upgrade	Horizontal Transfer
Operator I	33.3%	13.3%	20.0%	33.3%	60.0%	24.0%	16.0%

may want to compare shortfall rates for a given type of plant or to compare plants of a given size within the state. To make such comparisons, they should make additional tables which emphasize certain characteristics. To illustrate this disaggregating process, we will use the form shown in Table 12-13. This form is useful in comparing alternative employment concepts for different types of plants. Simply listing the levels of employment is not particularly useful; thus such tables are more meaningful when viewed as working tables or basic data tables (such as the plant data form) from which more meaningful calculations and forms can be derived. Perhaps of some interest are the averages of various employment concepts by type and size of plants that are shown in Table 12-13.

The data in Table 12-13 inform us that the average recommended number of Operators I in plants of size 1 in the state is 18.5, the average budgeted number of Operators I in plants of size 1 in the state is 16.75, and the average actual number of Operators I in size 1 plants in the state is 14.75. On the other hand, the average recommended number of Operators I in treatment type A plants is 20.4, with 15.2 budgeted and 12.2 actual. The figures in each of these cells would be obtained by disaggregating all plants of a given size and type and determining the total for each of the alternative employment concepts.

The same procedures would be used for comparing budget shortfall, vacancy, and employment shortfall rates, as well as the various elements of terminations, separations, and accessions, (Tables 12-14 through 12-16 are used for this purpose.) The data shown in these

TABLE 12-13

Comparison of Alternative Employment Concepts
by Type and Size of Plant for Operator I
(1975)

Type of Treatment	Size of Plant					Average for Given Type
	1	2	3	4	5	
A	a. 15	a. 17	a. 21	a. 23	a. 26	a. 20.4
	b. 13	b. 14	b. 15	b. 16	b. 18	b. 15.2
	c. 11	c. 11	c. 12	c. 13	c. 14	c. 12.2
B	a. 17	a.	a.	a.	a. 26	a.
	b. 15	b.	b.	b.	b. 19	b.
	c. 13	c.	c.	c.	c. 15	c.
C	a. 20	a.	a.	a.	a. 26	a.
	b. 18	b.	b.	b.	b. 18	b.
	c. 16	c.	c.	c.	c. 14	c.
D	a. 22	a.	a.	a.	a. 27	a.
	b. 21	b.	b.	b.	b. 20	b.
	c. 19	c.	c.	c.	c. 15	c.
Average for given size	a. 18.5	a.	a.	a.	a. 26.25	a.
	b. 16.75	b.	b.	b.	b. 18.75	b.
	c. 14.75	c.	c.	c.	c. 14.50	c.

Key: a. Recommended employment
b. Budgeted positions
c. Actual employment

TABLE 12-14

Comparison of Shortfall and Vacancy Rates
by Type and Size of Plant for Operator I
(1975)

Type of Treatment	Size of Plant					Average for Given Type
	1	2	3	4	5	
A	a. 18.2	a. 27.3	a. 41.7	a. 53.8	a. 57.1	a. 39.62
	b. 18.2	b. 27.3	b. 25.0	b. 23.1	b. 28.6	b. 24.44
	c. 36.4	c. 54.6	c. 66.7	c. 76.9	c. 85.7	c. 64.06
B	a. 15.4	a.	a.	a.	a. 46.7	a.
	b. 15.4	b.	b.	b.	b. 26.7	b.
	c. 30.8	c.	c.	c.	c. 73.4	c.
C	a. 12.5	a.	a.	a.	a. 57.1	a.
	b. 12.5	b.	b.	b.	b. 28.6	b.
	c. 25.0	c.	c.	c.	c. 85.7	c.
D	a. 5.3	a.	a.	a.	a. 46.7	a.
	b. 10.5	b.	b.	b.	b. 33.3	b.
	c. 15.8	c.	c.	c.	c. 80.0	c.
Average for given size	a. 12.85	a.	a.	a.	a. 51.9	a.
	b. 14.15	b.	b.	b.	b. 29.3	b.
	c. 27.00	c.	c.	c.	c. 81.2	c.

Key: a. Budget shortfall rate
b. Vacancy rate
c. Employment shortfall rate

TABLE 12-15

Comparison of Termination Rates
by Type and Size of Plant for Operator I
(1975)

Type of Treatment	Size of Plant					Average for Given Type
	1	2	3	4	5	
A	a.	a.	a.	a.	a.	a.
	b.	b.	b.	b.	b.	b.
	c.	c.	c.	c.	c.	c.
B	a.	a.	a.	a.	a.	a.
	b.	b.	b.	b.	b.	b.
	c.	c.	c.	c.	c.	c.
C	a.	a.	a.	a.	a.	a.
	b.	b.	b.	b.	b.	b.
	c.	c.	c.	c.	c.	c.
D	a.	a.	a.	a.	a.	a.
	b.	b.	b.	b.	b.	b.
	c.	c.	c.	c.	c.	c.
Average for given size	a.	a.	a.	a.	a.	a.
	b.	b.	b.	b.	b.	b.
	c.	c.	c.	c.	c.	c.

Key: a. Termination rate
b. Separation rate
c. Transfer out rate

TABLE 12-16

Comparison of Separation Rates by
Type and Size of Plant for Operator I
(1975)

Type of Treatment	Size of Plant					Average for Given Type
	1	2	3	4	5	
A	a.	a.	a.	a.	a.	a.
	b.	b.	b.	b.	b.	b.
	c.	c.	c.	c.	c.	c.
B	a.	a.	a.	a.	a.	a.
	b.	b.	b.	b.	b.	b.
	c.	c.	c.	c.	c.	c.
C	a.	a.	a.	a.	a.	a.
	b.	b.	b.	b.	b.	b.
	c.	c.	c.	c.	c.	c.
D	a.	a.	a.	a.	a.	a.
	b.	b.	b.	b.	b.	b.
	c.	c.	c.	c.	c.	c.
Average for given size	a.	a.	a.	a.	a.	a.
	b.	b.	b.	b.	b.	b.
	c.	c.	c.	c.	c.	c.

Key: a. Quit rate
b. Discharge rate
c. Death/retirement rate

tables will be of considerable use as raw input when in applied step 4 of the manpower planning process,² we turn to an analysis of possible manpower problems. For example, it is clear from the hypothesized data in Table 12-14 that shortfalls are both absolutely and relatively more serious problems with large plants than with small plants.

SUMMARY

The information obtained in the execution of this and the preceding step forms the data base on which much of the other tasks of manpower planning are based. The measurement of current employment characteristics will form the basis on which forecasts of future employment characteristics are made, the basis upon which the analysis of manpower problems are made, and the basis for attempting to improve the performance of the manpower planning process. For these reasons it is important to execute this step with care and provide for an easy access to the collected data. It is hoped that once again the formats of the various tables presented in this chapter will facilitate the efficient storage and retrieval of the relevant data.

²Olympus Research Corporation, Manpower Planning for Wastewater Treatment Plants (Salt Lake City: Olympus Research Corporation, 1973). Prepared for Office of Water Programs, Environmental Protection Agency.

SUPPLEMENTARY INFORMATION:
SAMPLING TECHNIQUES

We have previously referred to the possible advisability of manpower planners using sampling techniques in performing some of their various tasks. This is particularly the case when measuring current employment characteristics. It behooves us, therefore, to devote some time to an introductory discussion of what a sample is and why it is used. To accomplish this task we first need to make several definitions that are related to the general area of sampling.

The first term to be defined is that which is referred to as the population or "universe." The universe is defined as the aggregate or totality of all of the elementary units under consideration. Thus when levels of employment are measured, the universe of places of employment would be the total of all such places within the organization. A sample is a set of observations or elementary units drawn from the universe. Thus if the universe contained six hundred places of employment and data were collected on every tenth plant, the sample size would be sixty. It is common to have N denote the universe and n the size of the sample. Thus in the previous example, N equals 600 and n equals 60.

The word "statistics" was originally used to define a collection of information regarding the number and demographic characteristics of people living in a given locale who were considered vital to the state. From the original attempts to describe in numerical terms certain characteristics of the state, there has developed a scientific method that is now referred to as "statistics." A brief and commonplace example might give some insight into the use of statistics,

especially as it relates to universe and samples. Prior to an election for public office, public opinion pollsters often try to predict who the winner of the election will be. In doing this they try to estimate the proportion of the population that will vote and of this number the proportion that will vote for each of the various candidates. In most cases canvassing all eligible voters would be difficult, and thus a survey is made of a sample of voters. From the information obtained, estimates are made as to how many of the total population will vote for a certain candidate. The totality of all voters will be what we have referred to as "universe," and the number of voters that are actually surveyed would be the "sample." From this sample it is hoped that a reasonably accurate estimate of the relevant proportions in the population would be obtained. Making such an estimate is referred to as "statistical inference." This is to imply, in our example, that the voting characteristics of the unknown population are inferred from the voting characteristics of the observed, and therefore known, sample.

Such inferences as are made from the sample to the universe are done with some error. The exact proportion of the voters voting for a particular candidate will not be predicted with complete accuracy. If we note the proportion of people who will actually vote as P and the proportion of people who say they will vote for a certain candidate, as measured in the sample as p , then the estimate of the unknown population proportion P from the observed sample proportion p is as follows:

$$P = p \pm \text{error term} \quad (1)$$

An important question is how small this error will be. It can be shown that if the sample technique is a random sample (discussed later) and a large enough sample, then we can state with 95 percent confidence that

$$P = p \pm 1.96 \frac{p(1-p)}{n} \quad (2)$$

As indicated in equation 2, the accuracy is in part determined by the size of the sample taken which in equation 2 is n .

A numerical example may best indicate how the previous formula works. Suppose, for example, that of a thousand voters surveyed in a sample, sixty one choose to vote for a Democratic candidate. With this sample proportion of 0.61, equation 2 becomes

$$P = 0.61 \pm 1.96 \frac{0.61(1-0.61)}{1,000} = 0.61 \pm 0.03 \quad (3)$$

Thus with a 95 percent confidence, we estimate that the population proportion that would vote Democratic would be between 0.58 and 0.64. This interval is referred to as a "confidence interval."

In some cases the use of sample data does not result in data that are in the form of proportions, as in the previous examples. Rather, the data are generated in the form of aggregate numbers from the sample. We illustrate by an example from manpower planning. A certain state may have five hundred places of employment and an inadequate budget to survey all of them. It decides to survey a hundred places of employment -- those having been chosen at random. From that sample it may be determined that a hundred new employees with certain skills will be needed within the next year. If this sample were truly a representative one, it would be possible to determine

an estimate of how many new employees would be needed for the state as a whole. In this example, since the sample represented one-fifth of the total universe, it would be reasonable to suppose that five hundred new employees would be needed for the entire state. Making these judgments is often referred to in the literature on sampling techniques as applying an inflation factor. This simply means that any estimate obtained from the sample is multiplied by the reciprocal of the fraction that the sample represents of the universe to obtain an estimate of the relevant figure for the universe.

As already indicated, the accuracy of estimates depends upon the "randomness of the sample chosen and the size of its sample." We shall not go into detail on these two factors. The manpower planner should probably consult a statistician on these questions. However, a random sample is one in which the selection of the elements of the sample is better based on the use of a table of random numbers or the selection of numbers as if from a list or box with numbers representing all elements of the entire universe completely mixed. The selected references section lists books that explain these issues in greater detail.

SELECTED REFERENCES

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FORECASTING FUTURE
EMPLOYMENT CHARACTERISTICS

In this chapter we continue our development of the applied steps in micromanpower planning by discussing step 3: forecast future employment characteristics. It has been said in much of the literature on manpower planning that the major purpose of manpower planning is to forecast future employment conditions and manpower requirements and translate them into manpower planning needs. Such activity would include forecasting the level of new hires, the number of transfers into and out of an occupation, and the number and type of training programs.

Manpower needs are often defined in their simplest form as the difference between current employment and expected future employment. There are several problems, however, with this language and with the underlying concept. As we have previously mentioned, there is some question as to what constitutes a "need" and what constitutes a "requirement." The term "manpower requirements" appears most often to be used to mean that level of employment that we have previously identified as recommended employment -- that employment level contained in the staffing guide and presumably obtained as a result of applying human factors analysis. With such interpretations, manpower planning "requirements" are limited to number of employees and tend to exclude explicit consideration of their quality. Future manpower requirements, in this view, would be related to forecasts of future levels of recommended employment. Future manpower needs could then be defined as the difference between expected future recommended employment (i.e., manpower

requirements) and current actual employment. This would imply that an important element in the manpower objectives would be to eliminate not only the employment shortfall today (i.e., recommended employment minus actual employment) but any anticipated shortfall that might occur due to growth in recommended employment.

A further aspect of this definitional issue is that "manpower needs" relate to what is required when one compares the present with expected future conditions. It contains no reference to the expected effect the labor market may have in satisfying these needs or on how a concerted manpower planning effort might meet such needs. In fact, manpower needs are often listed as an argument for devoting more resources to manpower planning.

In much of the literature on manpower planning, the term "manpower needs" most often refers to the projected increase in the number of individuals that will be "needed." Other dimensions of manpower should also be considered. Among these should be the dynamic aspects (i.e., turnovers) and the quality of needed employees. A legitimate manpower need is to reduce the turnover rate and improve quality of new hires. Even when manpower needs are restricted to the concept of levels of employment, a portion of such requirements will consist of those individuals who will be needed to fill the positions vacated by current employees -- that is, as a result of turnovers.

Since this step deals with forecasting or estimating the future value of data elements, it is important for the manpower planner to determine the length of the planning horizon. We visualize the manpower planner as making periodic measurements and periodic projections,

the frequency of which would most commonly be annually. It is necessary, therefore, for manpower planners to determine how many years they will project into the future. We visualize manpower planners as measuring and projecting for each year in the planning horizon and doing it each year on a periodic basis. It is incidentally through this process that an adaptive mechanism enters the planning process: what manpower planners forecast for a particular year they measure in a subsequent year, and through the comparison of the resulting data make periodic adjustments in their measuring and projecting techniques.

FORECASTS OF RECOMMENDED EMPLOYMENT

One starting point in making forecasts of future employment characteristics is to begin with direct concern for levels of employment and begin the process with the estimation of the future recommended employment. Forecasts of recommended employment are made for each year in the planning horizon. We have selected a planning horizon of five years because it is consistent with planning horizons commonly used in many planning efforts. Many educational institutions with which a manpower planner will be required to work have five-year planning horizons. Some planning may be done for shorter periods of time, but because of the lead time required to develop training programs and to work with other agencies to implement manpower planning, a longer term planning horizon is deemed necessary.

There are two major causes of changes in the level of recommended employment: the modifications in existing places of employment (a term we have previously suggested that we refer to as plants) and

additions to the numbers of such plants. Existing plants may be modified by changes in their size or in the technology or methods of performing their various tasks. Such changes may increase or decrease the number of recommended employees. The number of new plants may increase for a variety of reasons, all of which could be related to an increase in demand for the agency's "output" (e.g., an increase in the amount of wastewater to be treated, traffic to be policed, or drinking water to be supplied). As the number of new plants increases with unchanged technology, it will generally bring about a consequent increase in the need for additional workers and increases in the level of recommended employment.

Within many public agencies a definable process exists by which new sources of employment come into being. In the water quality field, for example, new wastewater treatment plants come into existence as the result of a definite river basin planning process being followed as illustrated in Figure 13.1. This would seem to be the case in many other areas of the public sector. When such is the case, the time lag between the plans for the new employment source and the time when it is in full operation provides the manpower planner with some lead time and a basis for making projections of future manpower requirements. When the above process does not exist, other methods for projecting future manpower requirements will be needed.

In all of the preceding we have asserted that in order to make forecasts of recommended employment, the manpower planners must be familiar with the plans both for new plants and for changes in technology of existing plants within their jurisdiction and for a period of time at least equal to the length of the planning horizon. In some

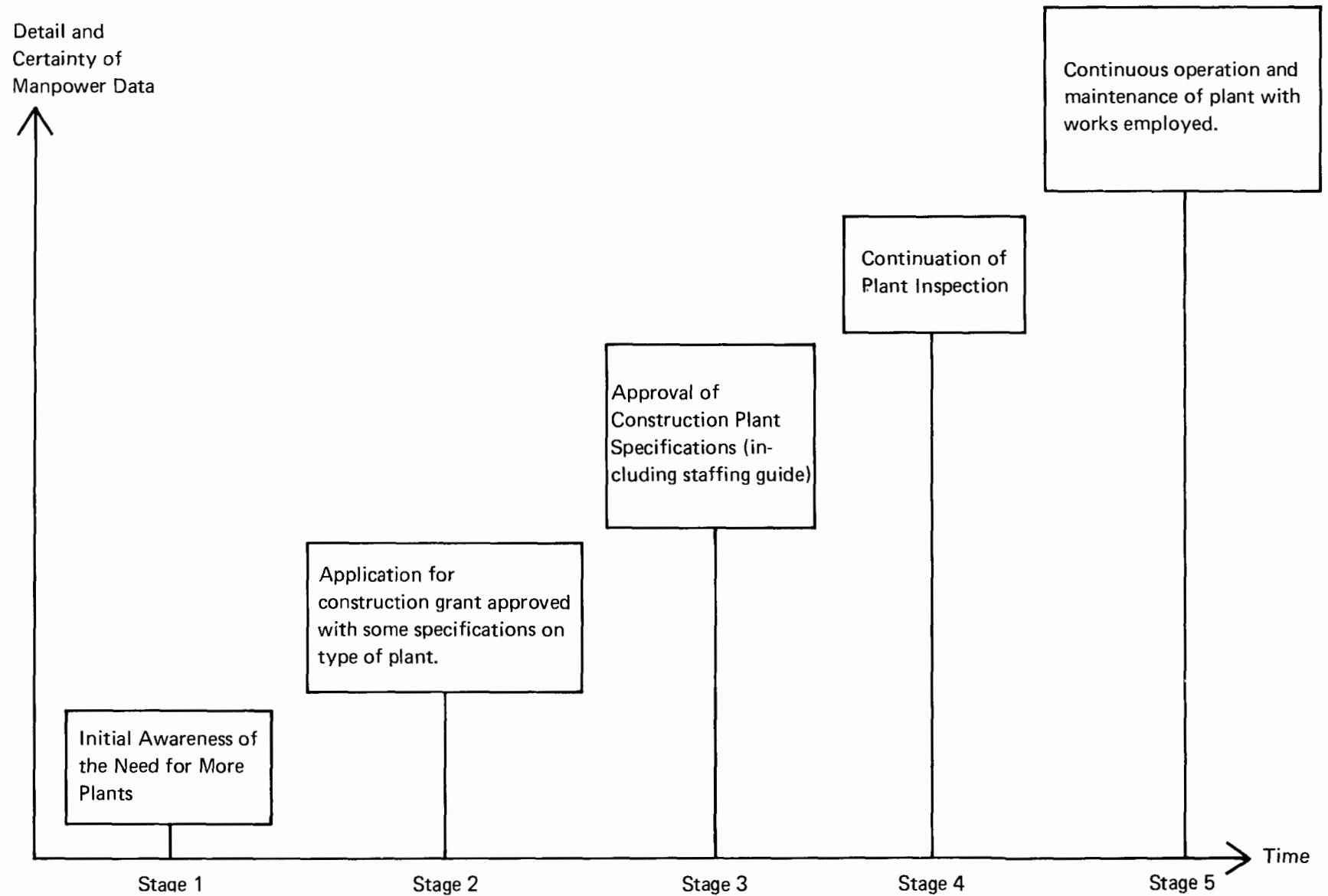


FIGURE 13.1. Time Phasing of Manpower Data

public organizations a well-defined process may exist, the general nature of which is illustrated in Figure 13.1. Notice that the process is arranged to emphasize the increasing certainty of the manpower data that can be obtained in each stage.

From the process outlined above, data on the time schedule for constructing new plants and making changes in existing plants can be obtained. Data on new plants may be entered in a form such as that shown in Table 13-1. Under columns "type" and "size" some code may be

TABLE 13-1

New Plants and Their Recommended Employment for Operator I

Type	Size	Completion Date	Recommended Employment

entered that is appropriate to the organization in question. For our exposition we shall rely upon the nature of wastewater treatment plants for our example and use codes of 1, 4, 5, and 9 for "type" for reasons that will become apparent subsequently. Since existing practices classify wastewater treatment by size according to the million of gallons per day (mgd) of wastewater they treat, a number code that refers to the mgds can be used as the code for plant size. Data to complete the remaining column in Table 13-1 are obtained in part by a process explained in the following paragraphs.

USE OF STAFFING GUIDES

The nature of staffing guides has already been explained under the rubric of human factors utilization. It is sufficient to emphasize at this point that staffing guides serve as a link between the estimated number of new plants and the estimated level of recommended employees. To refresh our memory, we show an example of a staffing guide in Table 13-2. Note that from such a guide the level of recommended employment for each occupation can be obtained for a plant of given type but of various possible sizes. If such completed guides were available for all different types and all possible sizes of plants the "recommended employment" column in the table could be completed by choosing the datum from the relevant cell in the appropriate staffing guide. For purposes of illustration only, we shall assume a simplified state wastewater system consisting of four types of treatment: 1, 4, 5, and 9. Tables 13-3 through 13-6 are Black and Veatch¹ staffing guides for each of these treatment types wherein only the figures for Operator I have been entered.

These (partial) staffing guides may be compressed into one master table for Operator I such as shown in Table 13-7. We suppose that the best available information indicates that during the planning horizon, the plants of a type and size indicated in the first two columns of Table 13-8 are to be constructed. From Table 13-7 we can complete such a table as shown in 13-8. After this table is completed

¹W. L. Patterson and R. F. Banker, Estimating Costs and Manpower Requirements for Conventional Wastewater Treatment Facilities (Washington, D.C.: U.S. Government Printing Office, 1971), prepared for the Office of Research and Monitoring, Environmental Protection Agency, by Black & Veatch Consulting Engineers, pp. 136ff.

TABLE 13-2

Staff Complements to Wastewater Treatment
Plants, Type Treatment 1
(1975)

[illegible]

TABLE 13-3

Staffing Guide for Treatment Type 1
(1975)

Occupation Title	Plant Average Day Capacity in mgd									
	1	3	5	10	20	35	50	65	80	100
	Estimated Number of Personnel									
Superintendent										
Assistant superintendent										
Clerk typist										
Operations supervisor										
Shift foreman										
Operator II										
Operator I	3	4	5	4	4	5	6	6	8	8
Auto. equipment operator										
Maintenance supervisor										

SOURCE: W. L. Patterson and R. F. Banker, Estimating Costs and Manpower Requirements for Conventional Wastewater Treatment Facilities (Washington, D.C.: U.S. Government Printing Office, 1971), prepared for the Office of Research and Monitoring, Environmental Protection Agency, by Black & Veatch Consulting Engineers.

TABLE 13-4
Staffing Guide for Treatment 4
(1975)

Occupation Title	Plant Average Day Capacity in mgd									
	1	3	5	10	20	35	50	65	80	100
	Estimated Number of Personnel									
Superintendent										
Assistant superintendent										
Clerk typist										
Operations supervisor										
Shift foreman										
Operator II										
Operator I	4	4	5	4	5	7	8	10	11	14
Auto. equipment operator										
Maintenance supervisor										

SOURCE: W. L. Patterson and R. F. Banker, Estimating Costs and Manpower Requirements for Conventional Wastewater Treatment Facilities (Washington, D.C.: U.S. Government Printing Office, 1971), prepared for the Office of Research and Monitoring, Environmental Protection Agency, by Black & Veatch Consulting Engineers.

TABLE 13-5

Staffing Guide for Treatment Type 5
(1975)

Occupation	Plant Average Day Capacity in mgd									
	1	3	5	10	20	35	50	65	80	100
	Estimated Number of Personnel									
Superintendent										
Assistant superintendent										
Clerk typist										
Operations supervisor										
Shift foreman										
Operator II										
Operator I	3	4	4	5	6	10	10	13	15	18
Auto. equipment operator										
Maintenance supervisor										

SOURCE: W. L. Patterson and R. F. Banker, Estimating Costs and Manpower Requirements for Conventional Wastewater Treatment Facilities (Washington, D.C.: U.S. Government Printing Office, 1971), prepared for the Office of Research and Monitoring, Environmental Protection Agency, by Black & Veatch Consulting Engineers.

TABLE 13-6

Staffing Guide for Treatment Type 9
(1975)

Occupation	Plant Average Day Capacity in mgd									
	1	3	5	10	20	35	50	65	80	100
	Estimated Number of Personnel									
Superintendent										
Assistant superintendent										
Clerk typist										
Operations supervisor										
Shift foreman										
Operator II										
Operator I	4	5	6	5	9	12	14	17	19	25
Auto. equipment operator										
Maintenance supervisor										

SOURCE: W. L. Patterson and R. F. Banker, Estimating Costs and Manpower Requirements for Conventional Wastewater Treatment Facilities (Washington, D.C.: U.S. Government Printing Office, 1971), prepared for the Office of Research and Monitoring, Environmental Protection Agency, by Black & Veatch Consulting Engineers.

TABLE 13-7

Master Staffing Guide for Operator I

Type of Treatment	Number of mgd per Day									
	1	3	5	10	20	35	50	65	80	100
1	3	4	5	4	4	5	6	6	8	8
4	4	4	5	4	5	7	8	10	11	14
5	3	4	4	5	6	10	10	13	15	18
9	4	5	6	5	9	12	14	17	19	25

the data may be entered for all occupations in a form such as that shown in Table 13-9. For such a table it will be necessary to determine the nature of the "year." We have used the calendar year concept, although in many states a fiscal year concept beginning on July 1 may be more appropriate.

It is important to note certain problems that might arise with the use of staffing guides in making forecasts of recommended employment. The closer in time a plant's completion data, the greater the probability of obtaining more reliable information from the several sequential data points in the process. When such data sources are available, they should be used, and whenever their information differs from that provided in the staffing guides, the more current data should be used.

In the example of wastewater treatment plants their size is measured by mgds. The size ratings on the staffing guides do not represent a continuum with respect to mgds, thus requiring some for

TABLE 13-8

New Plants and Their Recommended Employment for Operator I

Type	Size	Completion Date	Recommended Employment
5 ^a	35	September 1975	10
4 ^a	20	January 1976	5
1 ^a	10	October 1976	4
9 ^a	80	February 1977	19
5 ^a	1	March 1977	3
5 ^a	100	November 1977	18
4 ^a	5	May 1978	5
1 ^a	35	December 1978	5
9 ^a	50	January 1979	14
1 ^a	3	August 1979	4
9 ^a	80	May 1980	19

TABLE 13-9

Additions to Recommended Employment from New Plants
(From Table 13-8)

Occupation	Year				
	1975	1976	1977	1978	1979
Operator I	10	9	40	10	18

plant sizes falling within the interstices of such guides. This is likely to be a characteristic of many public sector organizations. If it is expected that such extrapolations will be made frequently, the master staffing guide for each occupation may be changed to reflect such expectations.

To complete the estimates of additions to recommended employment, the planner must obtain those changes that will result from the modification of existing plants. Such information may not be as easily predictable, for it is not certain that the use of staffing guides is appropriate in such cases. The construction of application forms, if available, may be used, however, to obtain the necessary data to complete a table such as shown in Table 13-9.

The data from the tables in Tables 13-9 and 13-10 should be combined to obtain Table 13-11. These data may in turn be added to those on current recommended employment (Table 12-7 in the preceding chapter) to obtain the data on total recommended employment shown in Table 13-12.

TABLE 13-10

Additions to Recommended Employment from
Changes in Existing Plants

Occupation	Year				
	1975	1976	1977	1978	1979
Operator I	4	10	11	0	1

TABLE 13-11

Total Additions to Recommended Employment
(Table 13-9 plus 13-10)

Occupation	Year				
	1975	1976	1977	1978	1979
Operator I	14	19	51	10	19

TABLE 13-12

Estimated Total Recommended Employment
(Table 13-10 plus 13-11)

Occupation	1974	1975	1976	1977	1978	1979
Operator I	1,100	1,114	1,133	1,184	1,194	1,213

We should also note that it is not absolutely necessary to carry the estimated data forward in aggregate form as shown in Table 13-12. Manipulations made upon these data in the next section do, however, provide some argument for such aggregation, although estimates of actual additional manpower needs (discussed subsequently) provide some reason for disaggregation of these data. We have chosen the aggregate approach primarily because it gives the manpower planner a feeling for levels of employment as well as changes in these levels, while the alternative approach emphasizes only the latter.

ALTERNATIVE BASES FOR FORECASTING FUTURE EMPLOYMENT

Without a clearly defined process that describes the additions to or modifications in sources of employment, in organizations that are experiencing some growth, the projecting of future manpower requirements may become a more difficult undertaking. The basis for such alternative projection techniques must, however, either directly or indirectly be related to estimates of the agency's output and the relation between such output and employment levels. The agency's output might in turn have to be related to other more easily quantifiable variables. If output is difficult to measure, current levels of recommended employment might be related to variables other than output that are initially presumed but subsequently found to have some stable relationship to employment.

An example of the preceding issues is required. Let us suppose that we are engaged in manpower planning for a state highway patrol agency and that we have some difficulty in measuring output. Are we to measure output, for example, by number of tickets written, number

of cars stopped, or number of crimes anticipated or prevented? Clearly the last of these is not measurable and the preceding two may not necessarily reflect all of the ramifications of what would normally serve as a basis for our discussion on projecting certain aspects of manpower data.

How would one go about projecting the number of tickets to be written over the next five years, or the number of cars to be stopped, and so forth? Upon reflection it becomes clear that some other more basic variable on which to base the projections is required. In the case of the state highway patrol, the number of registered automobiles (and the infractions attributable to that number) might be a more basic variable on which to base projections of future manpower requirements. Thus if historical data were available, or at least current data from the current measurement of employment supported by auxiliary data obtained elsewhere (e.g., state population figures), a simple relationship could be estimated between population and auto registrations, then between auto registrations and number of infractions, and finally between number of infractions and levels of recommended employment. Since projections of future population (and in some cases such other projections such as automobile registrations) are made by other agencies, the manpower planner could obtain such projections and obtain estimates of future manpower requirements by assuming, unless other information exists to the contrary, that the simple relationship that exists today between levels of recommended employment and population (i.e., auto registrations, tickets, and so on) will continue into the future. If it is expected that this linear relationship will change, for whatever

reason, this can partially handled by adjustments in the assumed relationships.

These methods will become more understandable as we continue into the next section of this chapter and introduce techniques for obtaining budgeted and actual employment from recommended employment. The techniques used in these estimates are identical to those stated above.

Forecasts of Budgeted and Actual Employment

Plans to provide training for additional manpower planning expected to enter the public agency must take into account estimates of actual, not recommended, employment. As a consequence of this fact, it is necessary to make forecasts of actual employment over the planning horizon. Such forecasts provide the basis for computing changes in actual employment. The method by which these forecasts can be made in the foreseeable future will rely heavily upon previously made forecasts of recommended employment. Forecasts of budgeted employment may also be made by using the same general techniques.

The method by which it is suggested that budgeted and actual employment be forecast is through the use of what we have termed the "factors of proportionality" between recommended employment and budgeted employment and between recommended employment and actual employment. Such factors are computed by dividing budgeted employment by recommended employment, and actual employment by recommended employment for those years for which actual data are available. We shall note the factor of proportionality for budgeted employment as P_b and the factor for actual employment as P_a . In Table 13-13 we display values for P_b and P_a based upon the hypothetical data used throughout

this and preceding discussions. The values as computed are 0.86 for P_b (indicating that budgeted employment was 86 percent of recommended employment) and 0.82 for P_a .

TABLE 13-13

Factors of Proportionality between Budgeted and
Recommended and between Actual and Recommended,
by Occupation
(1975)

Occupations	Recommended Employment	Budgeted Employment	Actual Employment	P_b	P_a
Total (all occupations)					
Superintendent					
Assistant superintendent					
Operations supervisor					
Shift foreman					
Operator II					
Operator I	1,100	950	900	0.86	0.82
Maintenance supervisor					

The manpower planner may now estimate budgeted employment for each year in the planning horizon, assuming the same factors of proportionality. Although the vagaries of politics and administration make this chore difficult, it may be assumed that in the absence of noticeable changes in the political situation, the same relationship or factor or proportionality will exist in each succeeding year as in the present year. In Table 13-14 we show the results of multiplying recommended employment for each year in the planning horizon by P_b to obtain estimates of budget employment, while in Table 13-15 we show similar estimates for actual employment, and in Table 13-16 the growth of actual employment on a year-by-year basis.

TABLE 13-14

Estimates of Budgeted Employment, by Year and Occupation

Occupation	Year				
	1975	1976	1977	1978	1979
Superintendent					
Assistant superintendent					
Operations supervisor					
Shift foreman					
Operator II					
Operator I	958	974	1,018	1,026	1,043
Maintenance supervisor					

TABLE 13-15

Estimates of Actual Employment, by Year and Occupation

Occupation	Year				
	1975	1976	1977	1978	1979
Superintendent					
Assistant superintendent					
Operations supervisor					
Shift foreman					
Operator II					
Operator I	913	929	971	979	995
Maintenance supervisor					

TABLE 13-16

Estimates of Growth in Actual Employment, by Year and Occupation

Occupation	Year				
	1973	1974	1975	1976	1977
Superintendent					
Assistant superintendent					
Operations supervisor					
Shift foreman					
Operator II					
Operator I	13	16	42	8	16
Maintenance supervisor					

A record should be maintained of the factors of proportionality as they actually develop from year to year throughout the planning horizon. This should be done for each occupation in a format such as that shown in Table 13-17. Such records may prove to be valuable

TABLE 13-17

Projected Factors of Proportionality between Recommended and Actual Employment - P_a

Occupation	1974	Factor of Proportionality				
		1975	1976	1977	1978	1979
Operator I	.86					

in more accurately forecasting actual employment by obtaining better estimates of future values of P_a . Insofar as the value of P_a changes throughout the planning horizon, both its current and past values should be used in projecting future values of actual employment, though some decisions are required as to how such information will be used.

The basic principle underlying the notion that several pieces of past information are useful in forecasting future values of P_a is based upon the assumption that there may be systematic forces operating upon the factors of proportionality to change them from one year to another. In 1975, only a single observation, that for 1974, is available as a base for projecting future values for P_a . In the absence of any other information, it is reasonable to assume that the value of P_a in 1974 would continue through 1979. In 1976, however, observed values of P_a for 1974 and 1975 would be available. If P_a differed for these and later years, the manpower planner would be faced with the decision of which if any of these values he or she should use in making projections of future employment in 1977 and beyond. Several options are available, none of which, a priori, are completely satisfactory. As manpower planners monitor and evaluate their planning process, they will obtain experience that would allow them to choose the best from among the alternative techniques that we now discuss.

The simplest solution to the planner's dilemma would be to use the most current observed value of P_a . If when this practice is followed, it happens that a trend in the values of P_a exists, then taking into account the trend will in general be an improvement over using the first (or the last) observed value for P_a . Such a practice would

also tend to give more accurate estimates than if some simple averaging technique was used.

If a trend does exist, however, some improvement may be made over the option of using the most current value by employing some technique such as adding the difference between the two previously computed factors to the most recent factor. Thus if in 1974 we observed $P_a = 0.86$ while in 1975 we observed $P_a = 0.84$, we might wish to assume that the value in 1975 would be 0.82. Such a practice could be continued throughout the planning horizon, although certain limits may have to be imposed upon such a process. Such estimates assume that changes that occurred in the past will continue in the future in the same direction and with equal force. Neither component of this statement is necessarily true. The observed value for P_a in 1976 may be in a different direction from that assumed in computing the expected value to be 0.82, or it may be in the same direction but of a different magnitude from that which was assumed. Clearly errors of the first type are more damaging than those of the second type.

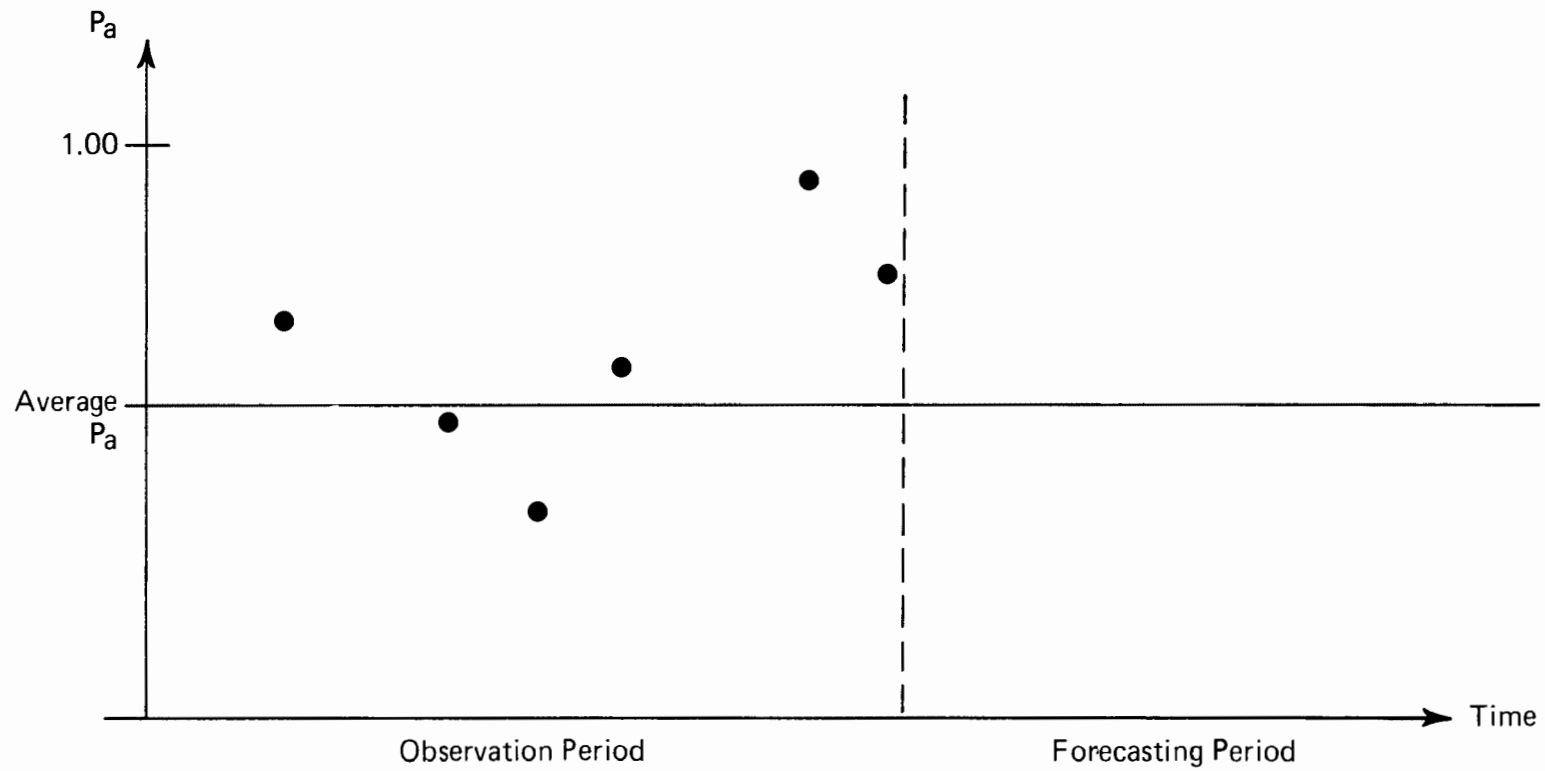
If no definite pattern is presumed to exist in succeeding values of P_a , then one possible solution in making projections for the unobserved values would be to assume some type of average of past values. Thus for the example in the previous paragraph, the value assumed for 1976 would be 0.85 if a simple averaging process were used.

Possibly one of the best ways for the manpower planner to learn how to choose values for a future P_a is to plot each one on graph paper. If the points seem to follow patterns such as those shown in Figure 13.2, then simple averaging would appear to offer some advantages; but if trends seem to be present as in Figure 13.3, some technique to estimate

this trend would be desirable. A brief introduction to a sample of such techniques is contained in the final section of this chapter, "supplementary information." It is hoped that such techniques will become available to individual manpower planners. When their various analyses and data are computerized, the manpower planners will be able to rely upon statistical techniques that should improve their ability to forecast future values of all the important variables.

The preceding analysis dealt with the forecasting of future levels of recommended employment under rather stable conditions. We need to mention that forecasts are often made in unstable conditions. It is the nature of forecasting techniques, even the sophisticated ones used in national economic planning, that they cannot handle what are referred to as "shocks" to the system. Such shocks, by their very nature, cannot be modeled. Examples of such shocks are again readily available from the water quality field. Funds for the federal contribution of building municipal wastewater treatment funds were impounded in the early 1970s for several months. Such impoundment would make inaccurate all previously made forecasts that did not take this impounding into effect. Yet very few planners could reasonably have been expected to see that such an impoundment was going to be made. When the funds were eventually released, any forecasts made on the presumption that they were not to be released would also have been in error.

Shocks are not predictable. It is probably the case, however, that if planners have a good predictive model, then after the shock has occurred they are in a better position to determine the effect of that shock upon manpower requirements than if they had no model whatsoever.



13-26

FIGURE 13. 2. Example of Plotting Values of P_a over Time

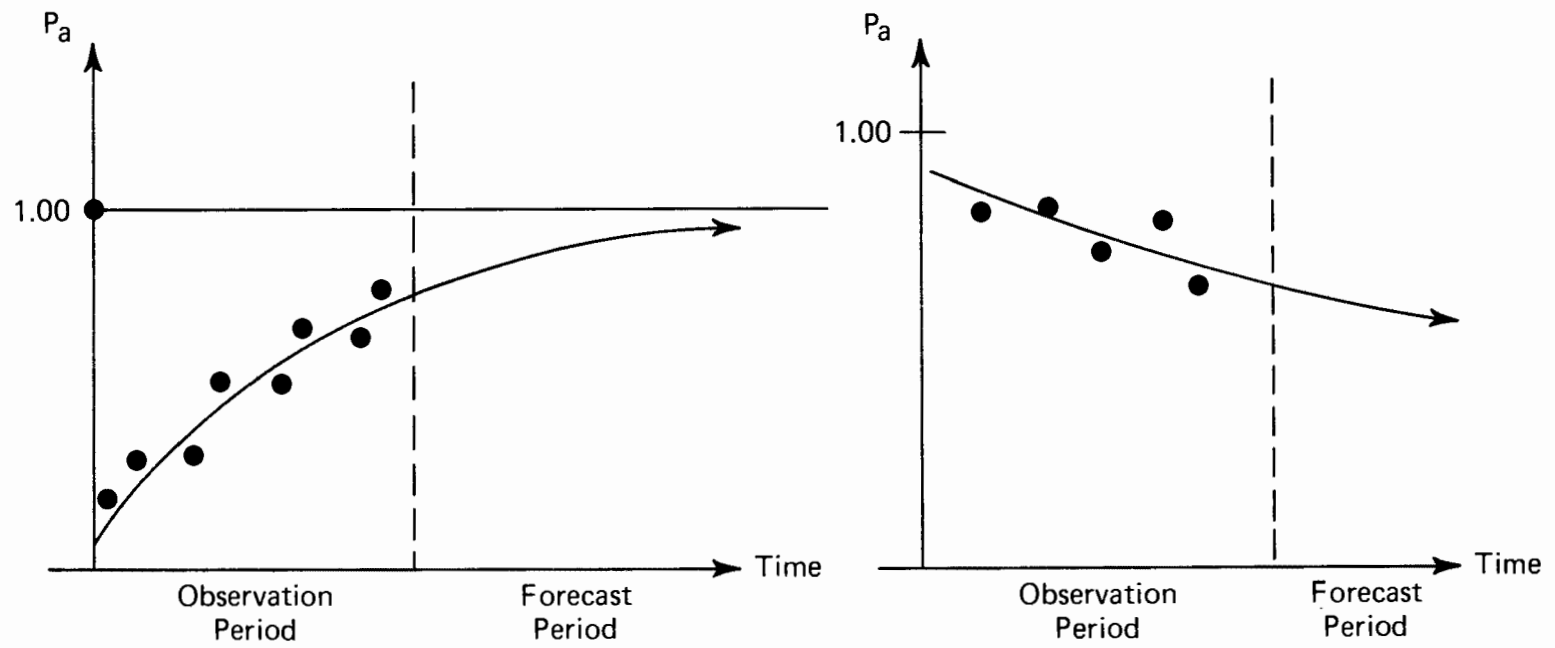


FIGURE 13.3. Example of Plotting Values of P_a over Time

Forecasts of Additional Manpower Needs

We have now arrived at the point where we can make forecasts of future additional manpower needs. Such needs will come from three sources: (1) terminations in existing employment, (2) the construction of new plants, and (3) changes in the numbers of workers needed in the modification of existing plants. The second and third causes can be combined and then referred to simply as additional manpower needed as a result of expected changes in growth of employment. These numbers can be computed directly from Table 13-15 by taking differences in the estimated values of actual employment, as shown in Table 13-16. For example, it remains then for us to illustrate how forecasts of additional manpower needs as a result of terminations are to be made.

The number of additional workers that will be needed because of terminations can be estimated by multiplying the estimate of actual employment by the estimate of the relevant terminations rate for the same year. To accomplish this process, the manpower planner must make forecasts of the future values of the termination rates -- the forecasts of actual employment having already been made. In general, the methods for forecasting future values of the factors of proportionality between recommended and actual employment should be employed in making forecasts of the future value of the termination rates. Some possible difference in techniques used, however, may arise.

Those variables that enter into the planner's judgmental decisions may cause him to expect different trends in terminations as compared to those trends expected in the factors of proportionality simply because different subjective elements on these matters. For example, expectations as to the rate at which employees will be discharged will

be based upon different premises from judgments concerning how local governmental units may try to decrease employment shortfalls. One further difference arises because certain types of information relevant to estimating future termination rates are available in a sense that equivalent information is not available in forecasting future values of the factors of proportionality. We have in mind that component of terminations due to death or to retirement. From figures contained in Table 12-5, information is available not only on the current termination rate, but also the current death or retirement rate. Information has also been obtained on the age distribution of individuals by occupation. This age distribution can and should be examined to see whether within the planning horizon there is reason to believe that significant changes in the death or retirement rate will occur.

To illustrate these points by one brief example, we consider two alternative age distributions. Such distributions are shown as examples A and B in Table 13-18. In these admittedly extreme cases we see that the death or retirement cause would not contribute any influence on the termination rate within the next five years in example A if the mandatory retirement age was 65, while it contributes a significant factor in example B, since 50 percent of the work force will retire within the next five years.

One method of displaying forecasts of the future values of the termination rates and the results of such forecasts as they affect the estimates for additional manpower is in a format such as Table 13-19.

From all of the preceding calculations, a format such as Table 13-20 may now be completed. The figures for growth in current employment,

TABLE 13-18
Percentage Distribution by Age

Years of Age	Example A	Example B
20 to 29	10	5
30 to 39	20	5
40 to 49	30	10
50 to 54	40	10
55 to 59		20
60		5
61		10
62		11
63		11
64		13

being determined by deducting the estimate of actual employment of each year from that of the previous year, are from Table 13-15.

Data such as are contained in Table 13-20 should of course be computed for each occupation, at which time it may conveniently be entered into a table such as the one shown in Table 13-21.

From the preceding table, we note that an additional 59 workers for the position of Operator I will be required for 1975 -- given the various assumptions, particularly with regard to employment shortfalls, that went into obtaining this figure. It will be useful from the point of view of planning appropriate training programs to obtain some notion of whence these 59 new operators are most likely to come. Estimates of how important the alternative sources are most likely to be can be obtained by examining available information on previous accessions. The most recent information on accession is for 1974, at which time we noted (see Table 12-5) that 25 workers acceded to the position of

TABLE 13-19

Forecasts of Additional Manpower Needs for Operator I due to
Expected Terminations

Termination Rates*	Year	Actual Employment by Year				
		1975	1976	1977	1978	1979
		913	929	970	979	995
0.0	1972					
5.0	1973	46				
5.0	1974		46			
2.0	1975			19		
2.0	1976				20	
1.0	1977					10

*Hypothetical termination rate.

TABLE 13-20

Additional Manpower Needed by Source for Operator I

Source	Year				
	1975	1976	1977	1978	1979
1. Terminations in current employment (from Table 13-10)	46	46	19	20	10
2. Growth in current employment (from Figure 13.9)	13	16	42	8	16
TOTAL	59	62	61	28	26

Operator I. Our forecast

TABLE 13-21

Additional Manpower Needed by Occupation
(1973 to 1977)

Occupation	Year				
	1975	1976	1977	1978	1979
Superintendent					
Assistant superintendent					
Operations supervisor					
Shift foreman					
Operator II					
Operator I	59	62	61	28	26
Maintenance supervisor					

Operator I. Our forecast is that 59 will accede in the coming year. In the absence of further information, it is reasonable to assume that the various components of accessions will represent the same proportion of the additional 59 as they did for the previous 25.

In Tables 12-5 and 12-12 we note that of the 25 accessions in 1974, fifteen (60 percent) were new hires, six (24 percent) were upgrades, and four (16 percent) were horizontal transfers. If we assume that these same percentages apply in 1975, we obtain the data shown in Table 13-22. Thirty-five (0.60×59) would appear as new hires, fourteen (0.24×59) as upgrades, and 9 (0.16×59) as horizontal transfers.

Assuming that the same percentages that were computed for 1974 will persist from 1975 through 1979, we can estimate the sources of additional operators throughout the planning horizon and enter them in Table 13-23.

TABLE 13-22

Estimated Sources of Additional Manpower by Occupation for 1975

Occupation	Manpower Needed	Sources		
		New Hires	Upgrades	Horizontal Transfers
Operator I	59	35	14	9

Table 13-23 is the result of the several calculations that were made in these two discussions. The table summarizes all of the material relevant to forecasting the quantity and most probable source of additional Operators I that will enter the wastewater treatment plants throughout the planning horizon. Such a table should of course be completed for each occupation.

TABLE 13-23

Sources of Additional Manpower for Operator I
throughout the Planning Horizon

Source	Year				
	1975	1976	1977	1978	1979
New hires	35	37	37	17	16
Transfers upgrade	14	15	15	7	6
Horizontal	9	10	10	5	4
TOTAL	58 ^a	62	62	29	26

^aBecause of rounding, this is not equal to the figure in Table 13-21.

SUPPLEMENTARY INFORMATION

As an extension of the discussion on forecasting future manpower needs, we present a brief review of more sophisticated forecasting techniques. (Our presentation is so brief that it calls into question the use of the word "review.") We have designed this review to simultaneously meet several objectives. Although this review of forecasting techniques is not complete enough to enable most manpower planners to use them in their planning processes, it will nevertheless introduce them to certain basic and important principles. It is hoped that this

introduction will stimulate their desire to improve upon their forecasting practices whenever it is possible to do so. A further objective of this review is to provide background material that will permit certain types of analysis to be better understood, which are relevant to the analysis of manpower problems that are discussed in a subsequent paragraph. As more manpower data become available and as the use of computer facilities becomes more widespread, more advanced versions of the material we are about to review can and should be adopted.

Uncertainty and Length of the Planning Horizon

It is axiomatic to say that we know less about what will happen next year than what happened this year. Uncertainty exists about future conditions, and the amount of uncertainty increases the farther into the future we try to forecast. Consequently, the forecasts that we make today of what will happen in the future will be less accurate the farther into the future we attempt to forecast.

This observation should not be taken as an argument against making forecasts. It is an argument, however, for imposing limits upon the period of time for which forecasts are made and an argument for engaging in what might be called adaptive or feedback forecasting. This is to imply, for example, that five-year forecasts are made each year so that in succeeding years the new forecast can be adjusted on the basis of information obtained on the accuracy of former forecasts.

A reasonable period of time over which to make estimates of future employment would appear to be five years, although there are no hard and fast rules concerning this. Because of lead time necessary to respond to whatever predictions about the future are made, a period of one or

two years would seem to be too short. This is especially true when it is recognized that most of the manpower data for the water pollution control industry will be available on a yearly basis. Furthermore, the tradition of two-year associate degree programs and four-year baccalaureate degree programs would appear to dictate a planning horizon of three to five years -- the additional year being required in which the forecasts are actually made.

Manpower Data

There are two basic forms in which manpower data may exist: time series and cross-sectional. Time series data are a series of numbers arranged according to times; e.g., according to yearly, quarterly, or monthly periods. Cross-sectional data are those pertaining to different elements of a population at the same point in time; e.g., data coming from families, industries, or plants in a given time period. It is common for the observations in a time series to be from successive and equally spaced intervals of time. Some data are available in a combination of time series and cross-section. Such data tend to be better for most purposes to which the data are to be put, either in time series or cross-sectional.

Most forecasts are based in part upon empirical observations. If forecasts are made on the basis of time series data, the period of time from which these observations were obtained is referred to as the "observation" or "sample" period. It will be convenient to use the same terminology for cross-sectional data even though time does not enter such data as it does with the time series format.

To firm up some of these concepts, let us consider a specialized form of the demand for operator function. We have stated in the discussion on labor economics that the level of actual employment (E_A) is in part a function of the wage (W) paid to operators and the budget (B) of the wastewater treatment plant. This simple relationship can be expressed in several functional forms. One might be:

$$E_A = a_0 + a_1W + a_2B \quad (1)$$

while another might be

$$\log E_A = a_0 + a_1 \log W + a_2 \log B \quad (2)$$

Which functional form would be most appropriate will in part be determined by the data and by feedback from an adaptive forecasting process.

When data are available for the variables E_A , W , and B , the use of certain statistical techniques called "regression analysis" can be used to estimate the values of the a 's. Many computer programs exist for conducting regression analyses that require only that the user supply data on the variables and have some knowledge to interpret the regression equation. We do not intend to review all of the statistical issues related to such regressions; rather, we shall review only the broad outlines of the technique.

Because of certain established theories concerning the relationship between the actual employment and variables (such as wages and budgets), we were able to write an equation such as (1) or (2) above. In many cases, the theory indicates the sign of the a 's, but not the magnitude. Through the application of the regression technique, we are able to obtain estimates of the size of the a 's. Once these estimates have been made and additional data on wages and budgets obtained for a period

beyond the sample period, it is possible to make forecasts of the actual employment of operators.

For example, suppose that data on the three variables in equation (1) are available and that the magnitude of the a 's has been estimated. The result might be as follows:

$$E_A = 250 + 3.00W + 1.01B \quad (3)$$

where wages are measured in dollars and budgets in hundred thousands of dollars. These estimates would imply that as the wage increased by one dollar, the level of actual employment would increase by three, and that as the budget for this plant increased \$100,000, it would wish to increase the level of actual employment by approximately one.

With estimated values of the coefficients (the a 's), the manpower planner could in principle forecast actual employment for operators if he or she knew the future values of both wages and budgets. This is, however, where a significant difficulty arises. A priori, there is no reason to believe at this stage of the development of manpower data that direct information on the future value of such variables as wages and budgets will be any easier to obtain than direct estimates of employment for operators. It is partly in acknowledgment of this drawback that the use of the factors of the proportionality method were suggested.

One way of viewing the use of the factors of the proportionality method is within the framework of a more complicated regression problem. It would be legitimate to argue that the determinants of actual employment include not only wages and budgets, but also the effect of recommended employment. Thus if we had the equation

$$E_A = a_0 + a_1W + a_2B + a_3E_R \quad (4)$$

where E_R denotes recommended employment, then a_3 would be the effect that changes in recommended employment would have upon actual employment, independent of the separate effects of wages and budgets. The reader may initially question this interpretation by asking how more people could be demanded when budgets were not changed. The answer that immediately suggests itself is that changes in the level of recommended employment might bring about changes in the allocation of a given budget in favor of hiring more operators at the expense of other (and supposedly less important) activities.

Our previous comments concerning the difficulty in obtaining estimates of future wages and budgets apply equally to equation (4). Removing the wage and budgetary variables from equation (4) does not, however, lead directly to the previously described factors of the proportionality method, for that method simply required that we multiply estimates of recommended employment by the last observed value of the ratio of actual to recommended employment, while the methods under review require that an averaging process be undertaken. Ignoring the wage and budget variables in equation (4) could result in the equation

$$E_A = a_0 + a_3 E_R \quad (5)$$

or, if we also eliminate the constant term a_0 , in the equation

$$E_A = a_3 E_R \quad (6)$$

Even though (6) may seemingly be rearranged to give $E_A/E_R = a_3 = P_a$, we should not commit the error of doing so. That this is an error is readily seen by noting that the estimate of a_3 in both (5) and (6) is made from several observations on actual and recommended employment.

A further refinement should be made in these equations. Since we do not expect and have not inferred exact relationships, an "error term" should be added to each equation. If we note such a term by "e," then (5) and (6) may be rewritten as

$$E_R = a_0 + a_3 E_R + e \quad (7)$$

and

$$E_R = a_3 E_R + e \quad (8)$$

The objective of our regression technique can now be stated as that of estimating the values of the a's while minimizing the error term.

We can illustrate all of the preceding by the use of a scatter diagram shown in Figure 13.4. In this diagram, the asterisks denote points over time, indicating relationships between actual and recommended employment. The diagram is so constructed that if these points were to lie on a 45 degree line through the origin (noted as the solid line), then actual and recommended employment would be equal. In our example, this does not occur.

By using regression techniques, we could estimate a line such as is represented by equation (8). The resulting estimate of a_3 would then be noted by the broken line. This line indicates a type of average relationship between actual and recommended employment. The distance between the x's and the broken line is the error term, and the broken line has been so constructed as to minimize the sum of the squares of these errors. The slope of this line denotes the value of the estimated factor of proportionality. In the example chosen, we have made the slope approximately equal to 0.80. This line can be extended beyond the sample period, as is indicated by the dots. Given the estimates of

recommended employment from the construction grants process, the manpower planner would then be able to read the expected value of future actual employment. This we indicate in the diagram by the circled dot. It is obtained by multiplying the estimated E_R by 0.80.

Note that if we had used the original factors of the proportionality method, we would have multiplied the estimated value of recommended employment by the last observed value of the ratio of actual to recommended employment. In the example depicted in Figure 13.4, this would have produced a value greater than 0.80. This is indicated by the fact that the last observed value is above the broke line. In any given year, such an estimate might be better than estimating on the basis of extending the regression line; but on the average, such estimates will not be as good if there is any validity to the assumed relationship between actual and recommended employment.

Possible improvements in the estimating procedure are obtained by estimating an equation of the form illustrated by equation (7), where a constant term is present. The relevant scatter diagram and regression line are illustrated in Figure 13.5. In this figure, we have used the same data as before, although now the estimated slope of the regression line is less than 0.80; let us say that it is approximately 0.75.

To forecast actual employment on the basis of estimates of recommended employment from this equation, we use a different procedure. Let us suppose that the full equation was estimated to be

$$E_A = 10 + 0.75E_R \quad (9)$$

and that the last observed ratio between actual employment was 0.90.

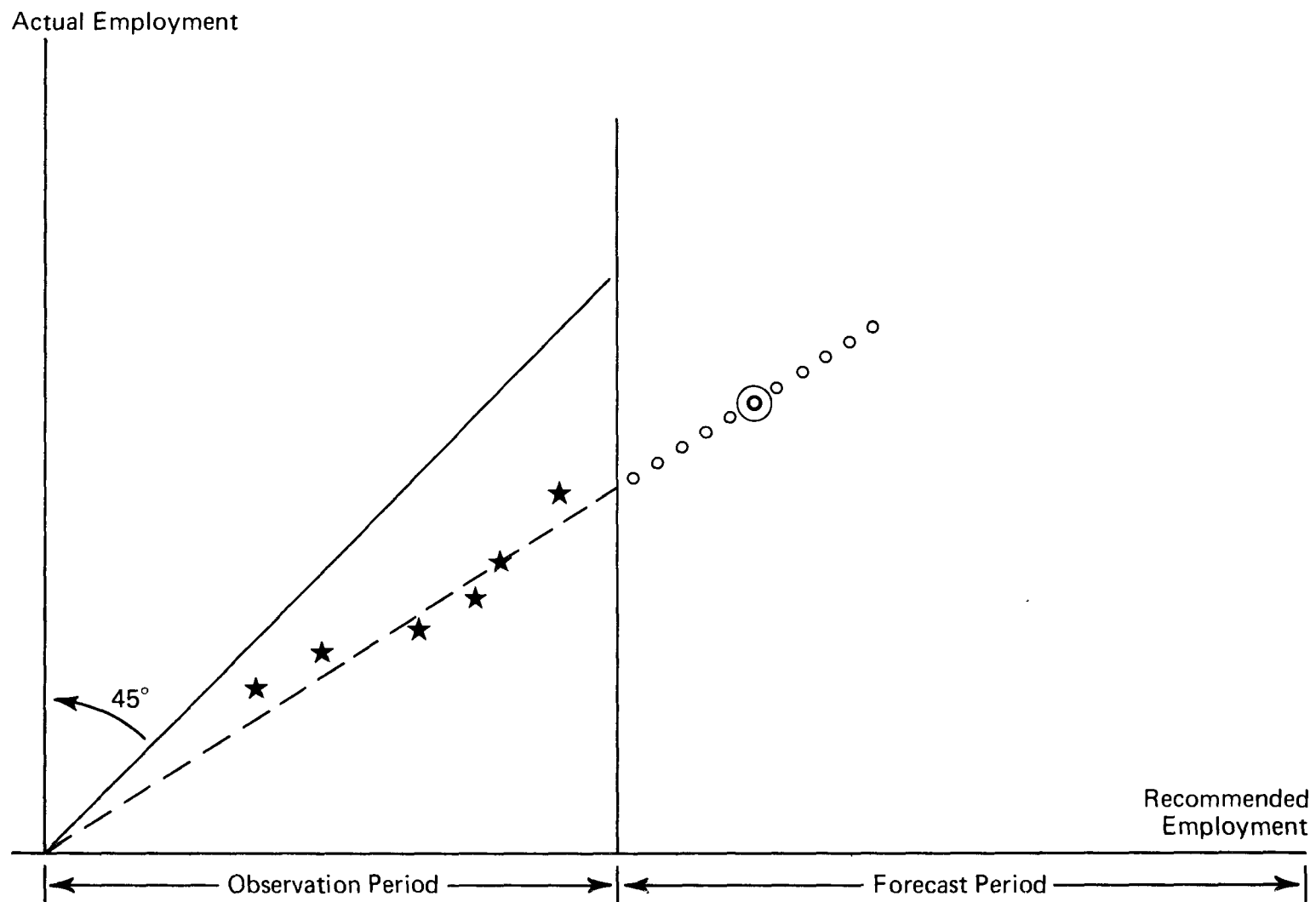


FIGURE 13.4. Scatter Diagram and Estimates of $E_A = a_3 E_R$

If the estimate of recommended employment next year is 120, then the estimate of actual employment using equation (9) would be

$$E_A = 10 + 0.75(120) + 0.90 = 100 \quad (10)$$

Using the results of equation (8), we would obtain

$$E_A = 0.80(120) = 96 \quad (11)$$

and, using the last observed ratio, we would obtain

$$E_A + 0.90(120) = 108 \quad (12)$$

We have therefore obtained three different estimates from the same data!

Which of these two regression equations will, on the average, provide the best results only time and experimentation will tell. The well-prepared manpower planner will want to use each of these procedures and compare their forecasts with observed values as such observations are made each year.

A possibly serious shortcoming of these regression techniques is the fact that as used so far in the analysis, the same value a_3 is used throughout the forecast period. This is because linear regression techniques were used in the estimation procedure. If nonlinear techniques were used, as would be the case for the logarithmic functional form in equation (2), then possibly more accurate estimates could be obtained of certain trends if the ratio relationship between actual and recommended employment were present. Thus it is possible that over time, the ratio of actual to recommended employment may approach its ideal limit of unity. This limit may be approached asymptotically; i.e., in decreasing increments. A linear regression would not pick this process up, although certain aspects of it would be captured if in each year regressions such as we have discussed in this sequel are reestimated.

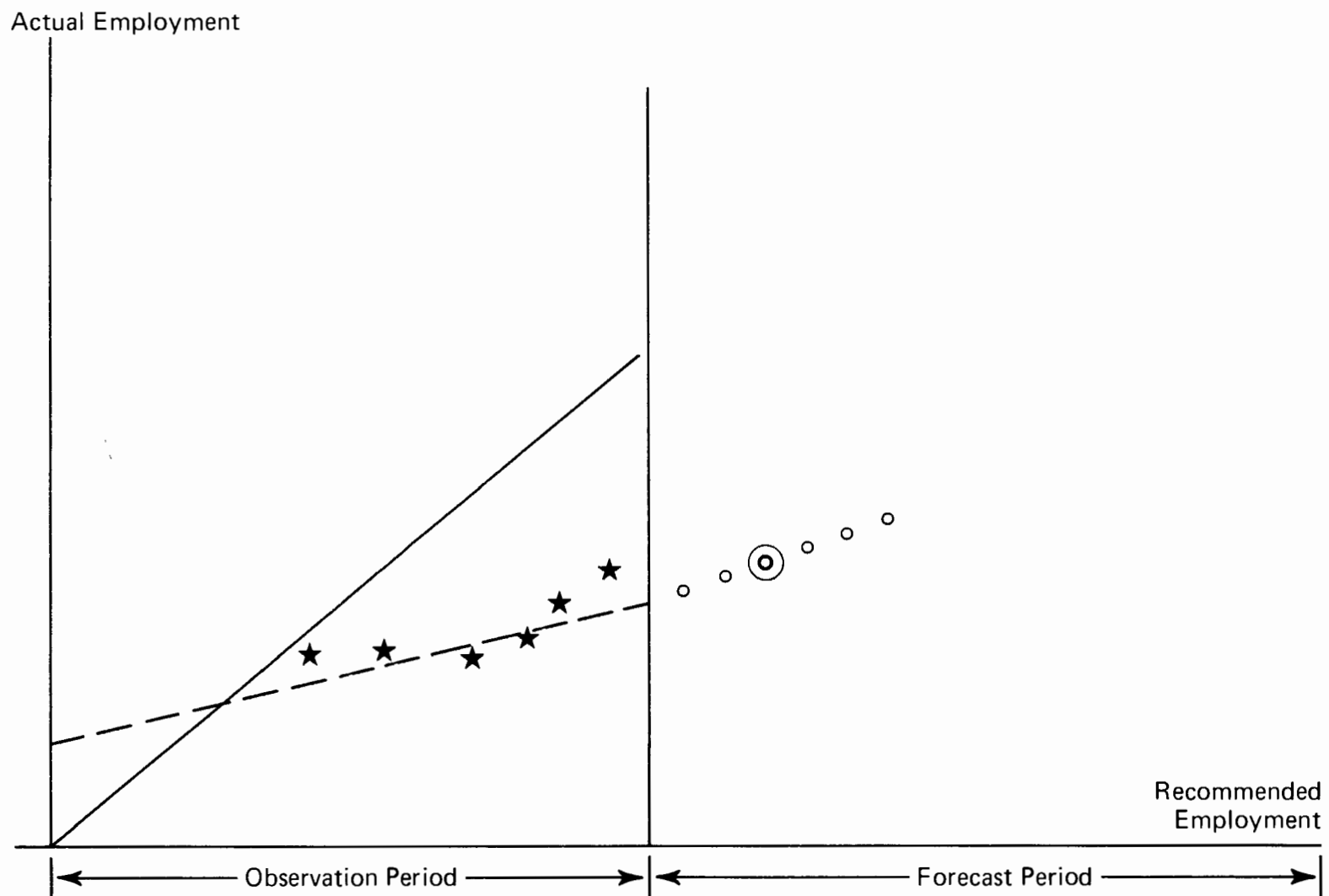


FIGURE 13.5. Scatter Diagram and Estimates for $E_A = a_0 + a_3 E_R$

SELECTED REFERENCES

Yamane, Toro. Statistics and Introductory Analysis.
New York: Harper & Row Publishers, Inc., 1967.

IDENTIFICATION AND ANALYSIS OF
MANPOWER PROBLEMS

In this chapter we discuss step 4: to identify and analyze manpower problems. The range of manpower problems is often categorized according to whether they are problems of recruitment, retention, training, or utilization. Before such a classification of problems can be made, however, it is first necessary for the planner to determine whether a problem exists.

DETERMINATION OF MANPOWER PROBLEMS

In important respects, whether manpower problems exist depends upon the content of the organization's general and manpower objectives. At least the seriousness of a particular characteristic that is identified as a problem depends upon the organization's objectives and their interrelationships. A further aspect of determining whether a problem exists is the identification of the causes of such a problem. People may differ as to what they conceive to be the causes of a particular employment characteristic and therefore differ as to the definition of what the problem is. These differences may then result in the design of manpower programs aimed at resolving differently conceived problems.

Whether an employment characteristic is considered a problem might depend upon the objectives of the organization and how they are translated into manpower objectives. If the primary objective of the organization is, for example, primarily to keep output, somehow determined, increasing at a particular rate, then so long as this rate

of output is maintained, regardless of "undesirable" employment characteristics that may result, the manager may not acknowledge the problem and may be unsympathetic to recommendations for its resolution. Thus the rate of change in output may be maintained at a desirable rate, but high turnover rates exist, making for higher than necessary costs. If these high turnover rates are "abnormal," the manpower planner may wish to decrease the magnitude of them by recommending a change in the occupational structure or wage differentials. It is possible that management would be unreceptive to these ideas and thereby not accept the notion that similar increases in output could be maintained at lower costs.

How far back into its "origins" a particular problem is to be traced is often a difficult decision. A framework for viewing a sequence of possible problems is illustrated in Figure 14.1. The sequence has been extended to just beyond that point where it seems reasonable to expect the actions of the manpower planner to have some noticeable effect. In the first block the specific problem confronting the organization is illustrated. A "cause" of this problem to some might be identified as inadequate staffing in both its quantitative and qualitative aspects, while to others inadequate staffing will simply be identified as another problem, and poor operation merely its symptom or consequence.

The cause of inadequate staffing might be identified as being related to recruitment, retention, or manpower utilization. These may be caused by low wages or poor working conditions, which in turn are identified by others to be the basic problem. Two other steps

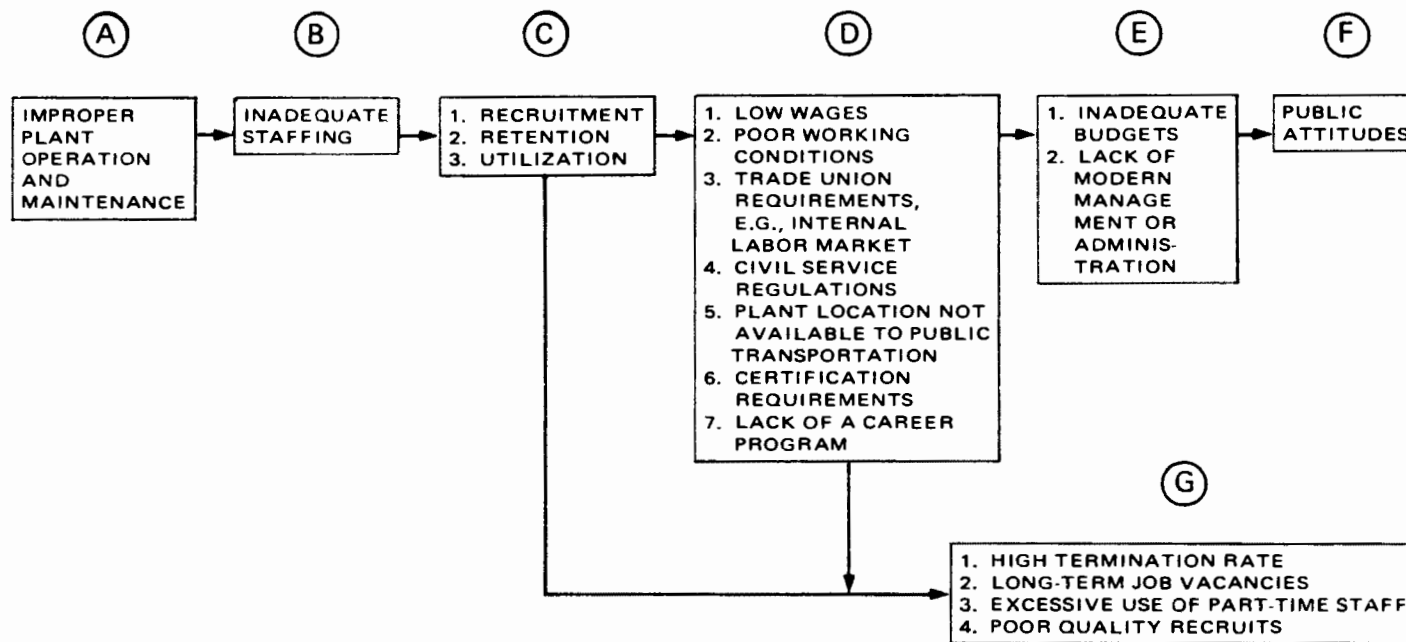


FIGURE 14.1. The Sequence of Manpower Problems

illustrating the problem of inadequate budget, poor plant management, and public attitudes are included in the figure. Block G, which is not in the chain of possible problems but is connected to blocks C and D, may be taken as consisting of factors which may be problems in themselves but also may be evidence of other problems. Thus the existence of a high termination rate is indicative of a problem of retention or evidence of poor working conditions.

The manpower planner, perhaps in conjunction with other members of the management team, must answer the question: At which level should I attempt to enter the chain of problems depicted in the preceding diagram? The principle of division of labor would seem to suggest that those individuals working with the technological aspects of the organization's operations be concerned with blocks A and B, while the manpower planner would direct most of his or her energies to solving those problems listed in blocks C, D, and G.

An example to further explain the material in Figure 14.1 would be as follows: The inability to recruit new and retain current employees may be related to the same variables. Difficulties in recruiting new individuals into particular occupations may be related to the existence of physically poor working conditions, the low prestige of the occupation, or low wages. The presence of any of these variables, in the absence of compensating offsets in other variables, would be sufficient to cause recruitment and retention problems. On the other hand, the presence of one or two of these variables may be completely compensated for by significantly high values of the remaining variables. For example, high wages may offset the effects of poor working conditions and low occupational prestige.

The execution of this manpower planning step is probably the most difficult for the average manpower planner in that it places the greatest demands upon his or her analytical ability and upon the services that are available within the planning office of the organization. In some cases the type of analysis required in this step can be obtained with the help of computer programs and a staff possessing considerable analytical skills. In those cases where such services are not available, a much less rigorous analysis will have to be conducted. Our analysis, as previously indicated, is directed toward those manpower offices with rather limited resources.

Manpower policy is concerned with fully staffing the public agency and keeping it fully staffed with the right people in the right places at the lowest cost. The role of the manpower planner is formulating and implementing plans to ensure that the above objectives will be achieved. It includes plans to correct current deficiencies and to anticipate and be ready with corrective action for deficiencies that may occur in the future.

The following sections use and extend the analytical tools of labor economics introduced in Chapter 3 to an analysis of manpower problems.

POTENTIAL CAUSES OF IMPROPER OPERATION AND MAINTENANCE

Manpower problems that may cause a plant to be improperly operated or maintained are classifiable under three headings: (1) there are too few employees, (2) the employees do not possess the qualifications and skills necessary for proper performance, or (3) the employees are not used to an optimum extent.

The fact that a plant is not staffed according to engineering specifications is not in itself a test of the adequacy of maintenance or operation. The specifications themselves may be faulty. It will be assumed for purposes of this discussion, however, that the guidelines are correct. Moreover, it seems probable that as experience is gained, the guidelines will be brought into harmony with reality.

Too Few Employees -- A Graphical Approach

The existence of an employment shortfall may be explained by supply and demand schedules. Let us assume that in Figure 14.2 the recommended level of employment for Operators I is Q_1 . Given the supply schedule S_1 , it would require a wage of W_1 and an expenditure on manpower equal to the area W_1AQ_1O to obtain the quantity of workers Q_1 . In the figure, the equilibrium wage and quantity that would result from the free operation of the labor market would be equal to the difference between Q_1 and Q_2 . One obvious method of eliminating this shortfall is to increase wages from W_2 to W_1 . This would be represented by a shift in the northwesterly direction of the demand curve until it intersects the supply curve at position A.

Other possible explanations for shortfalls emerge from an analysis of Figure 14.2:

1. The plant may be authorized to pay a wage of W_1 , but to employ only Q_3 workers. Clearly the budget itself is at fault and must be increased to reduce the shortfall. The plant could increase its employment with the same budget by allowing the wage to fall toward W_2 . It is not necessarily the case, however, that with the same budget and a

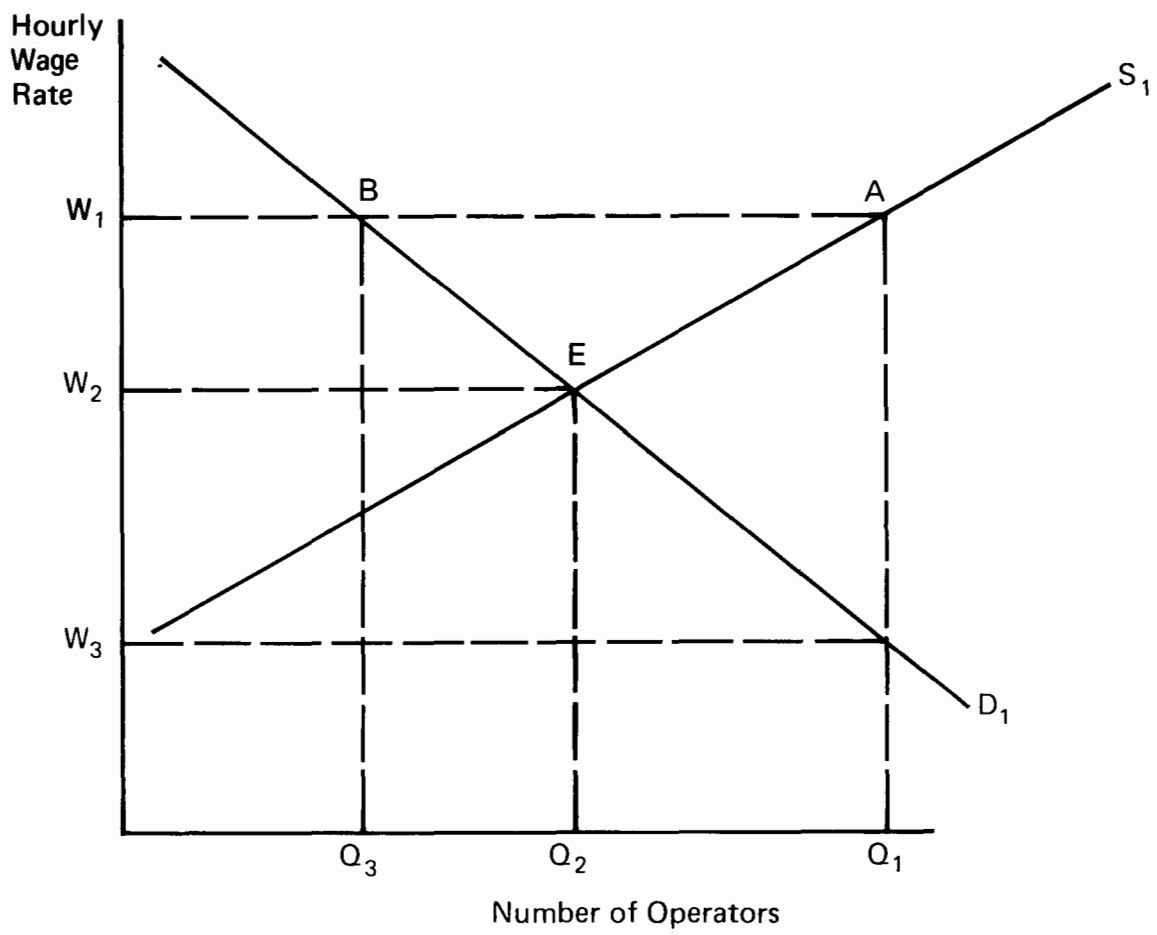


FIGURE 14.2. Employment Shortfall for Operators

wage of W_2 quantity Q_2 of workers could be hired. This is to note the fact that areas OW_1BQ_3 (the size of the budget) and OW_2EQ_2 are equal.

2. The plant may be authorized to pay a wage equal to or greater than W_2 but less than W_1 , with the number of budgeted positions being determined by positions on the schedule. For this range of wages and the quantities along the demand schedule the firm will experience no vacancies because it will always be able to fill its budgeted positions. Thus its shortfall between actual employment and recommended employment will appear to be solely a matter of an inadequate budget. And in fact, for any wage greater than W_2 , a larger budget will reduce the employment shortfall. Yet it cannot eliminate the shortfall unless the wage rate is increased to W_1 , or the supply schedule is shifted to S_2 , or some appropriate combination of the two occurs. This is illustrated in Figure 14.3.

Let us assume that the plant is authorized to employ Q_3 workers at a wage of W_4 (see Figure 14.3). This implies that the budget is area OW_4AQ_3 . If the appropriate legislative body (e.g., the city council) can be induced to increase the budget, increasing demand to D_2 , actual employment can be increased to Q_4 , with no raise in wages or shift in the supply schedule. The new budget would be OW_4BQ_4 . Any increase in the budget beyond that point, however, can only result in vacancies, unless the wage rate

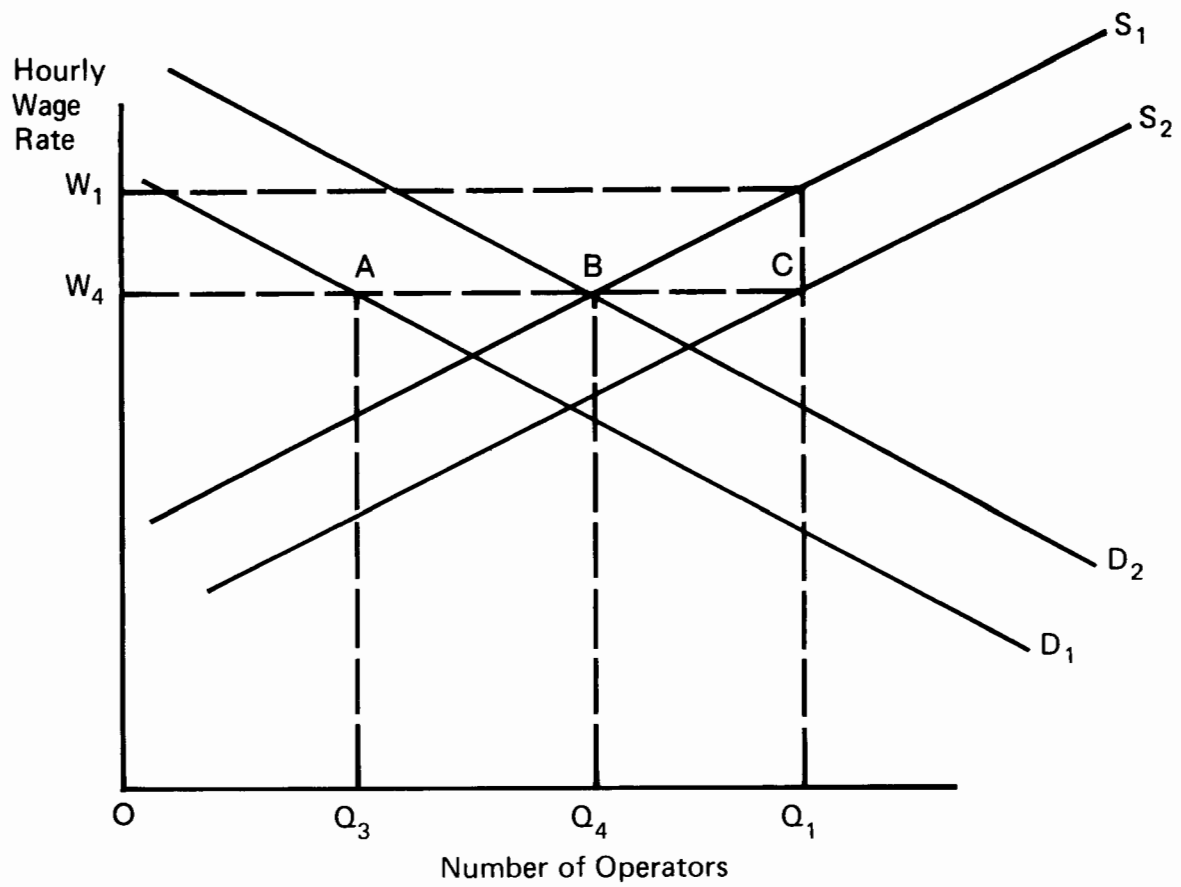


FIGURE 14.3. Alternative Methods of Eliminating Employment Shortfalls

is increased or the supply schedule is shifted to the right. To appreciate the correctness of this, one should note that in order to increase the number of workers willing to work beyond Q_4 when we are constrained to move along the supply curve S_1 , the wage must increase above W_4 . If the budget is increased, say to OW_4CQ_1 , but the wage remains at W_4 , the quantity willing to work is still Q_4 , but the number that could be paid (i.e., the number budgeted for) is Q_1 . Thus the plant's data would indicate that vacancies existed in the amount represented by the difference between Q_1 and Q_4 .

3. The plant may be authorized to pay a wage less than W_2 but greater than W_3 (see Figure 14.2). It will experience both vacancies and a budget shortfall. In such a situation, advocates of adequately staffed plants may be apt to simultaneously berate the legislative body for an inadequate budget and to bemoan the shortage of qualified personnel. The fact is, however, that actual employment cannot be increased except by a raise in wages or a shift in the supply schedule.

Let us assume that in Figure 14.4 the plant is authorized to employ Q_5 workers at wage rate W_5 . It will not be able to employ more than Q_6 (where the supply line crosses the wage line) workers regardless of any increases in the budget, so long as the wage or supply schedule remains unchanged.

4. The plant may be authorized to pay a wage of W_3 (Figure 14.5) and to employ Q_1 workers -- the recommended line in Figure 14.2.

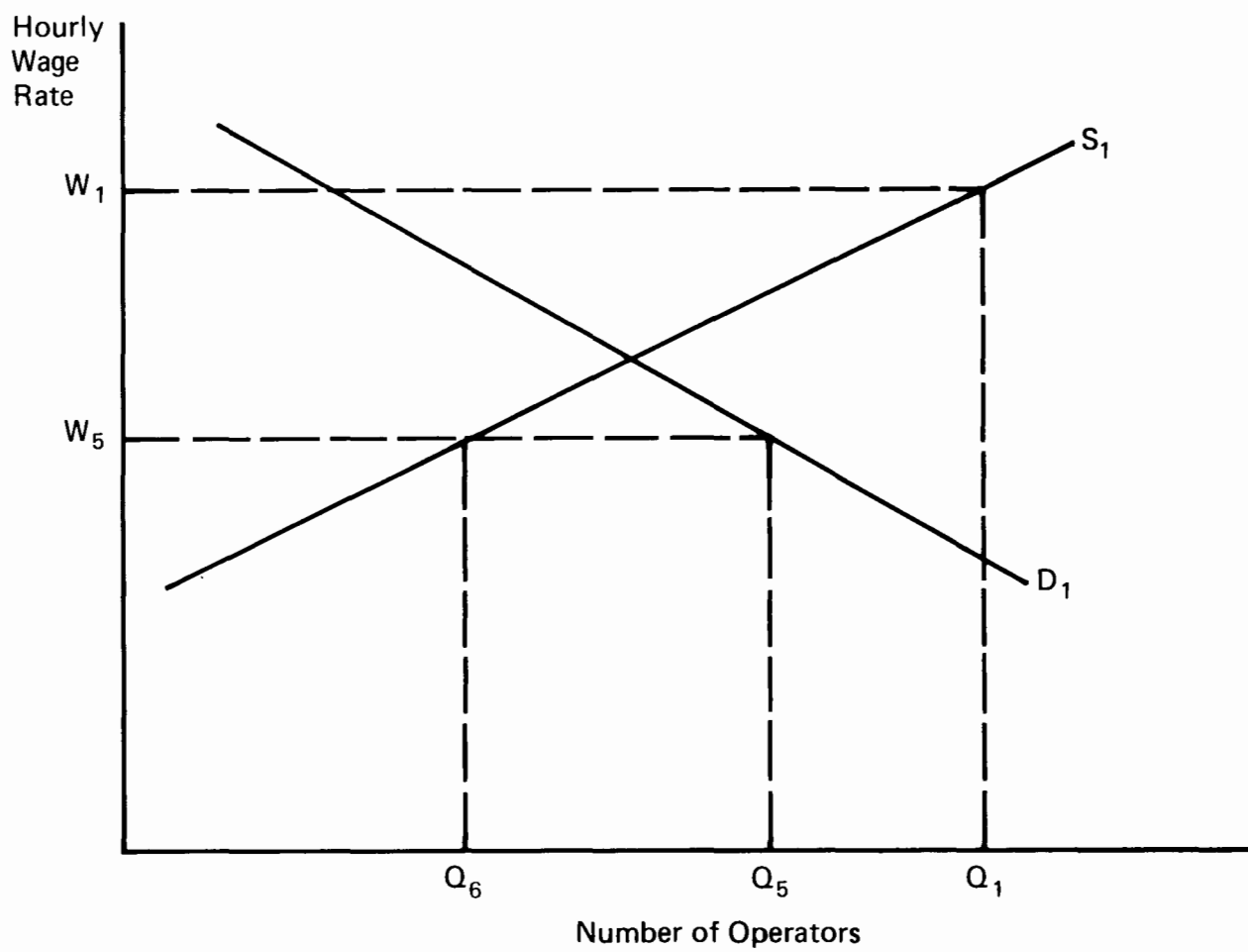


FIGURE 14.4. Wages and Budget Shortfalls

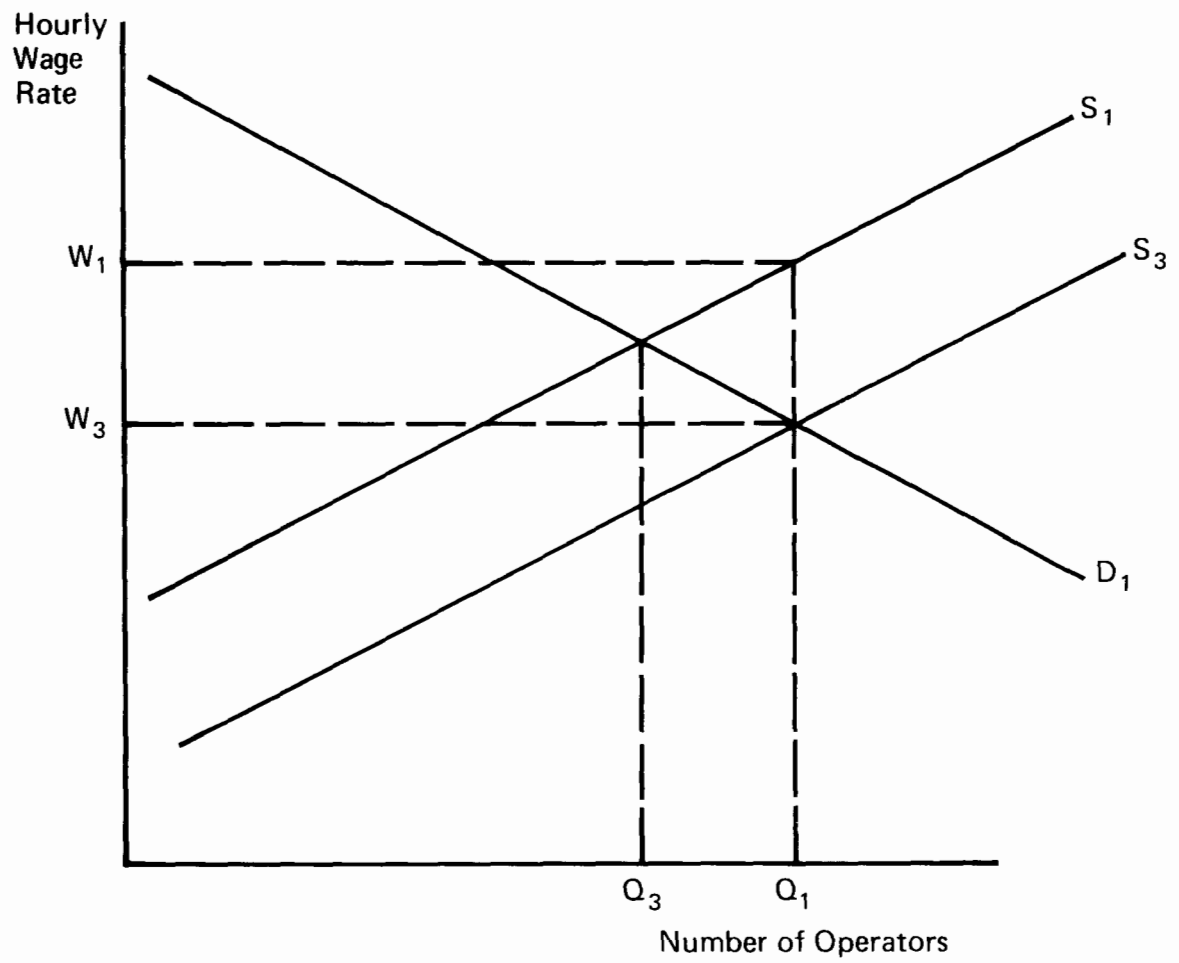


FIGURE 14.5. Wages and Vacancies

The budget shortfall will be zero since Q_1 is budgeted. Nevertheless, there will be vacancies because only Q_3 will work when supply is S_1 and the wage is W_3 . There will be a tendency to ascribe vacancies to a shortage of qualified personnel. Indeed the employment shortfall can be eliminated by increasing supply to S_3 . It can also be eliminated by a raise in wages to W_1 and a commensurate increase in the budget which increases demand to D_2 (not shown).

Two conclusions, neither of which should be surprising, follow from the foregoing discussion -- if adjustments in the wage rate are ruled out as a possible course of action. If there are no vacancies in budgeted positions -- a sign that the wage rate is at or above the equilibrium level -- an employment shortfall can be relieved only by an increase in the budget. A shift in the supply curve above cannot have any effect. On the other hand, if there are vacancies, a sign that the wage rate is below the equilibrium level, relieving a shortfall, will require an increase in the supply curve. To do so requires such measures as subsidizing training, recruiting more intensively, and improving the social image of wastewater treatment jobs, supervisory practices, job security, opportunities for advancement, and so forth.

Improperly Qualified Employees

A plant may be improperly operated or maintained because the people employed in it do not possess the qualifications and skills necessary for proper performance. To determine whether such a situation exists, the manpower planner must compare the attributes of

existing employees with those required by the various jobs in the plant. This in turn requires his or her knowing these attributes and requirements. This knowledge is best gained by well-ordered, systematic, and comprehensive analyses. If the problem is in the competence of the employees, an understanding is gained by a worker analysis that may include such devices as physical examinations, interviews, and aptitude, skills, and other kinds of tests. If the problem is with the job structure, a job analysis that yields specific, relevant, and comprehensive job specifications will yield the information needed.

If a comparison between workers' qualifications and job requirements prove that the current employees are not adequately qualified, a training program for upgrading is probably in order. It is not usual these days to terminate employees (once they have completed their probationary periods) for such reasons as the discovery that more qualified people should have been employed in the first place. Such action can demoralize the remainder of the work force.

The current drive in many industries to require some form of certification is based upon a belief that many present workers are not qualified to do their jobs correctly. A report on the water quality control field supports this statement:

Too often today, multimillion dollar plants produce unsatisfactory effluents which deny desired and obtainable water uses. Usually the reason is that these expensive plants are turned over to poorly trained personnel for operation and maintenance. Poor plant operation can result in undue pollution of the receiving waters with the resulting loss of water uses, such as closed swimming beaches. Poor plant maintenance can be extremely costly in yet another way.

Most waste treatment plants are designed and constructed so as to have a useful life of at least twenty years. Improper plant maintenance can actually reduce that useful plant life to one or two years in extreme cases.¹

The main thrust of that drive, of course, has not been to replace the current workers but to make them certifiable by means of training programs.

The procedures of worker and job analyses are desirable even though the plant is adequately manned. Maintaining such a status requires hiring qualified people in the future. To do this, one must have adequate job specifications (the results of job analysis) and effective selection procedures that accurately reveal the qualifications of the prospective employees.

Poor Use of Employees

It may be that a plant has sufficient personnel of adequate quality but falls short of proper performance because of the poor use of its work force. Such a situation is the converse of the one described in the previous section. When a plant has a sufficient number of employees but still is not properly operated or maintained, it must be (if the cause is manpower) that the employees either are not qualified or are poorly used (or both). If after worker and job analyses have been effectively done, it is discovered that the employees are indeed qualified and jobs are well structured, the only logical conclusion is that poor plant performance is the result of poor use of the work force.

¹Federal Water Quality Administration, U.S. Department of the Interior, Clean Water for the 1970's: A Status Report (Washington, D.C., U.S. Government Printing Office, June 1970), p. 70.

Poor Organization of Work Force

Organization of the work force refers to such matters as the structure of job content, the assignment of personnel, and the scheduling of jobs. Any alteration in these that leads to better plant performance -- no change in the number of man-hours of input or the quality of the personnel employed -- may be described as an improvement in the organization of work. Among the rearrangements that may be contemplated are the conversion to or from rotating shifts, a greater or lesser use of part-time personnel, a reassignment of personnel among the existing jobs, and a rescheduling of hours, vacations, overtime, and rest periods.

If the performance of the plant can be improved by reassigning personnel among the existing jobs, it must be that each job was not filled by the best qualified person among the current employees. Such a condition often arises from the promotion process; i.e., either employees are promoted to jobs beyond their abilities or less able people are promoted in preference to more able ones. If ability alone is the criterion (usually called promotion by merit), such a situation could not have arisen. Too often, however, true merit is not the sole guiding principle. Thus under the guise of merit, either favoritism and other forms of arbitrariness are allowed to enter into promotion decisions or merit is qualified or displaced by seniority.

It is always difficult to reassign personnel when demotions are involved. In fact, if there are many demotions, the effect on employee morale can be devastating. It is probably more feasible to change the policy so that future promotions will be more rational

from an efficiency point of view. But this, too, may be difficult to do when seniority is hindering the promotion of the most qualified man. There are some students of manpower who maintain that promotion of senior workers, rather than a pure merit system, requires management to develop a human resource development system that almost guarantees that senior workers are promotable.

Reducing the role of seniority may offend the senses of security and equity of many of the employees, especially the older ones, thereby adversely affecting their morale. This will be even more true if reasonably objective and accurate ways of measuring merit are not instituted at the same time. On the other hand, offsetting the adverse effect on the senior employees' morale -- especially if the means of measuring merit are acceptable to the employees -- will be the greater chances for advancement that accrue to the younger employees. To arrive at any rational decision about changing the promotional policy to include more merit and less seniority, the manpower planner must weigh the probable consequences to morale.

Communications

"Communications" means that process whereby tasks to be accomplished and the manner in which they are to be performed are communicated downward to those persons who will actually execute them so that the tasks will be done correctly. It also includes all manner of problems that are encountered in the actual performance of the tasks that get reported to personnel on upper rungs of the career ladders who are able to do something about them. If it is discovered that employees are not performing their jobs correctly, or that problems

on the job persist because remedial steps have not been taken, it may be profitable to examine the communications system.

Low Morale

"Morale" refers to the attitude of the employees toward their jobs. If they approach them with a reasonable degree of enthusiasm, a sense of wanting to do them correctly, and a feeling of concern toward the overall performance of the plant, morale can be said to be high. If on the other hand the employees are content to do as little as they can get away with, not caring one way or the other about the performance of the plant, morale can be said to be low.

It is not easy to determine employee attitudes at any particular time unless there are periodic morale surveys that use systematic procedures (usually some form of questionnaire) for measuring attitudes. A special kind of morale survey is the exit interview for employees who are in the process of quitting. This type of survey is advantageous because the planner is interviewing those employees who are most apt to speak their minds, but at the same time can be disadvantageous because it focuses on those who are least apt to be satisfied with their jobs. The best procedure for learning what the attitudes of the employees are -- in the absence of the undesirable manifestations noted below -- may be a combination of exit interviews and periodic surveys directed toward all of the employees.

If employee morale is low and is allowed to persist (often because management is unaware of it), it will eventually manifest itself in one or more objective ways. Among the more easily recognized symptoms of low morale is an increase in the incidence of disciplinary

problems in the plant or rises in the rates of turnover, absenteeism, or tardiness. Union representatives have their greatest success organizing employees where there is a certain amount of unrest. On the other hand, a strike of employees already unionized is not necessarily symptomatic of low morale. It may be no more than a coolly calculated step on the part of the union leadership to support a bargaining position. Probably a more reliable indicator in an already unionized plant is the number and nature of the grievances filed in the grievance procedure or the quit rate.

Sources of Low Morale. Every aspect of the plant -- its physical makeup, the manner in which it is operated, and especially the interpersonal relationships within it -- is a potential source of low employee morale. Consequently there is a large number of potential strategies for dealing with the problem, depending upon the specific causes. As a result, it is difficult to make general statements about the matter. Yet there are some areas where adjustments are commonly made to improve morale. These are: (1) the promotion policy, (2) the system of wage differentials, (3) the grievance procedure, and (4) disciplinary policy.

(1) Promotion policy: It may be said that the more precise the rules governing promotion, the more consistently they are observed; the better they are understood by the employees, the more they appear to the employees to be fair; and the more frequent the promotions, the better employee morale is apt to be. Strict seniority appeals to some because it is precise, easily observed in the sense that the minimum of judgmental decisions is required, easily

understood, and fair in that it precludes the exercise of whim and arbitrariness on the part of those who decide whom to promote. If merit is to be a consideration, workers must be assured that it will truly be recognized and rewarded, rather than serving as a mask for favoritism.

Management cannot ordinarily do much about the aggregate promotional opportunities in the plant, but it can often do something -- especially when merit is a consideration -- about opening up the opportunities to a larger portion of the work force by reducing the number of blind-alley positions. Channels of natural movement from one job to another can be discovered by careful job analysis and classification. Some readjustment and rearrangement of job interests may be possible that provide greater inter-job linkage. Finally, training programs can be instituted whereby employees may prepare themselves for advancement.

(2) System of wage payment: The method of wage payment can affect morale. The basic systems are time rates whereby workers are paid according to the amount of time they spend on the jobs, and piece rates whereby workers are paid according to their output. Most incentive wage systems involve some form of piece rates. One that does not is a plan for workers either to share in profits or in reduced costs.

In many forms of employment it is not feasible to pay piece rates. To have a beneficial effect on the morale and incentive of the employees, piece rates require that an individual's output be readily distinguishable from that of other workers, be easily measurable

by count, weight, or some other such manner, and be under the control of the individual employee.

A profit-sharing plan would also seem to be inapplicable in public agency employment. On the other hand, it may be possible to introduce a scheme for sharing in reduced costs. The questions to be contemplated by the management of public agencies are whether to pay flat rates (everyone the same) or rate ranges, and if the latter, whether to adopt a progression plan based on seniority or merit.

The advantage of flat rates is the absence of discrimination, all of the employees in the same job classification receiving the same rate of pay. Its disadvantages are twofold: (a) an employee cannot get a raise in pay in the absence of a general increase except by promotion or transfer to a higher paying job, and (b) an employee cannot be rewarded for superior performance except by promotion or transfer.

The converse of these disadvantages consists of the advantages of the rate range. If the progression plan is automatic (i.e., based solely on length of time in the particular position), every employee will periodically receive an increase without having to transfer or be promoted. If the progression plan is based on merit, the employee can earn that increase by superior performance.

Although some people may doubt that an automatic progression is much superior to a flat rate system (insofar as employee morale is affected), there are no serious comparative disadvantages to it. On the other hand, a plan based on merit is open to the charge of favoritism. If employees believe that charge, the effect of such a system on morale can be devastating.

There is no standard more important to individual employees for judging the fairness and equity of their compensation than that of comparing their wage with those paid in other jobs in the plant. Their morale is bound to be lowered if they feel that their job is worth more than it is currently paying, considering the rates paid in other jobs. The only way to minimize such a feeling among the employees is to base the structure of wage differentials on such considerations as the skill, effort, and sense of responsibility required that are widely accepted as equitable and relatively easy to discern as between jobs. This is best achieved by a systematic job evaluation scheme based on a careful job analysis.

(3) Grievance procedure: It is important for employee morale that there be procedures whereby individual employees can seek redress for any grievances that they may entertain. A good grievance procedure should contain the following elements:

- (a) The person who should judge whether or not a grievance should be aired should be individual employees themselves. So long as they are disturbed, it is better to give them a hearing rather than to dismiss their grievance as fanciful or without merit.
- (b) Employees must be able to appeal to higher management over the unfavorable decisions of lower management. In fact their grievance may be directed against the latter.
- (c) Employees must be free from and have no fear of reprisal for having filed the grievance.
- (d) Employees must believe that they obtained a full and fair hearing, that the person or panel who heard their case

was interested in and capable of searching out the objective facts of the case, and that the final decision was objectively and equitably arrived at after due consideration of those facts.

- (e) Employees should be able to be represented at a hearing by a representative of their own choosing.

It is probable that the best grievance procedures are found in unionized plants. A procedure conducted under a collective bargaining agreement has inherent advantages over those initiated by management. Individual employees are represented by a union spokesman or spokeswoman and hence their case will probably be better presented. Each employee's case will be heard by a panel that includes union representatives, offsetting any bias that might be found among the management representatives. There may be provision for an ultimate appeal to outside arbitration. And certainly the union is in a better position than management to convince an employee to withdraw a grievance that is without merit.

(4) Disciplinary policy: Disciplinary policy includes the rules, written or not, whereby employees are to conduct themselves when in the plant or on the job, and the penalties that will be dispensed when there are infractions of the rules. The purpose of a disciplinary policy is to ensure that the employees will not behave in a manner that detracts from the efficient operation of the plant. Yet if poorly handled, it can (by lowering the morale) have the opposite effect. It depends upon whether the employees feel that the rules are reasonable, are applied reasonably, and are administered with due regard for their dignity.

Some reasons that disciplinary policies often go awry are as follows:

- (a) Rules that come to be regarded as sacred long after they have become inappropriate simply because they have been in force for so long
- (b) Rules or their application that may be the result of a single individual's judgment, reflecting his or her biases and faulty perceptions rather than the reality that they are supposed to regulate
- (c) Rules that are not enforced consistently between employees or over periods of time
- (d) Rules that are not clearly specified or communicated to the employees
- (e) Penalties for infractions of the rules which may be applied without regard for any extenuating circumstances that made such infractions likely
- (f) Penalties which may outweigh the gravity of the infractions

POTENTIAL CAUSES OF EXCESSIVE COSTS

A plant may be properly operated and maintained (in the sense that it produces the expected quality and quantity of a product or service and is as durable as anticipated), but at a higher cost than necessary. Among the potential manpower causes of such excessive costs are the following: (1) the employment of too many people, (2) the employment of overly qualified, overly paid people, (3) the payment of higher than necessary wage rates, and (4) excessive turn-over rates.

Too Many Employees

If a plant is overstaffed, employees must be spending a portion of their time on the job in an unproductive manner: they are performing unnecessary tasks (such as maintaining a set of records that duplicate one available in another convenient and accessible place), or they are consuming more time and energy than needed while performing necessary tasks, or they often find themselves unproductively idle.

The process whereby such waste is exposed is often called "methods analysis" and is usually performed concurrently with job analysis. It amounts to alerting the job analyst, while he or she is engaged in the task of gathering facts about jobs, to look for and record such waste.

Overly Qualified Personnel

It may be that the job specifications call for higher priced personnel than needed. It is sometimes possible for the plant to be properly operated and maintained with less qualified people who are obtainable at lower wage rates. If such a situation exists and is revealed, realistic job specifications can be established by a properly performed job analysis.

Higher than Necessary Wage Rates

It may be that the plant is employing the right amount of people with the proper qualifications, but is offering them higher wages than necessary to attract them. If employment, aside from wages, is as attractive to prospective employees as employment elsewhere in the community or industry, there should be no necessity,

so far as the proper staffing of the plant is concerned, for offering them more than the going wage . . . that paid on the average for similarly qualified labor by other employers in the community or industry. Of course if there is a difference in attractiveness, the specific plant will have to offer more or less than other employers, depending upon whether it is more or less attractive as a place of employment.

To determine whether the wage being offered is too high, it is necessary to discover what other employers are offering. That information can be obtained for some industries, localities, and occupations from either the local office or the research arm of the state employment service. Often, however, it can be obtained only by a wage survey; i.e., a systematically conducted inquiry directed to the other employers. (Knowledge about the going wage can also be helpful for deciding whether an inability to attract enough employees is due to too low a wage.)

Of course it is not enough to learn what the going wage for a particular occupation is. A judgment must also be made about the relative attractiveness of the plant. It takes both to decide whether the wage being offered is too high.

Two important questions in the foregoing discussion are: Which going wage is relevant, that paid in the community or that paid in the industry? If a wage survey is necessary, should it be directed to the industry or the community? The correct answers will depend upon the kind of labor being priced and its relevant labor market.

Some occupations (e.g., clerk-typist) are used by a wide variety of employers within a given community. Workers in these

occupations may have little need to look outside that community to find alternative places of employment. The appropriate wage in this case is the community wage.

On the other hand, there are some occupations that are peculiar to one or a few industries. An elementary school teacher is probably a good example of one that is bound to a single industry. A person pursuing such an occupation (unless she or he is willing to change occupations) must of necessity talk to the various employers within the industry at alternative places of employment, and that very often will mean other communities. The appropriate wage here is the industry one with some possible geographic variation. Some highly skilled or technical jobs may have regional or national or even international dimensions.

The current effort to certify many employees may change the nature of the market for them. For example, prior to the certification of operators in wastewater treatment plants, operators were expected to possess physical attributes, intelligence levels, and educational attainments commonly found in the population at large. The traits that qualified a person to be an operator also made that individual eligible for a wide variety of other jobs in the community. A large number of persons holding or seeking other jobs could qualify as operators. The wastewater treatment plant was truly in competition for operators with other employers in the community and had to base its wage offer on that which prevailed in the community.

The use of certification requirements will change this in two ways: first, the chances will now be less that the agency will be

able to recruit fully qualified personnel (i.e., persons possessing the necessary certification) from other employers in the community. Second, the requirement will set apart persons certified as operators from the workers with whom they formerly competed. New persons with the certification possess a unique qualification that makes them alone eligible for certain jobs. In effect, a portion of a larger labor market has now been reserved exclusively for them, and the chances are probably good that they will prefer to operate within its protected confines. In other words, they will be more inclined to consider as alternative places of employment other plants in other communities, and less other kinds of jobs in a given community. The industry wage within a given geographical labor market area will not tend to become the relevant one for any plant.

Excessive Turnover Rate

The costs of turnover are clear. On the one hand, each worker who terminates after a period of work or training takes with her or him a certain amount of experience and efficiency that newly hired workers will lack. On the other hand, the costs of recruiting, hiring, and training new workers rise with increased turnover rates. An employer can lower costs of operation by reducing turnover. Of course it cannot be reduced to zero, except over relatively short periods of time. Employees will retire, die, and become incapacitated because of illness or accident, or will quit regardless of what an employer may do to retain them.

Some employers may not be able to reduce their turnover rate to that enjoyed by other employers. Some kinds of establishments

will inevitably experience higher rates than others, depending upon the kinds of workers they hire, the career opportunities they can offer their employees, and the alternative work opportunities available. In general, turnover rates tend to be higher the shorter the term of employment of employers' workers, the younger their labor force, the more females in it, and the more of these females who are young and married.

Some employers are able to offer employees greater career opportunities. At one extreme, large employers with a variety of jobs of varying skill levels can offer their employees a lifetime of promotions and movement up the job ladder. At the other extreme is the small employer who can offer only dead-end jobs. A small retailer may be able to promise a prospective employee no more than a lifetime as a sales clerk. Turnover rates among waiters, waitresses, bartenders, barbers, and the like tend to be high because they work in the latter type of establishment. They gain job variety and often promotion by occasionally changing employers.

Despite the above limitations, an employer may nevertheless be able to lower the turnover rate. The problem is to decrease the number of quits and discharges and to hire potentially more stable employees. What measures will be effective in reducing quits and discharges will depend upon the reasons for those separations. It probably behooves an employer to conduct exit interviews to learn more about the causes, and to maintain statistics for purposes of analysis. It may also be desirable to determine what kind of employees will tend to "stay put."

Whatever the causes may be, reducing quits is a matter of making the job more attractive so that potential terminees decide instead to remain with the employer. Among the inducements that may work are higher wages, better fringe benefits, improved working conditions, whatever it takes to raise employee morale, and increased opportunities for advancement (i.e., filling more of the better jobs by promotion from within, especially on the basis of merit).

The steps that will be effective in reducing the number of discharges will probably be revealed by reviews of the disciplinary policy, the state of employee morale, and the grievance procedure. It is likely that modifications in one or more of these areas will be in order.

A great deal can probably be learned about the causes of high turnover within a geographical area by an interplant analysis. For example a manpower planner may seek to determine whether or not turnover rates tend to be higher in low-wage plants. The procedure is described below.

Let us assume that there are five plants (sources of employment) in a state, which will be designated A, B, C, D, and E. Let us further assume that the wage rates they pay operators and their turnover rates for that occupation are as presented in Table 14-1. "Turnover rate" is defined here as the ratio of the number of replacement hires during a year to the average actual employment in the plant during that same period of time.

In Figure 14.6, the data contained in Table 14-1 is plotted, indicating a very strong, inverse relationship between turnover and

TABLE 14-1

Wage and Turnover Rates for Operators by Plant

Plants	Hourly Wage Rate	Turnover Rate
A	\$5.93	\$0.24
B	5.28	0.13
C	4.00	0.40
D	3.94	0.32
E	3.42	0.42

wage rates. However, before making a judgment about the importance of the wage differential as an explanation of the differences in turnover, the manpower planner may want to analyze in a similar fashion the importance of other explanatory variables. In fact, the planner may choose to perform a sophisticated multiple regression to determine how much of the difference in turnover rates is accounted for by each of the explanatory variables. Other indicators of the existence of manpower problems, such as quits, discharge, and vacancy rates, can be similarly analyzed.

As data systems are developed and computerized within each state and planning personnel develop statistical sophistication, more sophisticated analyses can be performed. Such increases in analytical abilities should be one of the goals of each manpower planner.

Notwithstanding current limitations on the types of analyses that can be undertaken, some insight into certain types of manpower problems may be obtained by obtaining rank orderings of occupations by such variables as shortfall and vacancy rates and comparing actual conditions with desired conditions. The rankings on these alternative bases may of course differ.

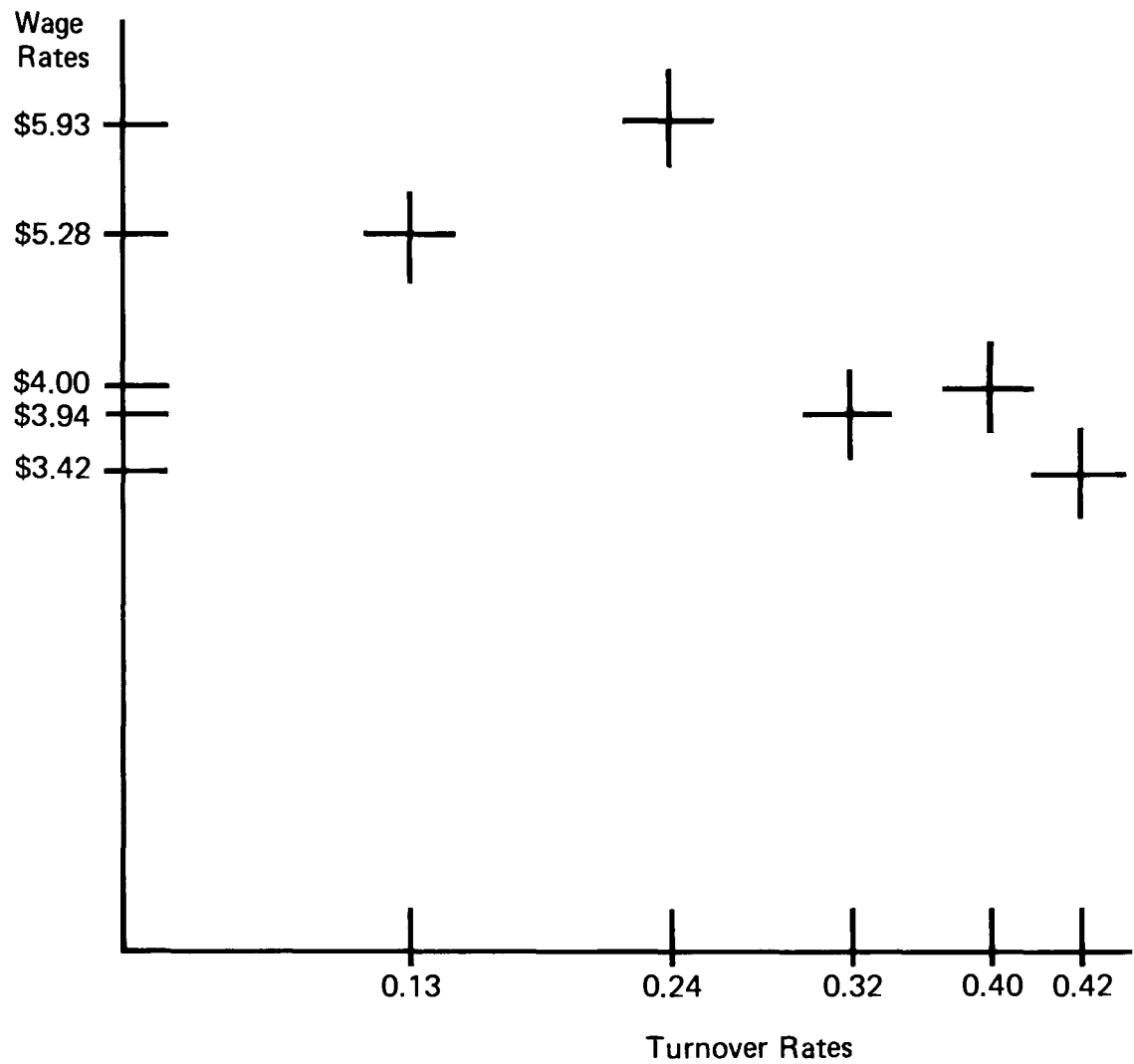


FIGURE 14.6. Relationship between Wage and Turnover Rates

Rank Orderings in Absence of Objectives

If the rank order of occupations by vacancy rate is as shown in Table 14-2, then it would be reasonable to assume that further investigations of Operator I and maintenance helper are warranted.

TABLE 14-2

Rank Order of Occupations by Vacancy Rate

Occupation Ranked According to Reversing Vacancy Rate (1)	Vacancy Rate (2)
Operator I	0.15
Maintenance helper	0.12
Electrician I	0.09
Chemist	0.06
.	.
.	.
.	.
.	.

Clearly within this framework, which occupations should be the objects of further and more intensive investigations is in part a judgmental decision. These decisions are affected by time and budgetary constraints in the planner's office and also by comparisons with similar occupations. Suppose, for example, that individual manpower planners had determined a set of occupations outside their agency which in many important aspects were similar to the various occupations within the organization.² If the vacancy rates were

²Determining what should be compounded into "similar" is not easy. Such elements should include, however, variables such as educational and skill requirements. Wages and working conditions should not always be included, for as we shall see, these variables may contribute to the cause of certain manpower problems.

obtained for each of these occupations, the resulting data may be as shown in Table 14-3. Much of the data to be used in such comparisons can be obtained from the employment office.

TABLE 14-3

Comparison of Vacancy Rates of Occupations
in Wastewater Treatment Plants with
Other Occupations Requiring
Similar Skills or Education

Occupation (1)	Vacancy Rate (2)	Vacancy Rates for Other Occupations		
		High (3)	Low (4)	Average (Unweighted) (5)
Operator I	0.15	0.18	0.13	0.155
Maintenance helper	0.12	0.15	0.07	0.11
Electrician I	0.09	0.11	0.09	0.10
Chemist	0.06	0.02	0.005	0.0125

The same rank ordering of occupations in the given agency by vacancy rate is maintained with accompanying vacancy rate for the paired occupation. One conclusion to be drawn from the hypothetical data is that the vacancy rate for Operator I does not seem to differ significantly from similar occupations. This does not necessarily remove "excessive" vacancy rates among Operators I from the list of manpower problems, but it does tend to add perspective to the problem, for the data as displayed seem to indicate that this may be a universal problem inherent in certain types of occupations or the individuals attracted to such occupations.

It should also be noted from the hypothetical data that a significant difference appears to exist in the vacancy rates for chemists.

Previously, it might have been assumed that a 6 percent vacancy rate would place chemists on the planner's priority list of occupations to investigate further, but if the vacancy rate for chemists in wastewater treatment plants is higher than for chemists employed elsewhere, it is incumbent upon the manpower planner to ascertain the reasons for the difference.

Similar types of data analysis can and should be performed in variables other than the vacancy rate. The type of analysis implied by the preceding tables has relevance to the three general manpower problem areas of recruitment, retention, and possibly to a lesser degree, utilization. These alternative rank orderings can, upon being completed, be entered into a single table and identified by their ordering rank order for a given problem area. Thus in Table 14-4 we see that Operator I was ranked first according to vacancy rate, discharge rate, and employment shortfall rate, while being ranked eighth and second, respectively, for part-time and quit rates.

Simple averages of the data in Table 14-4 may be computed and entered into a table as shown in Table 14-5 which indicates one possible overall rank order. This rank is based upon simple averages. It may be the case that weighted averages are more appropriate if, for example, vacancy rates are considered indicative of more serious problems than discharge rates.

If the appropriate facilities are available, the manpower planner can expand on the preceding type of numerical analysis and attempt to ascertain the possible causes of certain manpower problems. This can be partially accomplished by the use of regression techniques --

TABLE 14-4

Rank Ordering of Occupations According to
Several Possible Problem Areas

OCCUPATION TITLE (1)	OCCUPATION RANK ACCORDING TO				
	VACANCY RATE (2)	PART-TIME RATE (3)	QUIT RATE (4)	DISCHARGE RATE (5)	EMPLOYMENT SHORTFALL RATE (6)
SUPERINTENDENT					
ASSISTANT SUPERINTENDENT					
OPERATIONS SUPERVISOR					
SHIFT FOREMAN					
OPERATOR II					
OPERATOR I					
MAINTENANCE SUPERVISOR					
MECHANICAL MAIN- TENANCE FOREMAN					
MECHANIC II					
MECHANIC I					
MAINTENANCE HELPER					
ELECTRICIAN II					
ELECTRICIAN I					
CHEMIST					
LABORATORY TECHNICIAN					
STOREKEEPER					
CLERK TYPIST					
AUTOMOTIVE EQUIP- MENT OPERATOR					
CUSTODIAN					
PAINTER					
LABORER					

TABLE 14-5

Rank Order of Occupations According
to the Average Value of Several
Possible Problem Areas

Occupation	Average Value of Rank Order
Operator I	2.6
Maintenance Helper	3.0
.	.
.	.
.	.
.	.

a simple example of which we introduced in the supplementary information of chapter 13. Since, according to available information, the relevant facilities are not universally available and because the type of analysis to be conducted to ascertain the possible causes of certain manpower problems are not easily explained -- nor do simple versions of them supply reliable results -- we shall not pursue this subject at this time. As progress is made in federal, state, and local manpower planning offices and programs, this type of analysis may be introduced.

Rank Orderings in the Presence of Objectives

Much of the material of the preceding section can be used in working with rank orderings based upon a comparison of desired and actual conditions. We illustrate with the use of the two examples. The first is depicted in Table 14-6. In this table data are needed on the desired and actual levels of some employment characteristics -- we use employment shortfalls in our example. Both the absolute and relative differences should be obtained -- although one or the other

TABLE 14-6

Comparison of Desired and Actual Employment
Shortfalls by Occupation

Occupation	Desired State	Actual State	Absolute Difference	Rank of Absolute Difference	Relative Difference	Rank of Relative Difference

may be sufficient if the objectives (see chapter 11) are expressed in only one way.

We suspect that the rank order based on relative differences will carry more weight with management. A desired rate of 5 percent and an actual rate of 6 percent imply a reduction of 1 percent absolutely or by 20 percent of the desired rate.

So long as a single employment characteristic is being considered, little difficulty would be encountered for a knowledgeable manpower planner. Difficulties arise, however, in comparing employment characteristics. In Table 14-7 we provide an example of the last issue. When relative differences are used for comparisons the third and fourth items on the absolute comparison have equal rank. Other changes, with actual reversal of rankings could of course occur.

SUMMARY

More than with the discussion of any of the preceding steps we conclude this chapter somewhat arbitrarily with respect to the cutoff point for our discussion. So much could be said about the analysis of manpower problems that a single chapter will be inadequate. We therefore view this chapter as primarily having suggested certain aspects of the range of manpower problems that might befall an agency. What is important in this chapter is not so much the insight that might be obtained to a specific manpower problem, but rather an appreciation for the general way in which the analysis of manpower problems can be approached.

A considerable degree of sophistication will be required of manpower planners to execute this step in an efficient manner. It

TABLE 14-7
Comparison of Desires and Actual Employment
Characteristics for Chemist II

Characteristic	Absolute Difference (Percent)	Relative Difference (Percent)	Rank Order of Absolute Difference	Rank Order of Relative Difference
Employment shortfall	10%	100%	3	3
Vacancy	15	300	2	2
Quits	5	100	4	3
Discharge	20	400	1	1

will be the step into which they invest much time thinking of the alternative possible causes for a particular manpower problem that they feel they have identified with the help of data obtained in previous steps. On the basis of the analysis in this step, manpower programs will be recommended. In many cases the efficacy of the manpower program will depend upon the accuracy of the planner's analysis of the manpower programs. Recommendations to increase budgets without recommending an increase in wages will not eliminate employment shortfalls, for example, if their cause is low wages!

The successful completion of this step is, we believe, a prime candidate for that step in which, over many planning cycles, manpower planners will show the greatest relative increase in their proficiency. This believe is held on the basis that the beginning level of proficiency will be relatively low and also on the basis that the skills required in executing this step will be new to most new manpower planners but are of such a kind that they may be honed on past experience at relatively faster rates than many of the skills relied upon in the execution of other steps.

SELECTED REFERENCES

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DEVELOPMENT OF MANPOWER PROGRAMS

In this chapter we discuss step 5: Develop manpower programs in response to current and anticipated manpower problems. The tasks undertaken in the execution of this step build upon the data collected and the analyses made in the completion of previous steps. It is important for us to emphasize that the success of the material that is generated in this step is much more under the control of management than are any of the other activities that the manpower planner engages in. This observation is of course contingent upon the allocation of authority within the organization.

An integral part of this step is the preparation of a manpower plan to meet the perceived needs of the organization. Insofar as the manpower planner must report to other individuals within the organization, this plan might only be in the form of recommendations for certain programs to be undertaken to ensure that the previously identified manpower objectives be achieved. We take the position, based in part upon evidence obtained from those organizations where manpower planning currently exists, that the manpower planner will for the most part only recommend action and will seldom inaugurate programs directly. Hopefully the planner will be persuasive and have respect within the organization such that the recommendations have influence. In the final analysis, however, the planner is providing recommendations that he or she may have little if any control in implementing. This scenario indicates that in this

particular area of responsibilities, the planner may be continually frustrated.

PREPARATION OF A MANPOWER PLAN

The essential aspects of executing this step is the preparation of the manpower plan or annual report that is submitted to management. This plan should detail the various manpower needs of the organization, including, but not necessarily limited to, the number of new people that should be hired, the type of training new hires should receive, the type of training that current personnel should have, and the identification and solution of existing and expected manpower problems. This plan should not be long and tedious, but rather should summarize the manpower conditions of the organization in sufficient detail to portray to management the essential features of this condition. It should not attempt to impress management with the complexity of the manpower planner's various activities by burdening him or her with a plethora of tables and analysis. Such tables should be available upon request, but not in the initial document. Alternatively, the planning document may contain a summary table or tables, followed by several tables that include more detail. There is some advantage, however, to having the first table represent an overall view or summary of the various manpower programs, followed by subsequent parts that provide more detail for specific areas that management may examine more closely should this be desirable.

The principle underlying the design and execution of this step is the comparison between the actual and the intended manpower

condition of the organization. It is on the basis of differences between the actual and intended states of the organization that programs are designed and implemented. What the specific manpower needs of the organization are, and the resulting activities and programs that are undertaken to meet them, will, on specific issues, be related to the objectives adopted by the organization. This is equally true with the determination of what manpower planning problems might be determined to exist. There are, however, some problem areas that are universal and quite independent of an organization's peculiarities. Clearly, the hiring of new individuals to fill vacancies is an example of such problems.

There will be a training need in many organizations. In many instances new employees will have to be trained and many existing employees will need retraining to bring them up to the standards established within the organization and to meet technological change. Thus some plans will have to involve the allocation of training budgets by type of training and whether such training is to be given to new hires or to existing employees. In conducting the inventory of current personnel or an analysis of recent past hires, the planner may have to determine that the quality of both was not equal to that desired by the organization. It might be the case, for example, that new workers were being attracted to given occupations who were deficient in general education requirements, or they as a group may have been skewed in their age distribution. If such happenings have been identified as problem areas, then specific plans will have to be made to change such matters as

recruiting methods and aspects of employment (e.g., wages, promotion procedures) that may tend to attract more desirable employees.

The areas of manpower planning activity that we might call the problem resolution area will depend to a greater extent than the preceding upon the specific objectives of the organization. Whether a particular employment characteristic falls within the range to be considered as a problem depends, as we have mentioned previously, upon the specific objectives of the organization.

EFFECTIVENESS OF MANPOWER PROGRAMS

The most difficult and yet perhaps the most important aspect of devising solutions for the resolution of given manpower problems is the determination of what has been called the "social production function" of specific programs. What is meant by this is simply the relationship between the inputs that constitute a program and its output. Alternatively, it deals with the information on how certain manpower programs produce certain changes in manpower conditions. Information must be obtained on how well increases in wage, for example, decrease the vacancy rate or attract a higher caliber of individuals to a particular job, or how different types of training programs are more effective for different occupations. Much of this information can be gathered only after a considerable amount of time has been invested in the manpower planning process.

Furthermore, the degree of sophistication needed to spell out the details of such production functions cannot, with any reasonable expectation of what will occur in the foreseeable future, be expected

to exist at the state or local level. For this reason, in many functional areas of government activity there is, or there are plans for, a considerable and continuing federal effort to provide assistance on these matters by obtaining specific information about the production functions for presumably reoccurring and universal manpower programs. State and local manpower planners should keep abreast of such endeavors and continually be aware of the possibility of improving their own performance by using information disseminated by the federal counterpart to their agency.

Often what knowledge we have of the effectiveness of manpower programs is probabilistic. In the supplementary information at the end of this chapter, we consider certain aspects of decision making as they might pertain to a manpower planner attempting to make recommendations as to specific manpower programs that his or her organization should adopt. Such material as is covered in the supplementary section also relates to rational decision making that was alluded to in chapter 9 and the content of a management information system. We offer the material in an appended form primarily to avoid interruption of our development of the manpower planning steps.

An important aspect of coping with the problems discussed above is the relationship that individual manpower planners can establish with complementary agencies in his area. We have discussed some of these in previous chapters, and shall only refer briefly to them at this time. The employment service is an invaluable source of information on many aspects of employment. Data on wages by

occupation are available, as are profiles of employee characteristics by broad classification of occupation. The various institutions that engage in training are also invaluable in providing assistance on determining the effectiveness and costs of alternative training programs -- although these tasks may more appropriately be taken over by a training officer within the organization. State and federal departments of labor, through their publications and personal contact, can provide considerable information that will be useful to manpower planners in trying to determine the characteristics of their manpower program production functions. Experience in other organizations will, wherever possible and where appropriate with necessary adjustments, be invaluable as basic information in responding to issues in the planner's own organization. Even if hard data are not available from these institutions, qualitative insight into problems can be obtained. Such information should not be treated lightly, for not only is it the only kind available but in some instances is the result of keen insight on matters not easily quantifiable.

RELATIONSHIP OF OBJECTIVES AND PROBLEM AREAS

The programs or action steps designed by manpower planners will be those that they think, on the basis of available evidence, are essential in achieving the (preliminary) objectives identified in step 1. In many cases, however, it will be on the basis of the information obtained in step 5 that specific manpower objectives will be identified. An example will illustrate this: In the execution of step 5, and in the data collection in steps 2 and 3, the

current and projected vacancy rate for a particular occupation would have been identified. The manpower objectives might initially have been defined as "reduce the vacancy rate so that it is less than 10 percent." Alternatively, the manpower planning objective could have been stated as "reduce the vacancy rate by 50 percent." These objectives may have been defined prior to information obtained on the actual and expected vacancy rates, although there are some problems associated with doing so.

The advantages of setting an upper limit to the vacancy are that it does provide a target number toward which the manpower planner can aim. Furthermore, such a number could be one obtained from information on vacancy rates in other and similar industries and taken as somewhat of a standard by which manpower planners could gauge their own work. The disadvantage, however, of setting an upper bound on some characteristic such as the vacancy rate is that it might require too little or too much effort when the rest of the manpower program is being considered. Thus, if the actual vacancy rate was 50 percent, it might be "unwise" (i.e., inefficient) to attempt to reduce it to 10 percent, given the other problems (or objectives) facing the agency. Alternatively, if the vacancy rate was 11 percent and other problems were of considerable urgency, then perhaps no effort should be directed toward reducing the vacancy rate since it is so close to the targeted rate. In this case, however, saying that the target vacancy rate is less than 10 percent is inaccurate, for it is in effect not a target. All of this, however, is a matter of trade-offs and priorities when multiple objectives exist.

The objective expressed in the form of "reduce the vacancy rate by 50 percent" has the advantage of perhaps defining some degree of effort that the manpower planner should seek. It has the disadvantage that it also may be too much or too little for the reasons similar to those given above. If the vacancy rate was 5 percent, for example, and this was less than the national average for similar occupations, then it would seem, unless there are compelling reasons to the contrary, that the manpower planner should not attempt to reduce this particular vacancy rate further when he or she is experiencing conditions that are better than other organizations having similar occupations.

It is clear that the exact form of manpower objectives, if they are to be expressed as specific numerical goals, cannot be stated until the basic data gathered in steps 3 through 5 have been analyzed. In step 6 this information is to be taken and programs devised that are to contribute to the achievement of the specific objectives.

FURTHER ISSUES IN THE ANALYSIS OF THE MANPOWER PLANNING PROBLEM

A further word is required on analysis. In the execution of step 5 we suggested a format whereby the manpower planner obtains a rank ordering of possible manpower problems. We have, on the other hand, in chapter 9, presented some criticism of the priority approach to solving manpower planning problems or allocating training funds. One reason for such criticism is that rank orderings give only a part, and sometimes a deceptive part, of the issues related to assessing the nature and magnitude of an organization's

manpower and training problems. Listing such problems in some order does not necessarily give appropriate instruction on how to allocate the organization's limited resources in resolving such problems. It is not clear, however, that we can offer any viable solution to this dilemma, given the constraints under which we are presumed to be operating. We shall content ourselves with indicating some general problem areas and offering some cautions. Although not completely instructing manpower planners on how to cope with such issues, we shall at least introduce them to some dangers and thereby indicate to them areas for future research.

In the examples that follow, we shall concentrate on only two possible problem areas -- discharges and vacancies. Our analysis will be based upon the reasonable assumption that there are costs and benefits to reducing a given problem area. We shall therefore refer to the costs and benefits of problem resolution and shall, for the purposes of our analysis, assume that all such costs and benefits are well known to the manpower planner.

Some additional assumptions are required. We shall initially assume, for simplification only, that the benefits from resolving the problems of discharges and vacancies are equal. Normally we would also suppose that the benefits would increase at a decreasing rate. This would indicate that the incremental or marginal benefits of problem resolution are positive but diminishing. We shall save this more realistic assumption for a subsequent example and content ourselves at this point with the assumption that the benefits are identical and constant. This, as we shall see, permits us to

emphasize the cost side of problem resolution. For this aspect of problem resolution we shall suppose that as we begin to resolve a given problem the costs of further resolution increase, and do so at an increasing rate. This is just another way of saying that there exist diminishing returns to efforts in resolving specific problems. This implies that the marginal or incremental costs of problem resolution are positive and increasing.

In Figure 15.1, we illustrate the positive and increasing marginal costs for discharges (MC_D) and vacancies (MC_V). We have, for purposes of illustration only, assumed that the marginal costs for resolving the problem of discharges starts lower but rises more steeply than does the marginal costs for vacancies. It is

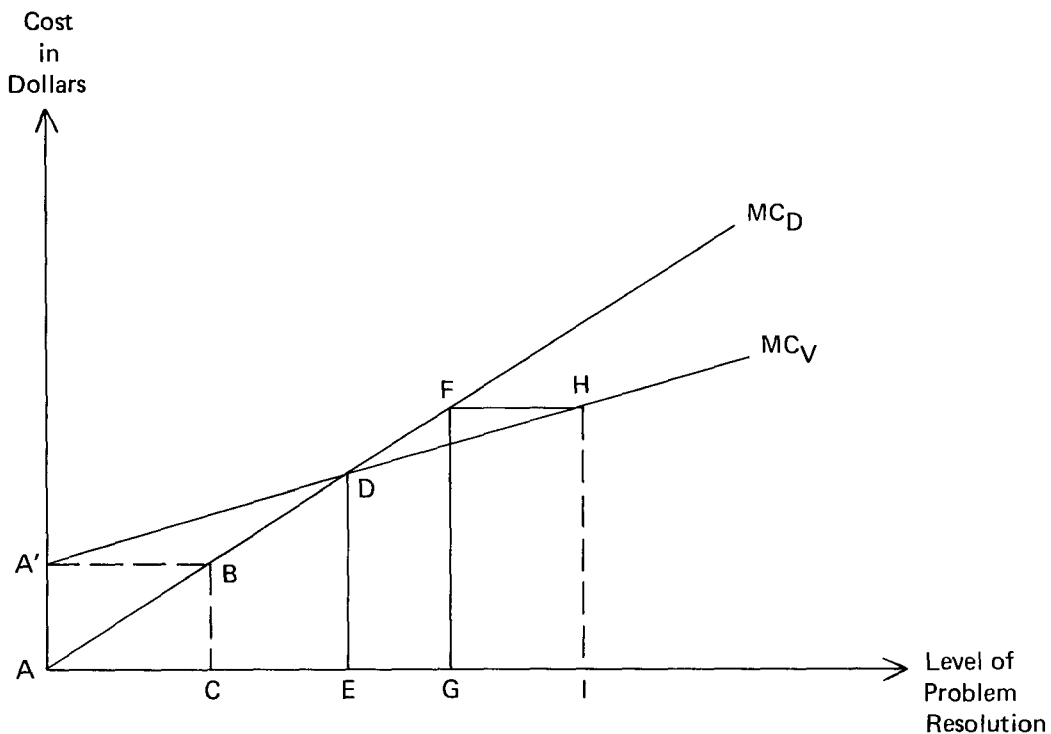


FIGURE 15.1. Illustration of Differing Cost Relationships

the nature of marginal cost curves that the area under the curve measures the total cost of the activity. Thus in Figure 15.1 area ABC denotes the total costs of reducing discharges by amount AC. The marginal costs of this rate of problem resolution is denoted by the height of the curve at that point, namely CB.

The efficient allocation of limited resources to completing ends requires that resources should be allocated to an activity until the marginal benefit of doing so is equal to the marginal costs. Thus an efficient allocation of funds to the resolution of discharges and vacancies would require that sufficient funds be allocated to each until the marginal benefits from doing so are equal to their respective marginal costs. Since in this sequel we have assumed that benefits are identical, such a rule requires that resources be allocated between discharge resolution and vacancy resolution until the marginal costs of doing so are equal to each other and to the common benefit. Thus if only ABC amount of resources is available, all should be allocated to the resolution of discharges, for at that point the marginal costs are equal to AA' and CB.

The danger with the rank ordering method is that some practitioners will feel that funds should be spent on the top-ranked item until either the funds are exhausted or the problem is resolved. If the latter, then the second problem is taken up. This is generally not the best procedure. Under the assumptions we have made (i.e., equal benefit for similar reductions in the problem), the optimum strategy from an economic point of view is to allocate funds in such a way as to keep marginal costs of the various problems equal.

Insofar as the cost structure differs among problem areas, then differing allocations should be made.

We have already indicated how the resources should be allocated if amount ABC is available. Suppose that resources in an amount equal to the sum of areas ADE and AA'DE are available. When such is the case, both problem areas should be resolved at the rate of AE. At such a rate there is an equality between their marginal costs, namely DE. This implies that additional resources expended on each problem has the same benefit. If more resources are available, the allocation between discharges and vacancies should be continued in such a manner as to always equate marginal costs. Thus with a budget equal to the sum of AGF and AA'HI, the allocation should be made in such a manner that discharges are being reduced at rate AG and vacancies at rate AI. At such allocations the marginal costs are equal at GF and IH. Note, however, that the rate of problem resolution is not equal, nor are the total allocations to each problem area equal.

The preceding examples were simple and ignored another important aspect of allocating scarce resources. Resources should not be allocated to any activity if the incremental benefit received therefrom is lower than the incremental cost. In order to illustrate this and related issues, we need to change our model somewhat and assume that the benefits from the resolution of discharges and vacancies are different and that they are positive but diminishing. To emphasize this aspect of allocation, we shall simplify in another direction and assume that the marginal costs of problem resolution are the same for both discharges and vacancies.

In Figure 15.2 we illustrate a situation where the marginal costs for problem resolution are equal, but the benefits from doing so are not. The curves noted as MB_V and MB_D are the marginal benefits from reducing vacancies and discharges respectively. The area under example is to allocate resources so as to keep marginal benefits equal. (Note that at this point we would also be satisfying the general requirement that marginal benefit equals marginal cost.) This rule indicates that with very limited resources an allocation is made only to the resolution of the vacancies problem. As budgets increase, both vacancies and discharges are allocated resources. In this illustration we can indicate another important rule: At no time should the activity be pushed beyond point A on MB_V or beyond point B on MB_D . To do so would imply that the benefits obtained

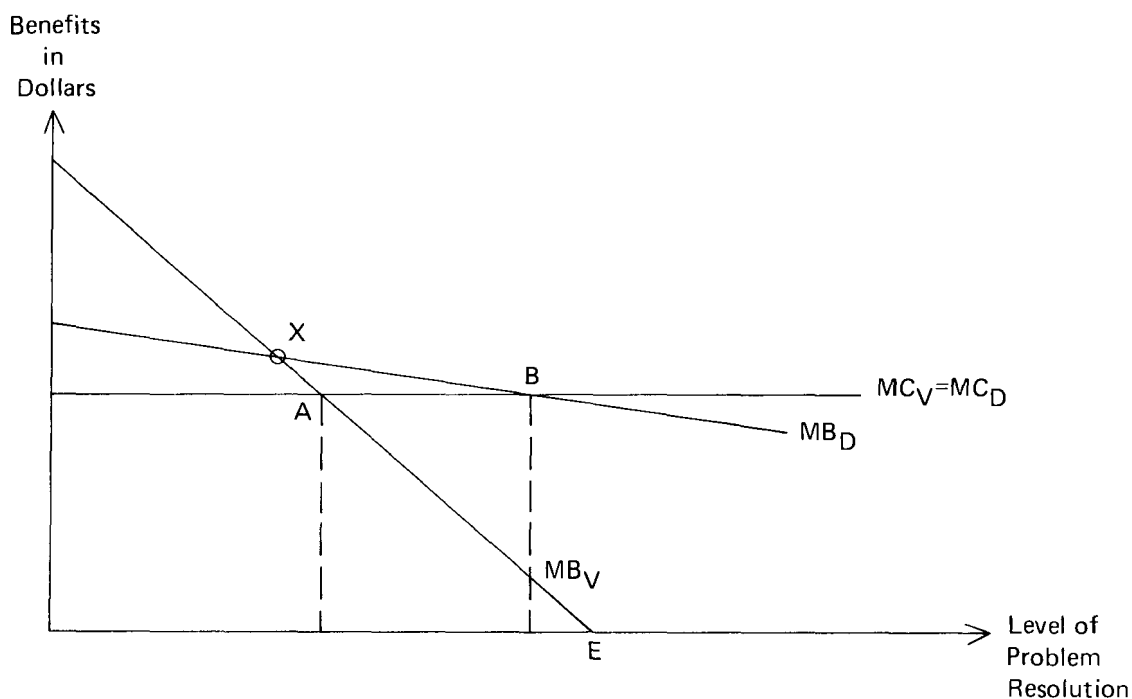


FIGURE 15.2. Illustration of Differing Benefit Relationship

from further problem resolution are not worth the extra cost to the organization. Only at the position X (where MB_V and MB_D intersect) should the allocation to each problem be identical.

The preceding examples are intended to emphasize some of the difficulties in making allocation of resources either to satisfy training needs or to resolve other perceived manpower problems. There is no easy "rule of thumb" that can be extracted from the analysis other than that in the absence of severe resource restrictions some allocation should be made to each training or problem area. The weights attached to such allocation could be based upon judgmental decisions regarding the cost structure of different problems and the perceived weights attached to certain objectives. The lower and less steep the marginal cost of a problem resolution, the more likely it will be that greater allocations should go to that problem area. This of course need not hold if differing benefit functions are assumed. Furthermore, it is not clear what information a rank ordering in objective functions will show -- other than satisfying possibly misinformed managements.

In Figure 15.2 vacancies initially appeared to have the highest priority in the organization's objective functions. This advantage is quickly lost, however, to discharges. Even if MB_V were everywhere above MB_D , there should not be an allocation of resources to V until that problem is resolved. If "solving" the vacancy problem meant, in the manager's point of view, a movement to position E, we clearly have a misallocation of resources -- resolving the problem is costing the organization more than the benefits it receives. The

problem of vacancies is "resolved" at A and discharges at B. This observation implies that an efficient organization will always have some positive vacancy and discharge rate.

All of the preceding is not purposely intended to frustrate the planner, although well it may, but rather to caution him or her about simple allocation procedures. Allocation issues are complex and the planner should realize that at this stage of development in manpower planning it would be expecting too much to go beyond such cautionary matters, but even this is a step in the right direction.

GENERAL PROBLEM AREAS FOR MANPOWER PROGRAMS

In executing step 4 the manpower planner will have assessed the number of additional workers that will be required within a given time period. Such individuals will be obtained from either the external or internal labor market. In either case, some aspects of recruitment will have to be undertaken -- the job will have to be advertised to the external as well as the internal labor market. It is not the direct responsibility of the manpower planner to engage in the actual task of recruitment but rather to supply that information to those individuals in the organization that have the responsibility of recruitment. Such an individual might be classified within the organization as the personnel officer. If such a division of labor exists within the organization, the manpower planner must work in cooperation with the personnel officer in determining the appropriate types of people to which specific recruitment will be directed. The planner should provide the personnel officer with

information similar to that obtained for the execution of step 1. This would include, for example, the descriptions for each occupation. He or she should also supply the personnel officer with information regarding whether in the past the organization has been able to attract appropriately qualified personnel to the specific occupations within the organization.

The second general area which provides some framework for classification of general manpower problems is the retention of existing personnel. As previously mentioned one set of manpower problems that may confront the organization is the existence of excessive transfers or separations from a particular occupation. The cause and effect of such terminations should whenever possible be assessed and from such information a program devised to eliminate it. This is to imply that if there is a high termination rate it should be determined whether or not this is due to the relatively low wages that are paid, the absence of career ladders, the poverty of training, or the previous hiring of people unsuited either by education or temperament for the job. If these problems have been identified in a manner that contributes to the manpower planning process a considerable degree of confidence in the designation of action steps or specific manpower programs is made less difficult.

The third general area of manpower issues for which programs may be devised is that of the use of existing personnel. It is not clear what the appropriate role of the manpower planner should be in this area. It is unclear whether manpower planners should merely identify problems related to manpower utilization or once identified

to suggest solutions for them. If manpower planners are to take an active role in developing action steps to eliminate utilization problems, they will have to do so in conjunction with those individuals who are more knowledgeable about the technical aspects of employment and training within the organization. We have addressed ourselves to some aspects of this issue in the discussion of step 4. We continue with the position that problems of utilization are more technological and should initially be brought to the attention of the manpower planner by those that in some agencies would be working in the office referred to as "operations and maintenance."

Perhaps the most important aspect in developing manpower programs, at least as judged by the amount of time and resources devoted to it by many organizations, is the role of training. In trying to understand the dimensions of an organization's training program the planner should be concerned about the following general types of questions:

1. Who is to be trained? (This means identifying the type of individual to be trained and attracted to the industry.) What is the level of education, age, and sex, that we desire to attract and train? How are we to obtain individuals for a given occupation from the internal or the external labor market?
2. Are individuals to be trained for entry-level positions, with career opportunities and upward mobility, or for positions that have little opportunity for advancement?

3. What prerequisite skills should be expected of those who enter a particular training program? How are those skills to be affected by the way new and additional employees are recruited?
4. What tasks are the graduates of such training programs expected to perform? Is the training that they receive related to those expectations?
5. Do existing training programs have the ability to satisfy current and projected needs? If not, what types of additions to existing training programs are required?
6. Where is training to be given and what type of training is to be given? Is the training to be of the institutional type or on-the-job training?

Many of the answers to these questions cannot be quantified. Furthermore, they are questions the answer to which must be provided by the training officer. But they are questions, nevertheless, with which the manpower planner must continually wrestle and be knowledgeable about.

ANNUAL MANPOWER REPORT

Previously we have suggested that the manpower planner, in preparing an annual report for management, should attempt to provide a one-page summary of the more important aspects of the manpower characteristics of the organization. Having made this suggestion, however, we admit to considerable difficulty in accomplishing this task. If one is willing to accept (as we are) that for many

organizations the important continuing decisions are those related to the hiring of new employees and the training of new and existing employees, then a one-page annual report that summarizes such issues can be made. We illustrate such a report in Table 15-1.

Since we have suggested that manpower planning have a planning horizon of at least five years, it seems only reasonable to suggest that the annual report contain information relevant to the planning horizon. Again in an effort to keep the report concise, the format suggested in Table 15-1 is detailed information on new hires and training requirements for the current year and an average of the succeeding years. The data from which these averages are obtained will of course be found in subsequent tables that would comprise the totality of the annual report to the management of the organization.

The disadvantage of showing the average of all of the remaining years in the planning horizon is that it hides any trends, whether positive or negative, that may exist in the data. There is some comfort in knowing that if the trend is uniform this will be indicated by the average -- being greater than the current requirements if a positive trend exists and smaller if a negative trend exists. If the manpower planning data determine that there is no trend but cyclical behavior, with some years requiring greater efforts than others, then such information will be buried in the averages. Since all this information is provided in subsequent tables, we do not consider this a serious shortcoming.

TABLE 15-1

Annual Report on New Hires and Training by Occupation for 1975

Occupation	New Hires 1975	Total Training 1975						Average Annual New Hires 1976-81	Average Annual Training 1976-81							
		OJT.1	OJT.2	C.1	C.2	S.1	S.2		Total	OJT.1	OJT.2	C.1	C.2	S.1	S.2	Total
1. Chemist I		a	/	/	/	/	/	/	a	/	/	/	/	/	/	/
2. Chemist II		b	/	/	/	/	/	/	b	/	/	/	/	/	/	/
3.																
4.																
5.																

^aTraining for new hires.^bTraining for current personnel.

The information contained under the training requirements, particularly those related to the training of existing personnel, refers not to what is needed in the totality but to what is planned for each year within the planning horizon. The meaning of this will become more apparent when we consider training specifically in explaining subsequent tables.

Equal in importance to consideration in plans for new hires and training, although the content possibly occurring on a more sporadic basis, at least in the long run, are problems associated with the identification and solutions to specific manpower problems. A suggested format for a summary table regarding these is found in Table 15-2.

Determination of New Hires and Their Training Needs

For each year in the planning horizon, we have obtained an estimate of how many people need to be brought into a specific occupation. These we have referred to as new hires, although they should not be considered necessarily as new hires to the organization, since a person entering a particular occupation for the first time might be a transfer from some other occupation within the organization. Such information has of course been obtained in the execution of steps 2 and 3, where projections of additional employees that will be needed due to expansion of employment and the replacement of existing employees have been made. The type of training that each of these new hires will require will in part be a function of the labor supply source from which they were obtained. Employees

TABLE 15-2

Identification and Proposed Solutions to Manpower Problems

Occupation	Problem Area(s)	Possible Causes	Proposed Solution(s)	Anticipated Cost	Anticipated Change	Budgeted Funds	Budgeted Shortfall

who come from external labor markets may require different training from those in the internal labor market. It is not expected, however, that the manpower planner make these determinations of what training is required for different types of employees. This specific aspect of the manpower plan should be obtained from (or completed in conjunction with) the training officer. Upon obtaining such information, however, the manpower planner should display the information in a way suggested in Table 15-1.

In order to obtain the necessary information on training, manpower planners will have to complete several tasks: They will have to provide information to the training officer as to the number of new hires and the expected sources from which they will be obtained, and they will have to provide the training officer with information regarding training needs of current employees. The first of these tasks would have been obtained in the execution of step 3. The more complete this information, the better assistance the manpower planner will obtain from the training officer. For example, if the manpower planner can tell the training officer that not only will a certain number of the new hires into a specific occupation come into the organization from the external labor market (with no previous experience in the plant) but also relate their general educational background, the training officer is aided not only in determining the appropriate current program but also in devising future training programs. The basis for this information to be supplied to the training officer is found in Table 15-3, chapter 13.

As a result of the forecasts of future employment characteristics and of their consultation with the training officer, manpower

planners will be able to complete tables such as Table 15-3 for each year in the planning horizon. By summing the information for each year and finding the average, they thereby obtain information by which they complete a portion of the annual manpower report.

TABLE 15-3
New Hires and Training Needs
by Occupation for 1976

Occupation	New Hires	Type of Training Required					
		OJT.1	OJT.2	C.1	C.2	S.1	S.2

In Table 15-3 the training listed is training required. This need not equal the types and levels of training recommended in the annual manpower report. It is required that we spend some time in developing the reasons for these differences.

Determination of Training Plan

The training efforts of the organization may be broadly classified as to the training of new employees and the training of existing employees. It is doubtful that the training budget will be allocated in such a way, and there is no overriding reason why it should be. Training resources will be available to the organization, and it will be a determination of the management, with the assistance of the manpower planner and the training officer, how these funds are

allocated not only between existing and new employees but also among the different types of specific training programs. This implies that at some point within the organization a determination must be made as to the allocation of resources toward different training programs. The organization should determine the most efficient use of its training funds, independent of any broad classification of training new or old employees. Such a procedure is unlikely to be followed, however, because the requisite information will not be available and many managers will think in terms of broad divisions of training funds. This being the case some general, but possibly useful, information to guide such allocation can be obtained.

If the organization has been hiring a caliber of new employees who are superior to existing personnel, then this might be taken as a suggestion for allocating more funds to training old employees. If the reverse hiring practices have occurred, the allocation of training resources would be weighted toward the training of new employees. In any event, what is required is that something be known about the productivity of training resources, depending upon those who receive the training. We have already indicated that this is a difficult area from which to obtain the necessary information. The only rule of thumb that we have suggested is that in general some of each type of activity (training) will be undertaken. This indicates that some new hires and some existing employees, although not necessarily all, should receive some training.

A further problem exists. After the current employment characteristics of the organization have been measured, the number of

existing employees who need some kind of training may easily exhaust current training resources and in some cases may represent several multiples of the annual training resources of the organization. Under these conditions, and given some presumed need to obtain and train new employees, it is unrealistic to assume that all of the training needs of existing employees can be satisfied within a given year. This requires that some plan be adopted whereby the training needs of current employees be satisfied over some pre-determined time span. When such allocations are made, it may be determined that presumed benefits from training existing employees outweighs the benefits of training some of the new employees. In such cases all of the new employees who do not receive training at the time of their hiring, but who do need some training, will be added to the inventory of untrained existing employees at some future date.

The allocation decided upon by the manpower planner and training officer should be illustrated in tables following the format suggested by Tables 15-4 and 15-5. These in turn can then be accumulated into a table such as Table 15-6, which in turn are accumulated and averaged for inclusion in the annual manpower report.

TABLE 15-4

Allocation of Training Resources
for New Hires for 1976

Type of Training	Budget Allocation	Number to be Trained	Shortfall of Training

TABLE 15-5

Schedule for Training Current Personnel
for Draftsmen II

Year	Type of Training						Anticipated Costs	Budgeted Funds	Budgeted Shortfalls ^a
	OJT.1	OJT.2	C.1	C.2	S.1	S.2			
1975									
1976									

^aAdjust for current shortfalls.

TABLE 15-6

Total Training Needs by Occupation for 1976

Occupation	Type of Training Required					
	OJT.1	OJT.2	C.1	C.2	S.1	S.2

One of the underlying assumptions for the completion of Table 15-5 might be to complete the training effort by the end of the current planning horizon. In our examples this would be 1981. This does, of course, have to be tempered by the possibilities of not obtaining the necessary resources. In the execution of step 3 we suggested -- but did not take up in detail -- that the manpower planner forecast expected budgetary levels and allocations. There may be some value in doing this even though it may be nothing more than some extrapolation from past experience -- a datum we did ask the manpower planner to obtain.

In Table 15-7 we have suggested that for each year the planner obtain information on the resources necessary to satisfy the training plan for each year in the planning horizon. Such a table would list the amount necessary to train those for whom plans are being made, the amount of money that is expected to be available if the future continues as in the past, and the anticipated budgeted shortfall. The purpose of such a table is to indicate to the management of the organization what the manpower planner considers to be a reasonable plan for meeting the training needs of the organization and the budget shortfalls, if any, that such a plan engenders. It also represents the planner's expectations of what resources are needed and what resources will be available if the plan is an indication of the future. Insofar as shortfalls occur, this information will be useful to the manager in determining whether increased allocations are to be made to the training aspects of the organization.

It will also provide information on the appropriate allocations to be made in the future, should the manager decide to change current practices.

TABLE 15-7
Training Budget Requirements

Year	Required Training Budget	Anticipated Training Budget	Anticipated Budget Shortfall
1976			
1977			
1978			
1979			
1980			
1981			

The manpower planner should, however, make contingency plans on the basis of no such increased allocations. An example of such a table is that illustrated in Table 15-8. The important aspect of this table is that it indicates the training shortfall that will occur if no changes are made in the resources devoted to training.

Resolution of Manpower Problems

In the previous step we have provided a method for presenting a rank ordering of possible manpower problems by occupation. We have, however, in this step and also in the chapter on planning, noted severe shortcomings with this common practice. These shortcomings are not so much with the issue of rank ordering itself, but

TABLE 15-8
Actual and Desired Training Requirements

Year	Desired Number to be Trained	Number That Can Be Trained	Shortfall	Accumulated Shortfall

with some of the possible uses to which such orderings may be placed. These cautions should be kept in mind as we proceed.

In providing for a plan for the resolution of manpower problems there are three major issues that the manpower planner must confront:

1. How to resolve the particular manpower problem
2. What resources will be required
3. What resources will be available

The issue of how to resolve a manpower planning problem is a question of which manpower program to adopt. The problem of the level and allocation of budget is one concerned with how much of the organization's limited resources should (or can) be allocated to a specific problem.

Again the problem of allocation might in some people's minds be approached on a step-wise manner by first allocating the organization's total manpower resources between the resolution of manpower problems and the training of new and existing employees. This is

an artificial dichotomy, however, for the information that would be required to make this general allocation in an efficient manner is also that information necessary to allocate funds between problems and training on an individual basis. Special interests may not allow such efficient solutions, however, and the demands upon data sources and analysis are presently too great. We would obtain benefits and costs of each program -- whether problem resolution or training -- and then allocate the limited resources to maximize the excess of benefits over cost. If we had such information we would not need to make an initial allocation between problem solving and training.

There is one overriding consolation that helps to mitigate some of the frustrations the manpower planner will face in trying to allocate resources to perform different tasks. This consolation is related to the amount of information or directive which is provided by the management of the organization. It is quite possible that officials of the organization will provide such detail in the objectives which they wish to have filled that little scope is left for the manpower planner to worry about the allocation of the organization's funds. Some may go so far as to suggest that the problem of allocation is not the manpower planner's concern. If "concern" means "actual decision to allocate," we would agree. If it means to take into account in considering alternative plans, we disagree. Alternative suggestions for the allocation of funds is an integral part of a manpower plan. It is the basis, for example, of determining how many people should be trained each year. The

manpower planner must realize that while training is important, not all problems are amenable to training.

Allocation of Scarce Funds: An Example

We now discuss one method for allocating limited funds to various activities that we have not discussed previously, although it could be applied to previous issues. In Table 15-9 we illustrate a series of manpower problems for different occupations. We include in this table an estimate of the budgeted amount that would make that manpower problem acceptable to management. The total of such amounts represents an estimate of the total cost that will be needed to solve the problems in some acceptable manner. This does not necessarily mean that each problem will be taken to its zero point. The next step is to compare the required amount with that amount which is expected to be available from various sources. Suppose, as in Table 15-9, that the required amount is \$10,000 and the amount expected is only \$7,000. This means that some reduction will have to be made. One method for reducing budgeted amounts is to reduce them by the same proportion such that the allocation recommended would be seven-tenths of that which would be required to bring each of the problem areas within a reasonable area.

This method of allocation is rife with problems. Nevertheless, it is a form of analysis that in most cases is superior to that of working down a priority list until funds are exhausted. Variations in allocations can be made by weighing the different categories. This is also illustrated for different weighting schemes in Table 15-9.

TABLE 15-9

Budgets for Resolution of Training and Manpower Problems

Training or Problem Area	Required Funds	Available Funds	Unweighted Reallocation ^a	Weighted Reallocation	
				(1) ^b	(2) ^c
Training Type A	\$ 5,000	\$ 4,000	\$ 3,500	\$ 4,200	\$ 4,200
Training Type C	2,500	2,000	1,750	2,100	1,400
Wage Increase	2,500	1,000	1,750	700	1,400
TOTAL	\$10,000	\$ 7,000	\$ 7,000	\$ 7,000	\$ 7,000

^aWeights were 7/10 of the required funds for each.

^bWeights were 6/10, 3/10, 1/10 of the available funds.

^cWeights were 6/10, 2/10, 2/10 of the available funds.

A possible problem with the redistributions is when the allocation rule calls for more of the total funds than are available and when the transfer of funds is not allowed. The system depicted in Table 15-9 works only when all that is given is a total budget -- the \$7,000. If an allocation is given (the third column), with no transfer rights, the manpower planner has little to do but accept the allocation and, in most cases, spend all of the funds. In such cases the management, or whoever made the allocation, has presumably given the planner a solution to the problem, although not necessarily a correct one.

SUPPLEMENTARY INFORMATION: SOME ASPECTS
OF THE LOGIC OF DECISION MAKING

Some reflection upon the interrelationship among several sequential or simultaneous wants would result in the perception of some cause and effect to these events. Such reflection might add credence to the notion that everything depends upon everything else. Further reflection would, however, indicate that some events are more important than others in causing or being related to a specific event in time. An understanding of this phenomenon will help us in understanding the purposes of establishing what are often called "models" of behavior. Models are used in many of the social and physical sciences and are attempts to simplify a particular problem so that it is manageable and conducive to analysis.

A model may be formally defined as an abstract representation of reality, which brings out the relevant aspect of a particular question and neglects all other aspects. All sciences use models.

A model reflects a definite idea about reality. In other words, a model is a simplified representation of reality or, more specifically, a reproduced segment of reality. We illustrate schematically the modeling process in Figure 15.3.

That models do involve an abstraction or simplifying process of reality will also be emphasized when it is noted that models also contain simplifying assumptions about the relationships of certain characteristics in the real world. Many relationships in the real world might be quantified and represented by functional relationships that follow somewhat complex, although regular, patterns. Simplifying assumptions that are contained in models might, for example, represent a particular relationship that in the real world is approximately a straight line by an exact straight line. In other words, a straight line may be used to represent a relationship that in fact may not be perfectly so. However, this simplification is used because the gain in manipulative or analytical ease more than offsets the consequences of a small error by assuming a linear relationship, when in fact the actual relationship is not exactly linear.

The value of any model is its ability to predict the occurrence of future events. How accurate such predictions are will in part be reflected in how successful the model was in making simplifying assumptions, yet capturing the essential aspects of reality. The relationship between the model's predictions and reality is illustrated schematically in Figure 15.4. In this figure we have indicated that the model may be used to predict future events and that such future

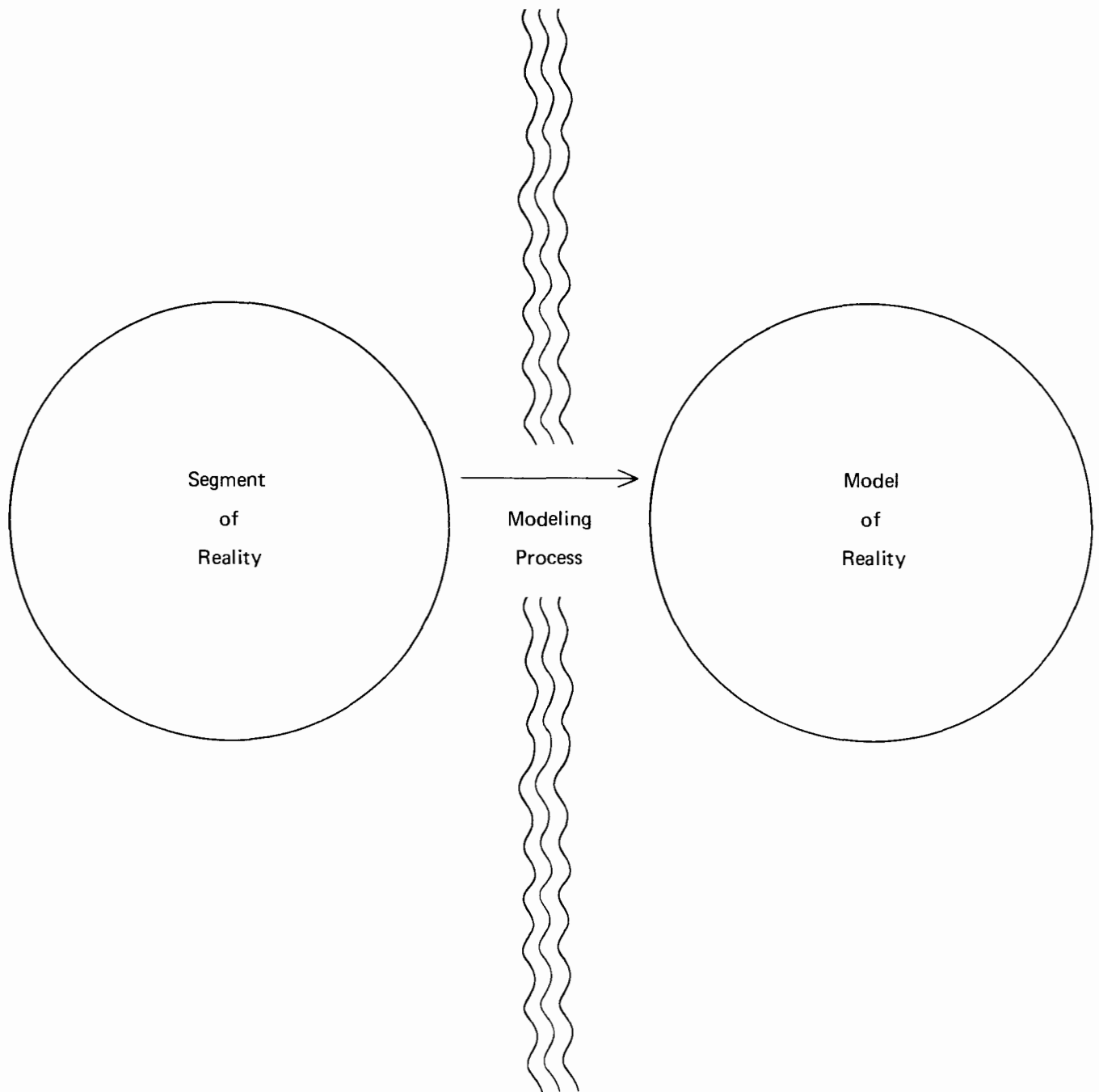


FIGURE 15.3. Schematic View of Models and Reality

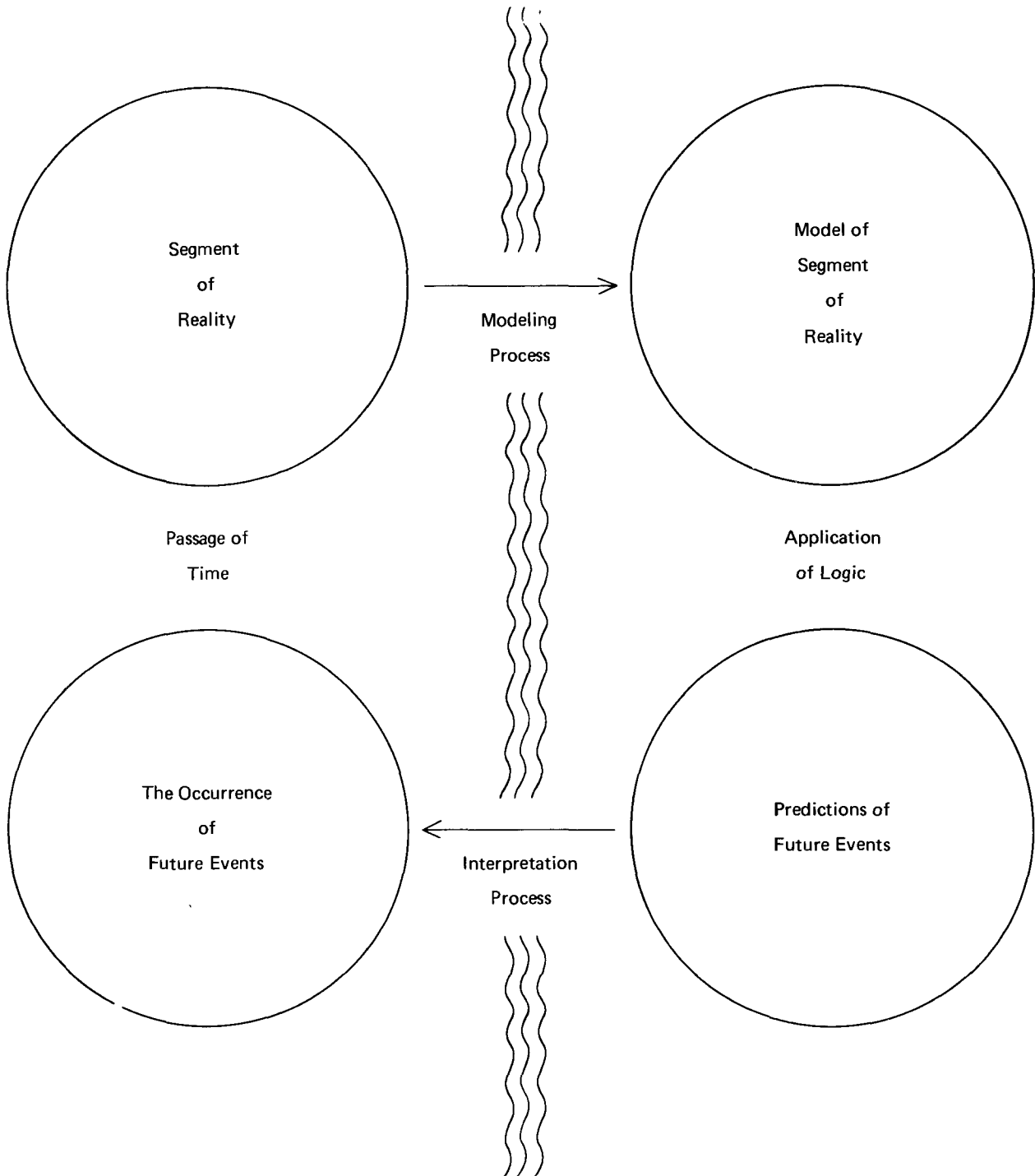


FIGURE 15.4. Modeling and Predictions of Future Events

events occur in reality through the passage of time. Furthermore, it illustrates that we may compare and interpret the predictions, made through the use of the model, with those events that actually do occur through the passage of time.

Models for Decision Making

In this section we wish to review certain elementary aspects of the theory of decision making. In many textbooks dealing with this subject it is mentioned that in certain fields there are two general types of models, one often referred to as "models of optimal choice" and the other one of "probability models." In what follows we shall attempt to combine these in examining some of their general characteristics.

Models of optimal choice deal with deriving those procedures necessary for the selection for the best course of action when several alternative courses of action are possible. Such models generally include the following elements:

1. A set of possible alternative courses of action from which the actor may choose
2. A set of possible events which are associated with each alternative course of action
3. A value or payoff as a consequence of each event
4. Some knowledge about the change of each event that is occurring

In general there will exist at any point in time more than one course of action that a person can take when confronted with a particular situation. In the simplest of all cases, one can either

act or not act, or choose or not choose. This is reflected in the existential discussions in what is referred to as the "either or" decision -- not to act is also itself an action or decision. Although many acts may be possible as a consequence of a certain set of situations facing some actor, not all acts should be included in a model of decision making because prior knowledge and experience may indicate either that such acts are not likely contenders to be the optimal act or that such actions are not directly related to the end point to which the model is directed.

Thus to take an overly simplified example, we might consider among the possible actions that someone employed as a state manpower planner might take when confronted with the requirement to act in response to an order to allocate training funds in an efficient manner. Individual manpower planners might have as their set of possible actions the distribution of such funds to existing employees, with the intent of telling them to buy more education, the distribution of funds to existing training institutions for them to establish institutional type training, the distribution of funds to individual plants or agencies to assist them in establishing on-the-job training, or the distribution of funds to high schools to advertise the career opportunities in the field. Clearly, for a variety of reasons the first and last types of actions, which are in principle possible, are not likely to be in the optimal set because of prior information or prior restraints on the elements of that set. Thus the two acts that the manpower planner might legitimately consider are those of providing for institutional training and on-the-job training.

Continuing with the example of the decision of what kind of training to provide -- the concept of an event associated with each act in this case might be related to the quality of the trainees recruited to the particular training program. We might classify these trainees as "good," "fair," and "poor." For simplicity we might further assume that (1) the same trainees would be attracted to either the institutional or on-the-job training, and (2) whatever type of trainee we assume would be attracted to such a program, all would be of the same quality. Thus if we were to assume that the event following the decision to have institutional training was that we would attract good recruits, then we would assume that all of the recruits would be good; similarly if we decided to go with on-the-job training. These assumptions will be relaxed subsequently. In any event, when we review what we have done so far, the acts that the person can choose among would be to institute a particular training, and the events associated with this act would be the recruiting of a particular quality of trainee.

The payoff or value associated with each event could, in the instance of our training example, be the cost saving in the operation that would occur because of the training that was given to a particular type of recruit. Alternatively, it might be some dollar value associated not so much with the cost saving that occurs in the operation but in the improvement of the output of the plant. In any event, we shall assume for the subsequent analysis that a dollar value may be associated with each payoff.

We indicate these relationships between acts, events, and payoffs in Figure 15.5, where we have provided an example of what is referred to as a "decision tree." We have attached to each event a dollar value, the nature of which will be explained more fully below. But for the time being, it is necessary to say that we assume in what follows that if we provide institutional training to people of good quality, the payoff is the greatest. But the payoff is also the lowest if we provide institutional training to recruits of poor quality on the assumption that the quality of recruits may be so bad that they cannot profit from the "book learning" that occurs in institutional training. This is contrasted with the possibility that recruits of high quality, though providing a high payoff when given on-the-job training, would give the highest payoff if provided with institutional training. This assumes some difference between the type of training offered in institutional vs on-the-job training. However, on the other hand we assume that if poor quality recruits are obtained, on-the-job training, due to its very nature, will result in a higher payoff than institutional training.

One final comment before we proceed: Some statement is required concerning the fourth item that is contained in any optimal choice mechanism. What is necessary in making any decision is some measure of the likelihood of each of the specified events occurring. At one extreme in the spectrum of our degree of knowledge is the state of perfect knowledge where one knows in advance that an event will occur. In such a case, there is but one possible event to be

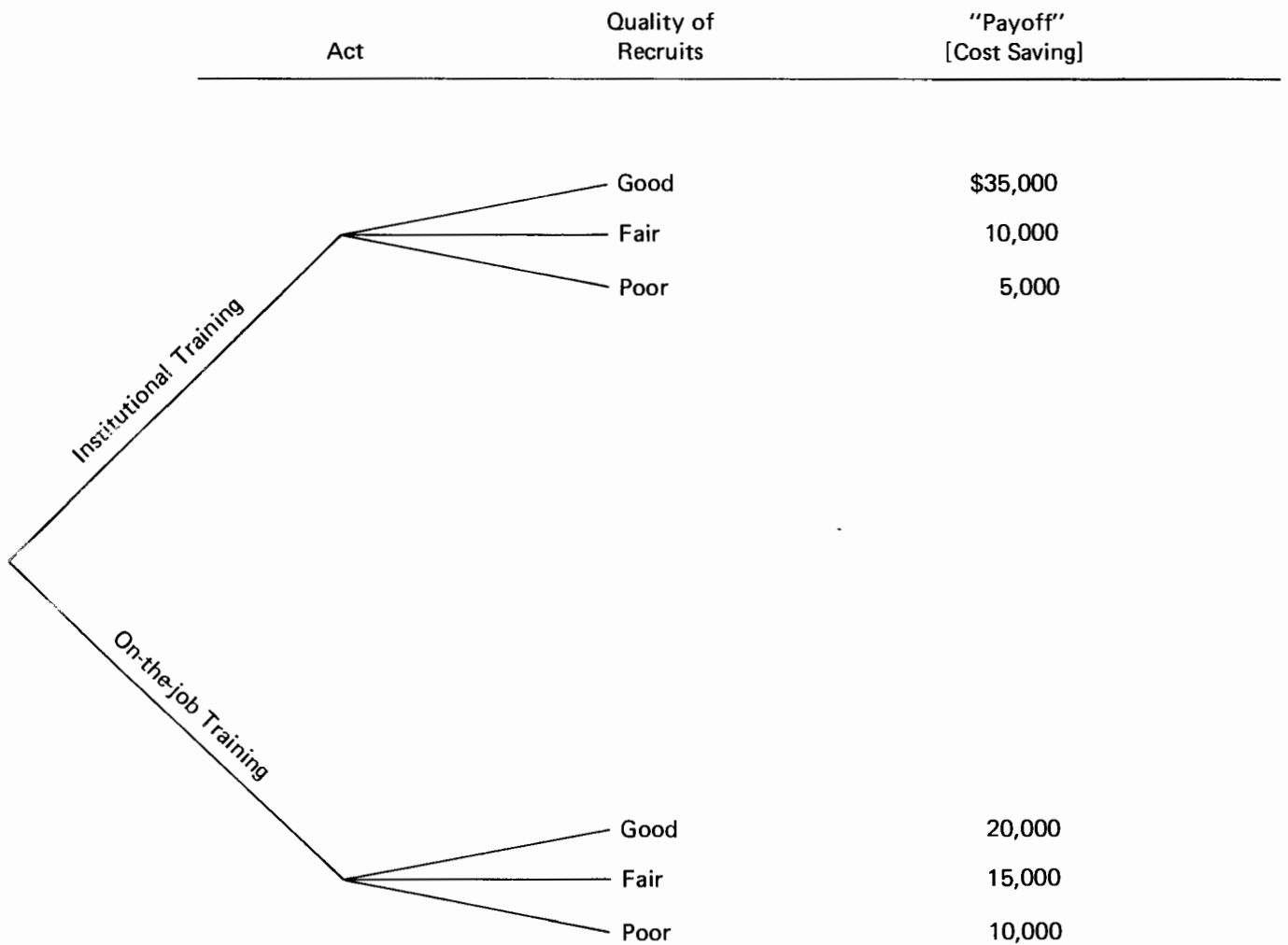


FIGURE 15.5. Example of Decision and Uncertainty

associated with each course of action and one payoff associated with each event. This we illustrate in Figure 15.6, which is really a shortened version of what we illustrated in Figure 15.5, for in Figure 15.6 we have assumed that we know with certainty that the type of recruit we shall obtain is a poor quality recruit; therefore the payoff, if we go with institutional training, is \$5,500, and if we go with on-the-job training, it is \$10,000. Life is not so simple, however, and complete certainty is often not attainable. We have, therefore, imperfect or impartial knowledge that some event will occur.

Our main problem then will be that of representing the likelihood of each of the possible events occurring. It is at this point where probability theory plays an important role in decision making and in the establishing of a management information system. Probability theory provides certain procedures for the assignments of weights to the occurrence of each possible event. These weights, which may be interpreted as reflecting the degree of knowledge or belief that a certain event will in fact occur, will vary from 0.00 to 1.00. A weight of 1.00 represents a belief that the event will occur with certainty, whereas a weight of 0.00 indicates the belief that the event is impossible and in fact will not occur. Events that are believed to be near certainty will have weights associated with them near 1.00, and those that are less likely to occur will have weights that are less than 1.00. It should also be noted that if only one event in the set of events can occur, but one of them must in fact occur, the sum of the probabilities or weights given

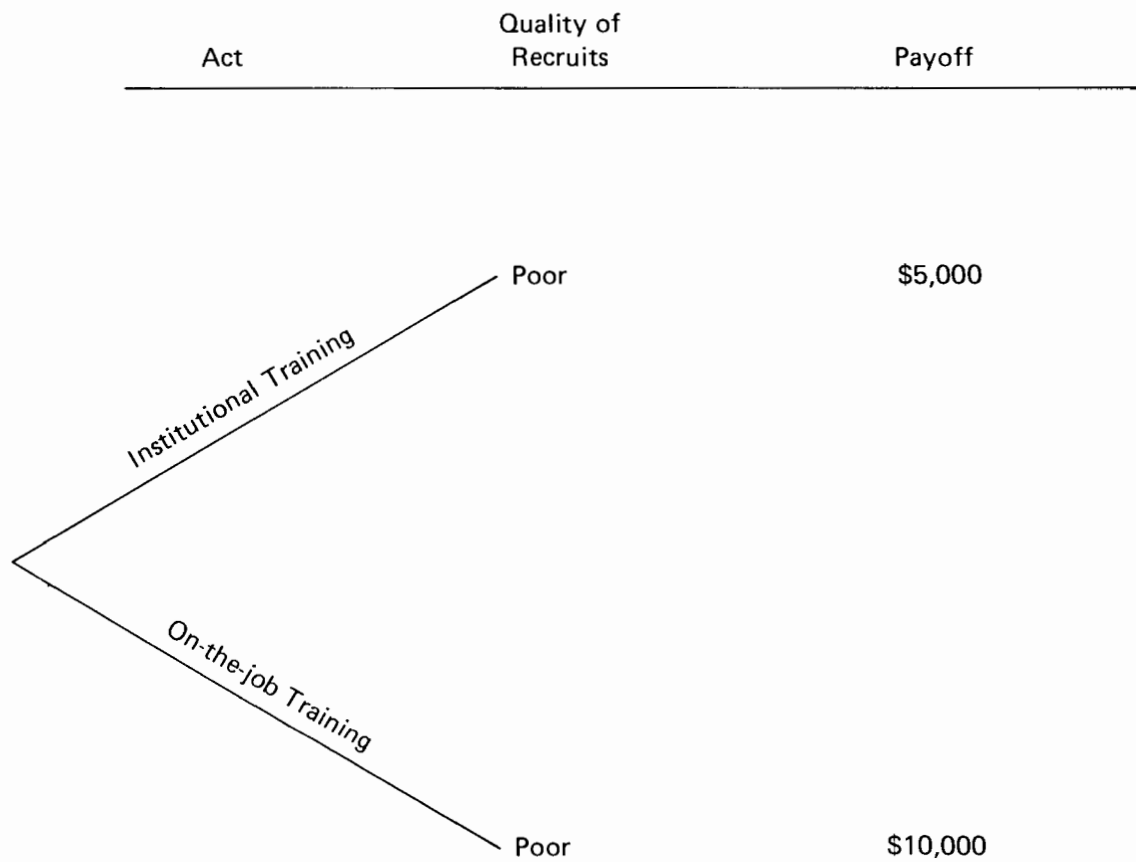


FIGURE 15.6. Shortened Example of Decision Making with Certainty

to each of the individual events must sum to 1.00. This of course is equivalent to asserting that one of the events from the set of all possible events will, with certainty, occur.

Criteria for Decision Making

We must now return to our set of those elements that would occur in any optimal choice procedure and add a fifth element: some criterion by which a particular course of action among all the possible actions is selected. What we have illustrated in the previous diagrams is the consequences of alternative acts, but we have yet to provide some rational method for choosing a particular course of action.

The criteria for choosing a particular course of action can be classified into two broad categories: criteria for decision making under certainty and criteria for decision making under uncertainty. We shall first analyze decision making under certainty.

Decision Making under Certainty

When we say that decisions are made with certainty, we are characterizing the previous decision tree by saying that we know that a particular event will be associated with a particular course of action, thus the combination of act-event is no greater than the number of acts or, alternatively, the selection of an act implies that we know which event will occur and therefore we know which payoff will be associated with that event. There are two criteria under decision making with certainty: maximization of payoff criterion and satisficing criterion.

The most commonly used criterion in models of decision making is that of choosing the act which maximizes the payoff. We illustrate this procedure in Figure 15.7 where we have plotted payoff on the vertical axis and alternative acts on the horizontal axis. Inspection of the diagram would indicate that act 3 gives the maximum payoff. We are able to choose act 3 because we know that with act 3 a certain event will occur, and we know before the event that the payoff will be at a maximum.

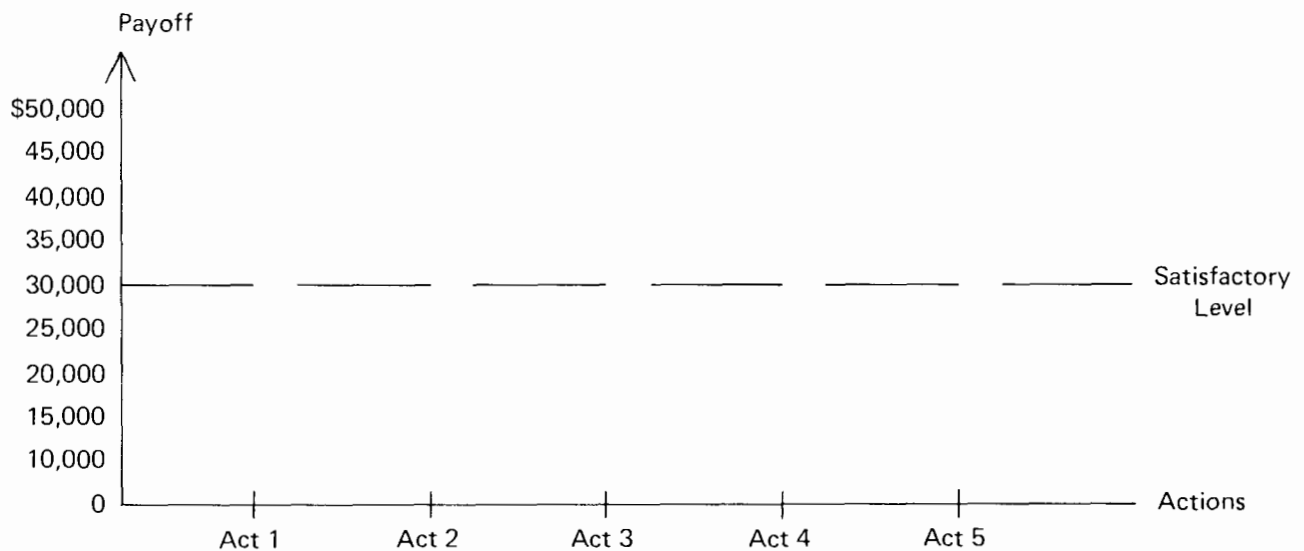


FIGURE 15.7. Decision Making with Certainty

The other criterion is one that is referred to as the satisficing criterion. For this criterion an act is selected that at least attains some specified minimum payoff. We illustrate this also in Figure 15.7, where we have indicated, as is often the case, that

there are several acts which attain this acceptable minimum level. Satisficing criteria are often used when the computation of the consequences of particular acts is either difficult or expensive. Thus we might compute the payoffs from certain acts seriatum and see that upon computing the payoff from act 1, it is not a satisficing level, but by computing the payoff from act 2, we have attained the satisficing level. Under certain situations we would not compute the payoffs of acts 3, 4, and 5, but we simply compute act 2, since it has attained our satisficing level.

Decision Making under Uncertainty

We have now come to the most difficult aspect of decision making -- decision making with uncertainty. "Uncertainty" in this case means that we do not know which event will occur after we have chosen a particular act. In terms of our previous example, we do not know what quality of recruits we will obtain. We shall assume, however, that regardless of which act we choose, the quality of recruits obtained will be the same for whichever act we choose.

For decision making under certainty, we stated that the payoff consequences of each act were assumed to be known or at least determinable; in other words, there was but one possible payoff outcome associated with each act at the point of decision. With decision making under uncertainty, more than one payoff possibility exists for each act at the point of decision making, and we do not know a priori which event and therefore which payoff will be forthcoming. The types of criteria we shall discuss in this section are called "pessimistic criteria," "optimistic criteria," "pessimistic-optimistic" (mixture) criteria, and "maximization of expected value criteria."

Pessimistic Criteria -- The pessimistic criteria may be explained as follows: The decision maker lists the least desirable outcome set associated with each of the possible acts. In the example chosen, the least desirable consequences of choosing to engage in institutional training would be the payoff of \$5,000 whereas the least desirable payoff when choosing on-the-job training would be \$10,000.

The pessimistic criteria implies that from this list of two least desirable outcomes, the actor must choose the most desirable outcome. Thus in this example, the actor would choose to engage in on-the-job training because if one obtains poor quality recruits one would be better off engaging in on-the-job training than in institutional training. In more formal contexts pessimistic criteria are referred to as the maximum criteria, in other words, one chooses a maximum among the minimum possible values of the consequences of choosing a particular act.

Optimistic Criteria -- The Pessimistic criteria concerned extreme judgment, and optimistic criteria concern extreme judgment although in the other direction. Under the optimistic criteria the most desirable of the outcomes of each act is noted. In our example the most desirable outcome of institutional training would be a \$35,000 payoff, whereas for on-the-job training, it would be a \$20,000 payoff. From this set of most desirable outcomes, the best or most desirable of this set is chosen, thus in this example the optimist criteria would be to choose institutional training. In

more formal derivations of this type of choice, these criteria are referred to as maximum criteria.

Pessimistic-Optimistic Criteria -- The previous two criteria were obviously extremes. A method for combining these extremes is obtained when we combine them in a particular way. We should note, however, that the pessimistic criteria are often used when least desirable outcomes are serious, and the optimistic criteria are used when most desirable outcomes are extremely favorable. Thus it can be seen that they are extreme also in implications that they have for decision making. An intermediate position that combines some of the extreme pessimism and optimism of the previous decisions is what is called in the literature the "pessimistic-optimistic criteria." The proportions of the mixture can be specified and then used to select and act.

For example, if the mixture chosen would be, say, 80 percent pessimism and 20 percent optimism, then each act is evaluated according to these weights, the least desirable outcome of an act is noted and is multiplied by 0.80, while the most desirable outcome of the same is multiplied by 0.20. Adding these two products gives us a number or index for each act; the act of the maximum or minimum value indicates the optimal act under this criterion with this specific mixture. For the example in our previous figures, we have the following indices for the two acts:

Index for the act "institutional training" is

$$0.80 (\$5,000) + 0.20 (\$35,000) = \$11,000$$

Index for the act "on-the-job training" is

$$0.80 (\$10,000) + 0.20 (\$20,000) = \$12,000$$

Thus the act of engaging in on-the-job training would be superior to the act of involving institutional training.

Maximization of Expected Value Criteria -- In the use of the pessimistic-optimistic criteria only the extreme values of the possible payoffs were used. In no case, for example, did we use the payoff that would be associated with a fair quality of recruit, thus the possible occurrence of the fair quality of recruit would not affect decision-making behavior and the previous criteria for decision making. The maximization of expected value eliminates this shortcoming and indeed is an extension, as will be seen, of combining in a general way all of the previous decision-making rules. This is so because the determination of the depicted value of each act -- the expected payoff for each act -- takes into account every possible outcome of payoff of the act. In order to obtain the expected value, we multiply each payoff outcome by its assigned probability or by the weight that we have in the belief that this event will occur. We multiply each payoff outcome of the act by the probability and add the products of such multiplications. This sum is then referred to as the expected payoff of the act. In Figure 15.8 we have adjusted our previous decision-making tree to add information concerning the probabilities of each event. Notice that the sum of the probabilities under each act equals 1.00 and that again, for simplicity, we have assumed that the probability that a certain

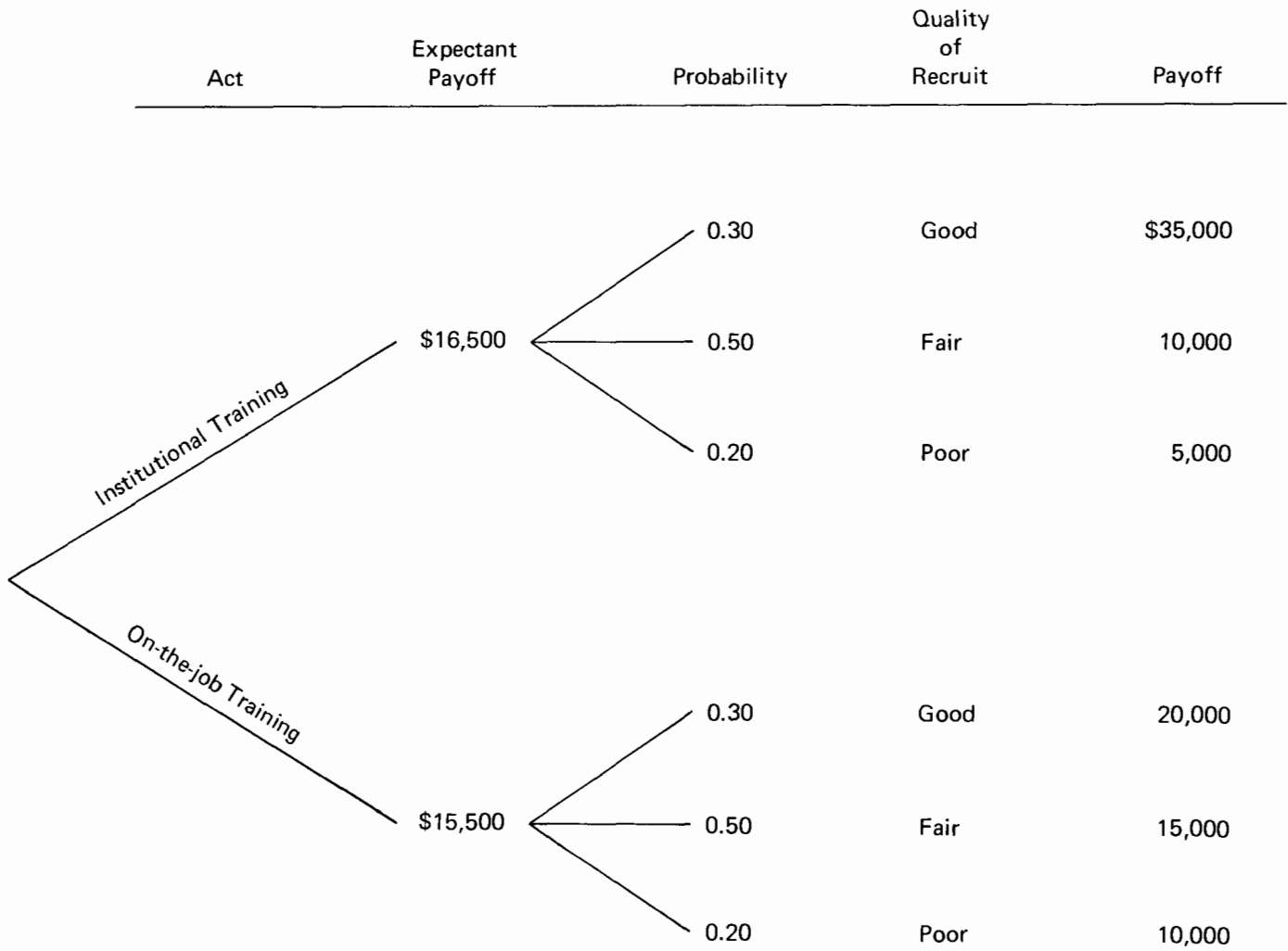


FIGURE 15.8. Expected Value Criteria for Decision Making

quality of recruit will occur once a decision has been made to act in a certain way is the same for each act.

Under the expected probability criteria, we would compute the expected payoff in the following manner:

Expected payoff for the act of "institutional training" is
 $0.30 (\$35,000) + 0.50 (\$10,000) + 0.20 (\$5,000) = \$16,500$

Expected payoff for the act of "on-the-job training" is
 $0.30 (\$20,000) + 0.50 (\$15,000) + 0.20 (\$10,000) = \$15,500$

We have entered the value of \$16,500 and \$15,500 in the diagram that the maximization of the expected value criteria would imply that we would choose the act of engaging in institutional training.

MANAGEMENT INFORMATION SYSTEMS AND DECISION MAKING

In the preceding section we reviewed some of the alternative strategies that are available for making decisions under uncertainty. We wish to explore further aspects of such decision making in this section.

In what follows we shall need to differentiate between what we might refer to as a communication vs a message which provides information. This will not be an easy task for us, as will be clear subsequently. We might try to approach the problem by noting that in our system for a communication to have value, it must provide information; for information to have value, it must cause a change in knowledge; and a change in knowledge must in turn cause a change in behavior. A change in behavior that occurs must be one that will lead to a greater level of utility than the outcome of the

behavior that would have been undertaken prior to the provision of the information in question. For purposes of internal reference we may wish to designate a communication as occurring when information of no value is transmitted, whereas a message is a communication that transmits information that has value.

What we have attempted to delineate is that a system may transmit a communication without transferring a message. Alternatively, any management information system must not only deal with the technical problem of how information may be given from one part of the system to another, but also should have some method by which to judge the value of the information that is transmitted. The former we may refer to as simply the transmission of information where no particular value judgment is made about the value of that information, and the second we might refer to as the transfer of information or the transfer of knowledge from one part of the system to another. Since we shall not be concerned so much with the transmittal of information, we shall assume that if information occurs, a change in knowledge has also occurred.

These and related aspects of information theory have interesting implications for the valuation and establishing of a management information system. It has been said by some practitioners in the field that all actions can be dichotomized into those which take place with an end in view and those which take place without such an end. It has also been concluded that only the former type of act has value. From this it is often deduced that valuation occurs only when "something is the matter." The success in valuing

an act depends upon two things: (1) the adequacy with which an inquiry into the deficiencies of an existing situation is being carried out, and (2) the adequacy of the inquiry into the lack that a particular objective which, when established, will, if acted upon, remedy existing deficiencies in the current situation.

What the preceding implies is that any management information system must be constructed with a certain end in view. What that end is determines the information requirements of such a system. Furthermore, it will be difficult, if not impossible, to have an objective or to anticipate the consequences of some particular activity unless there has been some consideration given of the means by which this objective can be brought into existence. Although obvious and bordering upon truisms, these observations are important in trying to sort out what information is required in establishing a manpower planning system -- how information should be transmitted, and what kind of activities we expect to come from this system. Each of these relate to the overall objective which should be the guiding principle in establishing a management information system. All of this suggests that in order to evaluate such a system, we must (1) investigate and determine the conflict that exists because certain information is not available, (2) determine alternative ways in which the information can be made available, (3) determine the degree to which the supply of information will overcome conflicts caused by the lack of information, and (4) determine the benefits and costs of obtaining (supplying) the information.

Evaluation of a Manpower Information System

Four subject areas have often been chosen on which to base the evaluation of a management information system. These areas are as follows:

1. The concept of information
2. The concept of probability
3. The relationship between the payoff of a decision and the utility of the outcome
4. Statements concerning the types of information that are available

The Concept of Information

There are at least two approaches to the concept of information that shall be adhered to in the establishing of a management information system. These concepts relate to the following questions:

1. Does information provided reduce the uncertainty held by the decision maker?
2. Does the information provided change the belief of the decision maker?

The concept behind the first question defines the role of information as that of changing or affecting the probabilities concerning the occurrence of different states of natures or events. The second concept includes this role, but also increases the size of the available choice set. This is to imply that a change in belief may be caused by a decrease in uncertainty, but may also change for other measures.

Concept of Probability

Three views concerning how probability should be conceived have received much attention. These are (1) logical, (2) the relative frequency, and (3) the subjectivist view. We shall say more on this later.

Relationship of Payoff to Utility of Outcome

It may be assumed that payoffs may be mapped onto a particular utility service of the decision maker, or alternatively that this is impossible to do. We shall also return to discussion of this assumption in the subsequent part of our analysis.

Types of Information

Several categories relating to alternative concepts of the type of information that could in principle be available has been made. These categories are:

1. Categorical and precise information -- The probability of some event occurring is either 0 (zero) or 1 (one) and the information either confirms or denies one of these values.
2. Categorical and imprecise information -- Which is to imply that the probability of a certain event is either 0 or 1, but the information adds only to the degree of belief regarding these values and is therefore only partial information.
3. Probabilistic and precise -- This is to imply that the probability of a particular event is only knowable in

the stochastic form, and the information defines the vector describing this distribution.

4. Probabilistic and imprecise -- Which is to say that the probability of an event occurring is knowable in the stochastic form, and the information is in terms of the vector of possible distributions which describe the distribution in question.

In each of the preceding cases the information, regardless of the category in which it is placed, may come from a reliable or unreliable source; thus instead of four categories, we would have eight categories, depending upon the source from which it would be assumed to come from.

If certain combinations of the preceding assumptions are accepted, many of the problems associated with a management information system would be solved according to conventional decision analysis reviewed in the previous section. Since there are alternative assumptions that may be made, some combinations of these various assumptions would imply a different type of decision analysis than the conventional one previously discussed.

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PERFORMANCE CONTROL

In this chapter we conclude our development of the applied steps of the micromanpower planning process by discussing step 6: Develop a performance control mechanism. The purpose of this step is to provide for the improvement of the manpower planning process. In its simplest expression an improvement is obtained if the difference between the position in which the organization would like to be (i.e., its desired state) and that in which it is (i.e., its actual state) is diminished. The desired state results from obtaining the objectives set forth for the planning process as discussed in step 1.

THE MANPOWER PLANNING SYSTEM

To understand the importance of this step, and our reason for reserving it as a separate step rather than combining it with previous steps, we borrow from the field of cybernetics. It can be said that what we have been developing in this book would be characterized in the field of cybernetics as a system -- a manpower planning system. Such a system, if it is to be a viable system, has three attributes: an innate complexity, a complex interaction with the environment in which it operates, and a complex internal connectivity (Beers, 1966). The significant and repeated notion in each of these characteristics is the presence and idea of "complexity." Most systems are more complex than often thought to be. Attempts to simplify discussions of them may have undesirable consequences. One

of the more important of these is that when a complex system is treated as a simple one, the amount of information that can or will be obtained about that system is reduced. This further reduces the opportunity to improve the system. Monitoring and evaluating the planning process, in a manner to be suggested in this chapter, are an attempt to come to grips directly with the possible complexities of the planning process by seeking meaningful information about it. Such information then serves as the basis for the performance control processes that are discussed in this step.

We quickly acknowledge that in the very concept of this book -- presenting a "simplified approach" to manpower planning -- we might be found guilty of contributing to the possible shortcomings alluded to in the previous paragraph. By simplifying the manpower planning process, which we have attempted to do, we run the risk of ignoring important concepts. Of these possibilities we are aware. We should observe, however, that cybernetics does not fully disparage simplification, but rather warns us of the dangers such simplifications may generate. Protestations against simplification must be tempered, as we have consistently argued in this text, by the constraints under which we have produced this book and the constraints under which we anticipate the expected user to be working.

The planning process may not accomplish that which was initially expected of it for many reasons. Among the more important reasons are the occurrence of mishaps and the presence of probabilistic behavior. Each of these is a variation of what in other contexts

is simply termed "uncertainty." Those aspects of the planning process that might be classified as mishaps often are attributable to errors made in the execution of certain functions or the unforeseen imposition of the outside environment. The latter, of course, recognizes that the manpower planning process operates within a framework not entirely controllable by the planner. The notion behind dysfunctions due to probabilistic behavior is that there is much in human behavior that is unpredictable, partially of course because of lack of knowledge about such behavior. It has been said that one of the functions of managements is to cope with probabilism and attempt to reduce it. This can also be said of the manpower planning function.

Planning and Control

As developed more fully in our chapter reviewing the theory of planning, planning creates standards by which behavior or actions are to be judged. Alternatively, objectives within the plan create standards that determine the dimension of intended action. Such standards become the basis for control of the planning process. What is often called the state of control is a condition in which action is conforming to the standards developed within the plan, while the process of control is those activities undertaken to maintain conformity between the plan and the actions within the plan. Such an idea can be taken on two levels: first, process control might mean a system by which individuals working within the planning function are, through whatever means, brought into conformity with those actions previously determined as being

necessary for the efficient execution of the plan. Secondly, process control may also refer to those activities which attempt to ensure that the total of activities undertaken to execute a given plan do in fact meet those standards generated by the plan.

We shall assume that manpower planners have control over the internal workings of their operation and that they can therefore induce individuals who work for them to do those tasks they assign them. Thus the manpower planner's main task in the area of control is determining those actions that will bring actual performance into conformity with desired performance. We shall therefore place our emphasis upon looking at the overall plan and its components and measuring intended performance with actual performance. For this reason, we prefer to speak in terms of performance control.

A common view of the performance control process is one in which the manager is seen as attempting to arrange activities within the plant's operations to meet a predetermined standard or objective. This, however, is not the only way in which control can be viewed or established. A manager could impose control by changing whatever standards may have previously existed to conform with existing action, This of course is not always effective or desirable but would be so if it were determined, for example, that existing standards were no longer appropriate. Some combination of changing action and changing standards would be a third view of the control process.

Basic Control Systems

In the literature dealing with the theory of control, two basic control systems are usually postulated -- the open sequence

or open loop type of control and the closed sequence or closed loop type of control.

In the open sequence control system the change in one set of circumstances brings about a planned change in another set of circumstances. Consider, for example, two processes -- process A and process B. Let process A be a controllable and controlled process, while process B is either an uncontrolled or uncontrollable process. Let it further be assumed that changes in A can compensate for changes in B. A common example of an open sequence control is that of a thermostatic control for the temperature relationship between the inside and outside a house. The temperature outside a house has an effect upon the inside temperature, but the outside temperature cannot be controlled. A thermometer might be devised which both measures outside temperature and activates a device to adjust a valve that supplies heat to the inside of the house. By knowing the direct relationship between outside temperature and inside temperature, one can make the necessary fuel adjustment. In such a system outside temperature (B) is uncontrollable, but the heat release device (A) is controllable. Thus the controllable process compensates for the effect of the uncontrollable process. We illustrate this in Figure 16.1.

In practice the open sequence type of control system is often used to change the standard by which plans are measured rather than the action. In business, for example, such systems might be used to adjust inventories (process A) to comply with the firm's desired ratio (the standard) between inventories and sales volume (process B).

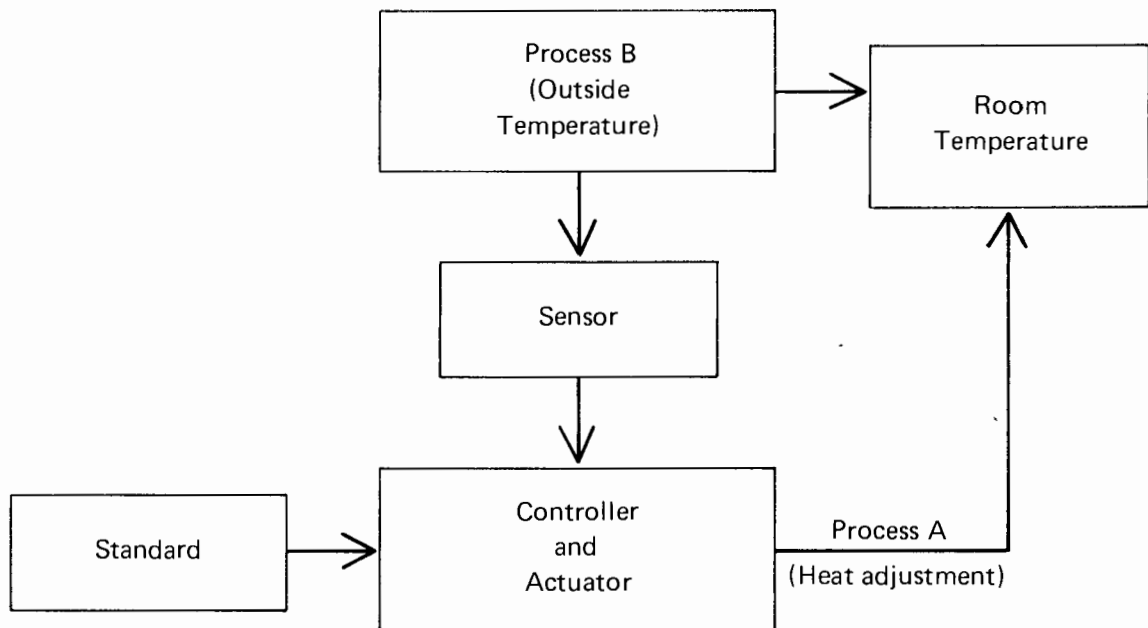


FIGURE 16.1. Schematic View of Open Sequence Control

The open sequence control system is a feed forward information system for it feeds information forward in the system to compensate for changes in the uncontrolled variable. Such systems suffer from two principal disadvantages. First, they require careful planning and estimates of the relationships between the controlled and uncontrolled processes. Such estimates must be based upon either predictable or deterministic relationships. Second, the system cannot deal with unusual circumstances; in the case of the thermostatic control, for example, the system cannot differentiate between cold nonwindy days and cold windy days.

An example of an open sequence control in manpower planning might be as follows: Process B may be a change in wages in other organizations, while process A will be a change in wages in the organization under study. The implication here is that as wages elsewhere increase, undesirable employment characteristics will develop in the studied organization. These may be mitigated by an increase in its own wages. Such a control system requires information on wages in other organizations, knowledge on the effect of other wages upon the organization's employment, and employment characteristics in the given organization.

The second type of control system is referred to as a closed sequence, loop, or feedback control system. In such a system a change in one set of circumstances (or the occurrence of a difference between desired and actual performance) is communicated back through the control process to an actuator which undertakes predetermined action in an attempt to eliminate the change or the difference. The feedback control system in physical and biological systems is a self-correcting process since when certain divergences exist certain predetermined action is followed or activated. This aspect of feedback systems does not exist to the same degree when human activities are under consideration.

An example of a closed loop or feedback control system is a thermostatic control used within most buildings. A thermometer measures heat within the room and compares actual with desired temperature -- the desired temperature having been determined previously and set on the thermostat. If the comparison shows that

there is a difference between actual and desired temperature, a predetermined set of activities is undertaken. In this example the actuator causes a certain amount of heat to be released, the amount depending upon the difference in actual and desired temperature. This continues in an iterative manner until the desired temperature is obtained (see Figure 16.2).

Such systems also have their weaknesses. In the first place, they rely upon divergences between actual and desired conditions, and therefore corrections happen only after an undesirable change has occurred or an error is detected. A second type of disadvantage occurs because of the after-the-fact aspect of this type of control -- a time lag will exist between the time when a problem occurs and when control is implemented.

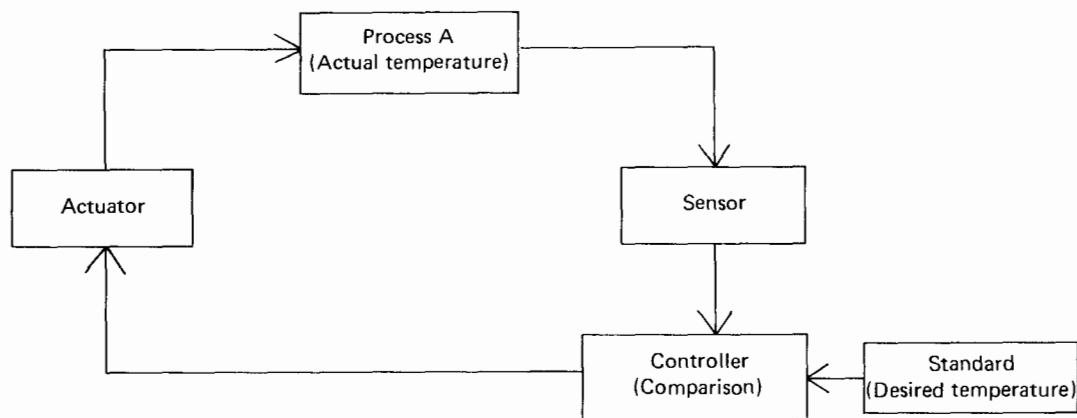


FIGURE 16.2. Schematic View of Closed Loop Control

An example taken from the manpower field will help clarify this type of control process. Suppose the control mechanism is set to control for vacancies. The equivalent of the thermostatic setting is some predetermined vacancy level or rate that is judged to be unacceptable. When this level or rate occurs, it is picked up in the measurement step (the sensor). Noting that the actual is not equal to the desired, the closed loop system assumes that the manpower planning process has determined in advance what manpower program(s) would be enacted to remedy the problem. These programs are then actuated and the problem resolved or mitigated. Giving this example for manpower illustrates another possible shortcoming of the closed loop system and, to a lesser extent, the open loop system. When multiple causes of a given problem exist, the remedy will depend upon the exact cause. Thus vacancies may be caused by changes in (1) relative wages, (2) working conditions, or (3) inefficient manpower programs such as recruitment practices. If the third one is the root cause, one cannot be sure that automatically increasing wages will solve the problem. At least it will not solve the problem as efficiently as would the making of appropriate changes in recruitment practices.

Some reflection will indicate that a total commitment to either general type of control system is inappropriate. Under certain conditions a single cause and effect condition may exist, and a closed loop system may be more appropriate for this reason, and also because of difficulties in knowing in advance what the internal effects of some external stimulus might be. In other

cases, when the possible effects of external occurrences are known with some certainty, the time lags inherent in the closed loop system can be eliminated by adhering to the open loop system of control. Each system makes different demands upon the information a manpower planner must obtain. In each case, however, the planner is confronted with the previously mentioned problems of knowing the dimensions of the manpower program production function. In the open loop sequence a planner must also have firmer knowledge concerning the relationship between external events and internal manpower conditions.

Much of what we have said concerning the control mechanism has applied to the type of issues more correctly covered in the preceding step. What we wish to emphasize at this point is how such mechanisms should be used to improve the entire manpower planning process. We seek directly to establish procedure for improving the performance of manpower planners in their various planning functions.

We prefer to think of the process we call performance control as consisting of two primary and discrete tasks. The first requires that the manpower planner monitor and evaluate the manpower planning process. The second requires, based upon the information and judgments obtained in the previous steps, that a corrective system be established.

MONITORING AND EVALUATING THE PLANNING PROCESS

To accomplish the task of performance control, the manpower planner must first gain an understanding of the functioning of the manpower planning process itself. This may be accomplished by

monitoring the process. By introducing this task, we wish to differentiate between the collection and analysis of data undertaken in the previous steps and the collection and analysis of data for slightly different, although related, purposes. The monitoring process cannot occur until the first five steps have been completed. At that point all of the data that have been collected will enable the manpower planner to compare the actual and desired state. By monitoring the manpower process, we simply mean checking the process to ascertain the quality of the process itself or, alternatively, checking the divergence between desired and actual states of the organization. Some definitions of monitoring might include the process of evaluation. It is intended that the manpower planner not only check the possible divergences between elements of the actual and desired states but also evaluate (i.e., make judgments about) such divergences as a preliminary activity to determining the content of the feedback control mechanism developed subsequently.

Although this step can be viewed as an extension of the measurement or data collection functions, it is best thought of as a separate function. All of the previous data will be used as inputs into the monitoring and evaluation task and also the development of a control mechanism. The difference between the data used in this step and those collected and generated in previous steps is a difference based upon the characteristics of the planning process. In chapter 9, we noted a distinction between the form and the content of the planning process. Previous steps have been concerned with content, while this step is concerned with the form.

The primary emphasis, then, in this step is that of measuring the degree to which the planning objectives were achieved and of attempting to build into the planning process mechanisms by which these objectives might be continuously achieved, or at least the difference minimized in some systematic fashion. Insofar as this is accomplished, each cycle in the planning process should experience some improvement.

It is often desirable that a system have some form of self-regulation or automatic control. This can be accomplished with varying degrees of success by designing a control mechanism as an integral part of the system. As mentioned previously, a good manpower planning process (system) will be a learning process where current practices are adaptations of past practices in a continuous search for improvement. Such improvement comes about through adjustments made on the basis of information obtained, evaluated, and then integrated into the system. It is by allowing and arranging such a mechanism that the manpower planning process becomes an adaptive process.

Many control mechanisms operate upon the principle of partial adjustments based upon the difference between where the system is and where it is intended to be. Similar principles can be included in a manpower planning process with the degree of partial adjustment, ranging from zero to one, being determined by the costs of making the needed adjustments relative to the benefits derived therefrom. Through the control mechanisms, information will also be obtained that will assist in the reevaluation of manpower goals. We have

illustrated a common occurrence in Figure 16.3. At some point in time, noted as t_0 , the system was at position A, and it was determined that position B was to be reached by time period t_3 . Points c and d represent intermediate positions to be achieved by time periods t_1 and t_2 respectively. (These points may represent, for example, the ratio of budgeted to recommended employment, with position B being unity or 100 percent.) The dotted line denotes the actual path accomplished by the existing manpower programs. Objective B is not achieved on schedule, being now achieved at time t_4 . This is noted by the fact that B^1 , identical to B, is attained at time t_4 . The difference between these two paths may be the result of unrealistic expectation in establishing the goal of reaching B at t_3 . (The broken line represents another alternative -- that of never reaching B but approaching some other

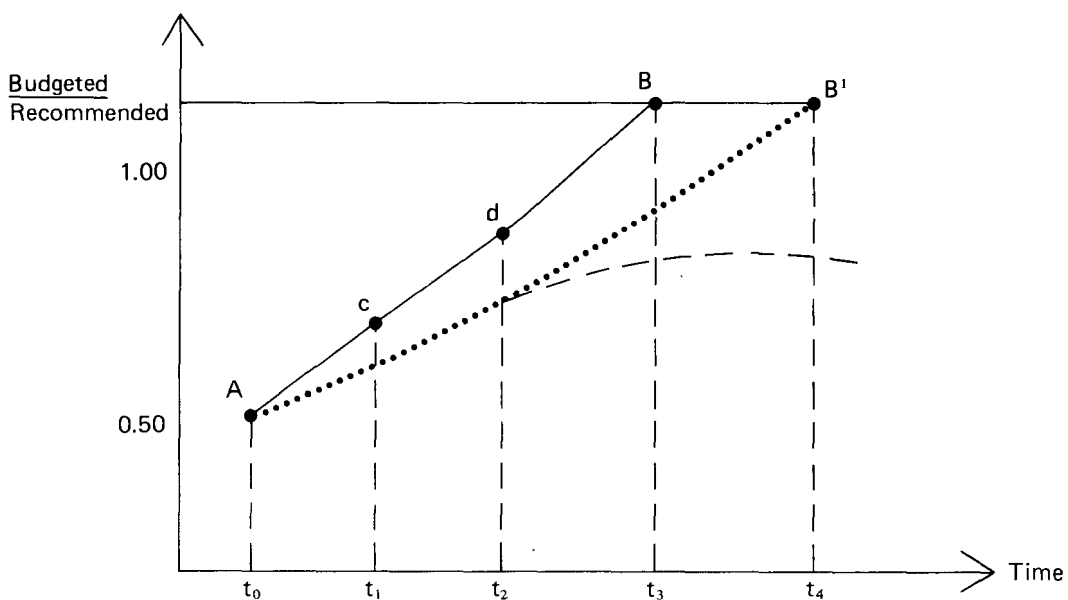


FIGURE 16.3. Illustration of Alternative Manpower Goal Achievement Paths

limit asymptotically.) The difference may represent poor performance on the system either because the right variables were not changed by the correct amount or the wrong variables were changed. Which of these and other possibilities have occurred must be determined by the planner.

The preceding example indicates that individual manpower planners must apply the same principles and procedures to their own activities as they do to the manpower for which they are planning. This is to imply that they analyze the manpower planning process and identify and arrange for the resolution of any problems. Thus they must measure, project, and analyze their own manpower planning problems. What is important in the illustration, however, is the fact that information regarding "rational" or "achievable" goals is obtained. (Recall that we defined "rational" in chapter 9 only in relation to achieving given goals -- not in the determination of such goals.)

Continuous Nature of Performance Control

As indicated previously, the need for monitoring arises from the fact that the manpower planning process leads to a plan of action that attempts to achieve certain objectives. The action involves establishing manpower planning programs designed to improve the current performance of the agency and to forestall the development of future problems. Accomplishing the latter requires the forecasting or anticipation of problems before they develop. A plan of action is of course of value only if it is implemented.

Monitoring is a process whereby the implementation is observed and the probability of implementation increased.

The need for evaluating the manpower planning process arises from the fact that the manpower planning is essentially a judgmental process. Such judgments are directed toward appraising the nature and seriousness of problems currently besetting the agency and of those that may beset it in the future. It is also a judgmental process about the alternative courses of action that might resolve these problems. These appraisals are based on current information held by manpower planners. This information should suggest to them what their alternative course of action might be and in many cases, what their action should be.

The judgments and appraisals upon which a manpower plan is based should be reviewed periodically in the light of more or better information. Such information might lead to such conclusions as:

1. The plan is not proceeding according to schedule because of practical problems of implementation.
2. The implementation of the plan is not having the desired effects.
3. The nature and seriousness of problems identified in 1 and 2 above were misappraised.
4. New and unforeseen problems have developed in the agency.
5. Forecasts upon which much of the plan was based are faulty.
6. Alternative courses of action which might be pursued have changed to the degree that if such conclusions are reached the plan should probably be modified.

The need for monitoring and evaluating never ceases. A plan that has been proceeding smoothly can at any time become unexpectedly snarled; unforeseen events can confront manpower planners with new problems or upset their most carefully prepared forecasts. The alternative course of action that might be pursued can be altered by such developments as new knowledge of perspectives about human behavior, the consequences of research in the social and behavioral sciences, or by changes in the law, in public policy, or in the economic climate. Even in the absence of any radical change in the environment in which the planner operates, there is need for continuous monitoring and evaluation; plans can almost always be improved, and an accumulation of information over time should facilitate that process.

The need for monitoring and evaluation is especially great during the early stages of the manpower planning effort; it is customary at the outset to make a number of untested, undocumented assumptions. Some assumptions, for example, would have to be made in the making of forecasts based upon data collected for only one year. Many such assumptions that are used in the making of forecasts are sure to contain errors. To facilitate appropriate adjustments and corrections of these errors, all assumptions should be made explicit so that they can eventually be tested against the data and past performance and, as the need arises, be modified.

The Role of Forecasting

The sensitivity of the manpower planning process to its internal assumptions should be investigated. This is particularly true

with respect to the process of making forecasts of future conditions. No step in the manpower planning process can be judged more important than that of forecasting. In fact, most of the activities in which the manpower planner engages involves forecasting future conditions, even when his attention is directed toward a currently existing problem he is forecasting. The advice or plans that he offers relative to a specific problem imply that if certain steps are taken the problem will be ameliorated. The term "forecasting" as it is usually used in manpower planning does not apply, however, to anticipating the consequences of a plan; rather, it is often restricted to the formal process of anticipating future demand and supply of manpower.

It is appropriate to distinguish between forecasting and projecting, another much used term in manpower planning. The latter consists simply of extending a past trend into the future; a projection reveals what will happen in the future if things continue to develop as they have in the past. An example of a very simple projection would be to assume that the past annual rate of growth and employment in the organization will continue in the future. A more complex projection might be based upon the observed correlation in the past between the annual growth on the one hand and the growth of population and its increasing urbanization on the other. Such a projection would assume that the correlation will continue to hold in the future.

A forecast is the best estimate of what is likely to happen in the future, taking into consideration those events that are likely

to change and making some estimate of their probable effect on the process under review. The importance of forecasting in manpower planning is in the fact that it attempts to anticipate potential imbalances in manpower characteristics early enough to permit the implementation of a plan of action in time to forestall the imbalance. The manpower planner's forecasts are not, of course, offered with the same confidence as those made by soothsayers gazing into a crystal ball, or by an astronomer planning a course of the planets of the heavens. Rather, they are offered as likely to be true, given the information currently available. Thus they are subject to revision, as are the plans based upon them, as better or more current information becomes available.

The forecast should be continuously monitored to determine whether the variables being forecasted are behaving as expected. To the degree that their values differ from those anticipated, the forecasting procedures should be reviewed for purposes of improvement. This may mean collecting more reliable, more specific, or different types of data. It may also mean experimenting with other forecasting techniques. The mere fact that a time series is being developed through the continuous application of a manpower planning process will mean that certain techniques (e.g., the projections of trends via the least squares method) will in time become usable.

A forecast, of course, is a prediction of the future value of some variable. Its value for planning purposes is a direct function of its accuracy. Accurate forecasting does not ensure effective planning, but planning is more apt to be effective the more

accurate the forecast. Suppose that a forecast is made that five years hence there will be x number of vacancies in the organization. Then unless training programs are instituted that will provide y number of fully qualified graduates in the interim (where y , of course, is equal to or greater than x), the possibility of hiring qualified individuals will be diminished. Suppose further that on the basis of the forecasting task, such a training program was instituted. The process would have worked ideally if after five years there were no vacancies or surpluses. The forecast would have been accurate and would have effectuated the necessary action.

It is possible, of course, that the above forecast may have been accurate for reasons other than those contemplated by forecasters. They may have underestimated equally the growth of demand and supply. In a sense, this makes no difference. If the crucial variable for planning purposes is the number of vacancies, the important task of the forecaster is to predict it as accurately as possible, regardless of how that is done. On the other hand, forecasters cannot have faith in their continued ability to forecast accurately unless they know why supply and demand grew more rapidly than anticipated.

Few forecasts will be perfectly accurate. The ideal is seldom realized. The question consequently arises about the allowable margin of error of forecasts. How wrong can a forecast be and still be acceptable? It is a truism that any forecast is of value which permits better planning than would have been possible in the absence

of such a forecast. (This does not imply that it is worth the cost, however.) We consider this issue in a subsequent section below.

QUANTIFICATION OF MANPOWER OBJECTIVES

In the execution of the previous steps, data were obtained which should enable the manpower planner to portray the objectives of the agency in numerical terms. The array of such numbers may indicate both the actual and intended or desired state of the agency. Such information might be collected and displayed for each year and for those characteristics in which the agency has expressed special interest. In Table 16-1 we display a suggested format for these data. In this table we have listed both the desired and actual values of certain employment characteristics in percentage terms. We have also included a column indicating the relative difference between the desired and the actual. For the relative difference, the actual difference is taken as the base. Finally, we have provided for a ranking of objectives (should such a ranking exist). This ranking reflects either the judgments of the manpower planner or directives from management on the presumed seriousness of certain employment characteristics to the organization.

It is not at all obvious that displaying the relative differences, as we have in Table 16-1, is as instructive as might first appear. Notice that when the desired difference is zero, the relative difference indicates a 100 percent desirable change regardless of the magnitude of the actual. This characteristic could be

Table 16-1
Current Differences between Desired and
Actual Manpower Characteristics
(In percentage terms)

Characteristic	Desired (D)	Actual (A)	Relative Difference	Ranking
			$\left[\left(\frac{D-A}{A}\right) \times 100\right]$	
Budget shortfall	0%	10%	100%	4
Vacancy	5	15	67	1
Quit	2	3	33	2
Discharges	0	5	100	3
Wage differential	0	20	100	5

eliminated by using the desired state as a base. Doing so, however, results in a possible relative difference that goes to infinity in those cases where the desired state is zero. Although it has its shortcomings, we feel that using "actual" as a base has more advantages, or fewer shortcomings, than alternative measures.

More interesting data can be obtained as a manpower planning process is repeated. Such repetition improves the base on which future forecasts can be made, it allows measurements to check on the accuracy of previous forecasts, and it also provides a basis for examining trends in the relative differences between desired and actual manpower characteristics. Information relative to these characteristics can be obtained and catalogued for a particular characteristic as illustrated in Table 16-2. These in turn may be collected, graphed, and displayed in a manner such as Figure 16.4.

Table 16-2

Time Profile of Budget Shortfall Rate

	Year									
	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
Desired	0	0	0	0	0	0	0	0	0	0
Actual	20	17	15	12	10	10 ^a	9 ^a	9 ^a	8 ^a	8 ^a
Relative difference	100	100	100	100	100	100	100	100	100	100
Percentage change from previous year $\left[\frac{A_{t-1} - A_t}{A_t} \right]$		15	12	20	16	0 ^a	10 ^a	0 ^a	12 ^a	0 ^a

^aDenotes forecasted value.

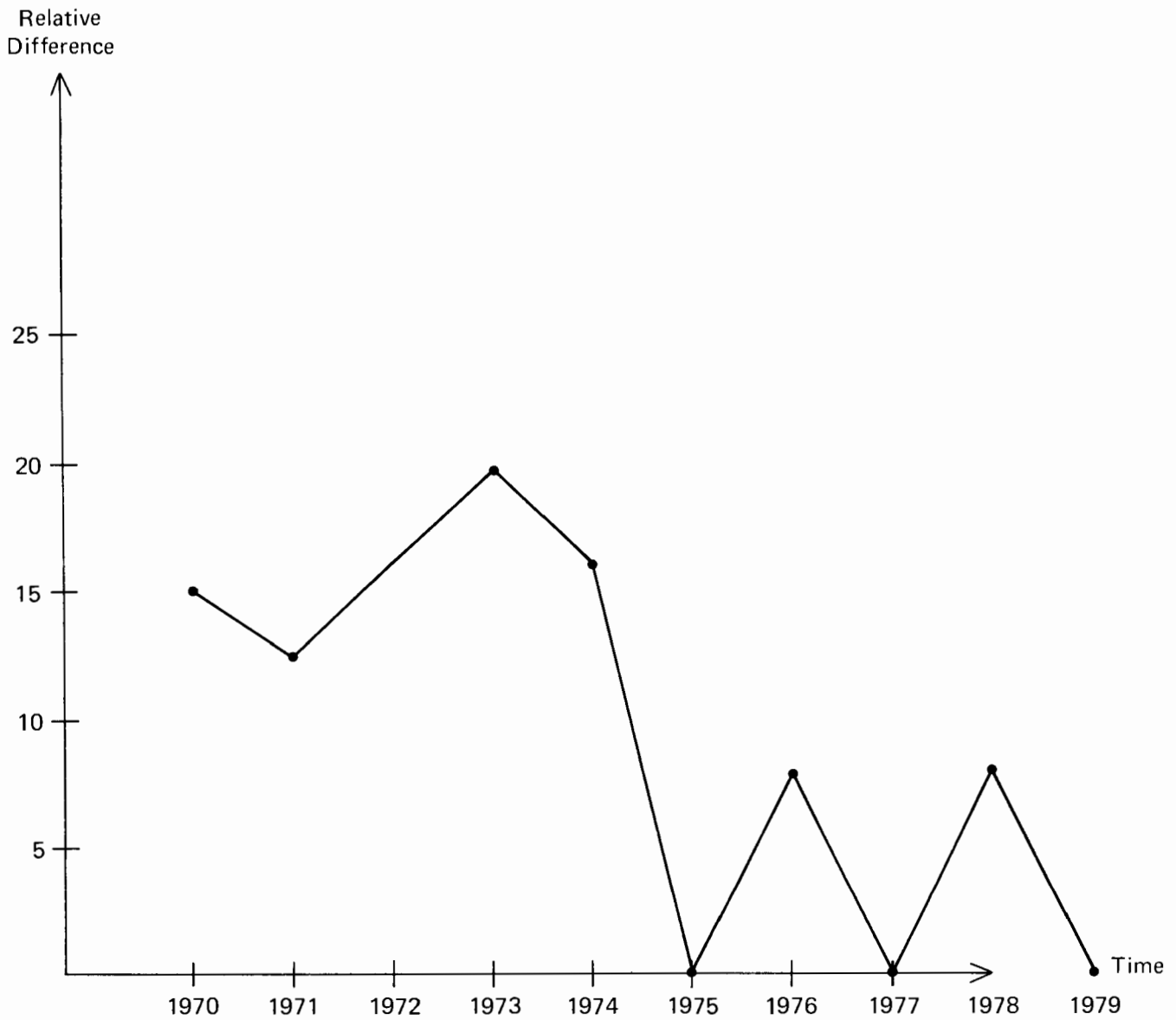


FIGURE 16.4. Plot of Time Trends in Relative Differences in Manpower Characteristics

ESTABLISHING A CORRECTIVE SYSTEM

The purpose of providing for a corrective (feedback) system is to facilitate adjustments in the planning process so as to diminish the difference between the desired and actual state of various manpower characteristics. The key element in this step is the process of adjustment. Adjustments will occur in three primary areas: adjustments in what data are collected (measurement), adjustments in forecasting techniques, and adjustments in the design of manpower programs and content of action steps.

As the manpower planning process proceeds through its periodic phases, peculiarities of the agency might indicate that additional information pertaining to manpower is not being collected, but should be, or that some information is being collected and is not being used. Each of these conditions would seem to require some adjustments in the measuring process, although the lack of immediate use of some data should not warrant a discontinuance in its collection. In the act of forecasting future conditions, a planner will inevitably make forecast errors. Some of these may be eliminated by adjustments in the forecasting techniques, although others will not be subject to improvement. Finally, certain action steps aimed at eliminating specific problems may in time be found to be less effective than previously thought and thereby require adjustment in program action.

Modifications in Forecasting Techniques

An important aspect of a corrective or feedback mechanism is the adjustment of forecasting techniques. In the initial phases of

the planning effort, the manpower planner will be required to forecast additional manpower and training needs on the basis of little data. As the planning effort continues, more data will become available, some of which will be in the form of having measured in one particular year that which was forecast in some previous year. Undoubtedly there will occur differences between the estimated and the measured variables. One important function of the manpower planner is to adjust the forecasting techniques so that they decrease such errors.

In this section we shall use the process of forecasting additional manpower needs for wastewater treatment plants as an example of how forecasting techniques might be adjusted. Throughout the analysis, one unquantifiable element of the planning process must be kept in mind -- the judgmental decisions of the manpower planner. Throughout all of the manpower planning, but particularly in forecasting future needs, the planner will be required to make judgmental decisions on such matters as how much to adjust certain variables and what value to assign to certain parameters. The basis for such decisions will in part be the accumulated data, but many decisions will be related to innate ability and will have the characteristic of an art that cannot be taught. Fortunately or unfortunately, many good decisions might be considered lucky decisions, and vice versa. It is hoped that the importance of the random elements in forecasting techniques will be reduced as the manpower process becomes an important and integral part of the agency and as the skill of the manpower planner improves.

We have argued previously that additional manpower needs should be based upon the concept of actual employment, rather than recommended or budgeted employment. If we denote the forecast of additional manpower needs for next year (i.e., 1976) as $(AMN_{76})^*$, actual employment this year as E_{75}^* , the estimate of actual employment next year as $(E_{76}^A)^*$, and the estimated termination rate for next year as $(t_{76}^2)^*$ then, in equation form, we may write the formula for additional manpower needs as

$$(AMN_{76})^* = [(E_{76}^A)^* - E_{75}^A] + [(t_{76})^* (E_{76}^A)^*] \quad (1)$$

Estimated values in the preceding are noted with an asterisk (*).

An example and further discussion will clarify the meaning of equation 1. Let us suppose that the measurement process is completed in December of each year. Then in December 1975, we obtain a measurement of current employment for 1975. We also obtain a measurement of what the termination rate was in 1975, forecasts of expected employment for 1976, and forecasts of the termination rate for 1976. Let us suppose that actual employment in 1975 was 150 and the termination rate was 10 percent. Let us also suppose that the estimate of actual employment for 1976 is 175 and the termination rate is expected to be 11 percent. Applying equation 1 to these figures gives us the following:

$$\begin{aligned} (AMN_{76})^* &= (E_{76}^A)^* - E_{75}^A + (t_{76})^* \cdot (E_{76}^A)^* \quad (2) \\ &= 175 - 150 + (0.11) \cdot (175) = 25 + 19 = 34 \end{aligned}$$

We have suggested that forecasts of actual employment may be based upon forecasts of recommended employment by the use of what we have termed "factors of proportionality." We have suggested

this method, in spite of its problems, primarily because it provides a simple method by which forecasts of actual employment may be made. We may now rewrite equation 1 using the factor of proportionality concept as

$$(AMN_{76})^* = [(P_{76}^a)^*(E_{76}^R)^* - E_{75}^A] + [(t_{76})^*(P_{76}^a)^*(E_{76}^R)^*] \quad (3)$$

where $(E_{76}^R)^*$ notes estimate of recommended employment. Rearranging this equation, we obtain

$$(AMN_{76})^* = [1 + (t_{76})^*] (P_{76}^a)^*(E_{76}^R)^* - E_{75}^A \quad (4)$$

An examination of equation 4 indicates that there are three estimated variables that are relevant for each year's estimate of additional manpower needs: $(P^a)^*$, $(E^R)^*$, and $(t)^*$. Estimates of additional manpower needs may change as a result of changes in any or all of these variables. Thus errors in our forecasting procedures may be attributed to any or all of these three variables.

In forecasting future additional manpower needs, the manpower planner first measures current variables and then forecasts the value of future variables. The information obtained from the measurement process is used in the forecasting process, while the information used in the forecasting process is used to improve the measurement process. While the results of each process have independent value and use, the data that each generates are interdependent. These processes may be represented schematically as in Figure 16.5.

The above process indicates that in any one year, the manpower planner is measuring and forecasting variables of certain manpower characteristics. As the planning process continues, it

will happen that at some time the variables which at some point were forecast will now be measured. Thus in year one, the present year, we measure actual and recommended employment and compute the factor of proportionality and the termination rate. We also forecast future values of these variables. In particular we measure actual employment this year and forecast recommended employment for next year, along with the factors of proportionality and the termination rate. When the second year arrives, we measure all of these variables and thus provide a basis for comparing measured values with forecast values.

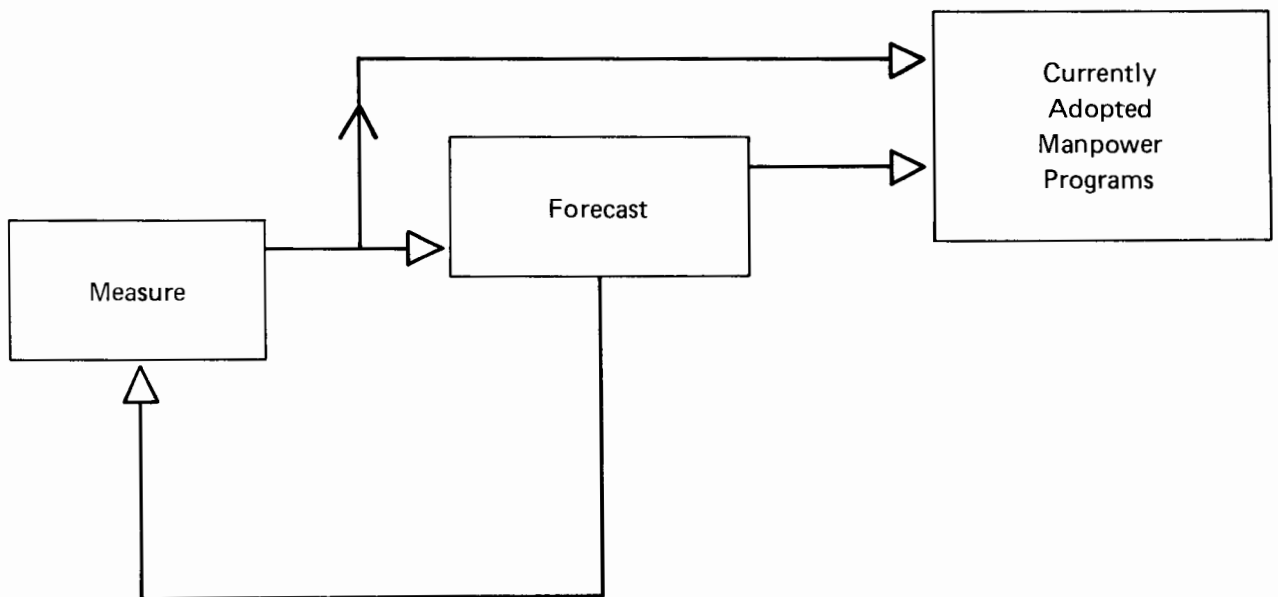


FIGURE 16.5. Measurement and Forecasting Processes

Over time it will be possible for the manpower planner to compare estimated with actual or measured values of the various elements of the manpower data. On the basis of such comparisons, adjustments in measurement and forecasting techniques may be made. To illustrate these possibilities we present Table 16-3, wherein is shown a detailed example on one aspect of the manpower planning process and how it may be changed over time.

The first year in the planning horizon is 1976 with the measurement of current employment and the initial forecasts being made in 1975. When the initial measurements and forecasts are made, we obtain the first column in Table 16-3. Hence the current actual employment is 150, the termination rate 10 percent, and so on. We illustrate only two additional years in each column, although we cover each year in a five-year planning horizon in each row. As we begin the process it should be noted (in column 1975) that the forecasts of future factors of proportionality and termination rates are equal to those measured in the current period. This need not be the case, we simply assume it is the case for this example.

When we come to 1976, the measured actual employment is 160, whereas our forecast of future actual employment was 180. Examination of the measured data indicates that the error in the estimate was caused by a decline in the factor of proportionality from 0.90 to 0.80. To adjust for this measured decline the manpower planner, on the basis of judgmental decisions in this case, forecasts the factor of proportionality to be 0.85 for the two succeeding years. The planner has perhaps assumed that the 0.80 was a random event

Table 16-3
Numerical Example of Changes in Manpower Forecasting Techniques

	Year					
	1975	1976	1977	1978	1979	1980
Actual employment	150.00	160.00	184.00	200.00	240.00	248.00
Termination rate	0.10	0.10	0.10	0.10	0.10	0.10
Factor of proportionality	0.90	0.80	0.80	0.80	0.80	0.80
Actual recommended employment	165.00	200.00	229.00	250.00	300.00	310.00
Forecast of recommended employment (one year hence)	200.00	230.00	250.00	270.00	310.00	315.00
Forecast of factor proportionality (one year hence)	0.90	0.85	0.80	0.80	0.80	0.80
Forecast of actual employment (one year hence)	180.00	196.00	200.00	216.00	248.00	252.00
Forecast of termination rate (one year hence)	0.10	0.10	0.10	0.10	0.10	0.10
Additional manpower needs (new hires; one year hence)	48.00	56.00	36.00	38.00	33.00	29.00
Forecast of recommended employment (two years hence)	230.00	250.00	270.00	300.00	315.00	320.00
Forecast of factor of proportionality (two years hence)	0.90	0.85	0.80	0.80	0.80	0.80
Forecast of actual employment (two years hence)	207.00	213.00	216.00	240.00	252.00	256.00
Forecast of termination rate (two years hence)	0.10	0.10	0.10	0.10	0.10	0.10
Additional manpower needs (new hires; two years hence)	48.00	38.00	38.00	48.00	29.00	30.00

and not likely to continue, but the fact that it was lower than the previously measured 0.90 may indicate that 0.90 was a randomly high measurement or that a downward trend may be in the offing. The rest of the 1976 column continues by assuming the 0.85 factor of proportionality, the same termination rate, and the assumption that the methods of forecasting recommended employment continue to be correct.

In 1977 the measurement of actual employment is 184, while the forecast of actual employment made in the previous year was 196. Again the error is in the use of the wrong factor of proportionality. The planner used 0.85, but the actual was 0.80. This leads the planner to think that 0.80 is the correct one and adjust future forecasts accordingly. All other forecasts remain intact.

In 1978 the measurement of actual employment confirms the planner's judgment that the change in the factors of proportionality to 0.80 was the right one. He or she thus continues with this estimate and with all other forecasting techniques. Alas, in 1979 actual employment is 240, while the forecasted level was 216. Now the error seems to be induced by a miscalculation in the level of recommended employment. The planner had forecasted this level to be 270, and it turned out to be 300. Let us suppose that the reason for this error is the faster than anticipated completion rate of new plants.

Note that the level of recommended employment in 1979 is equal to that which was forecast for 1980. Because of the unexpected spurt in recommended employment for 1979, the planner assumes that

recommended employment will not grow relatively as fast in the succeeding two years. (Such judgment is based, perhaps, on the added information that for political reasons special effort was made to complete certain plants in 1979.) His estimates of future recommended employment thus exhibit a smaller growth rate than in previous years. The data in column 1980 indicate that the planner's judgments in this case were correct.

Reviewing the preceding, we note that the three areas for possible error are: the raw estimates of recommended employment, estimates of the relationship between actual and recommended employment, and the estimate of the termination rate. It is clear that accurate data should be kept on measured and estimated variables and the various components of employment so as to facilitate corrections for future years. Some of these corrections may be effected by adjusting the quantitative aspects of the forecasting techniques, as would be applicable for errors on estimates of the factor of proportionality and the termination rates. It might be discovered, for example, that errors in the factors of proportionality or termination rates were made because trends were erroneously read into or left out of the analysis or that certain important causal factors that would affect such rates were ignored or misjudged for discrepancies between measured and forecast levels of recommended employment. The manpower planner will have to determine whether the discrepancies arose because the number of plants scheduled to come on line were not completed on schedule, whether the information from staffing guides or engineers' reports was accurate (a matter

related to the proportionality factors), or whether these shortcomings were related to inadequate budgets, or new legislation, or simply that generally poor information from other sources was obtained.

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IMPLEMENTATION OF A MANPOWER
PLANNING SYSTEM

There are two general approaches which could be followed in discussing the implementation of a manpower planning system. The first we refer to as the how to win friends and influence people approach. Such an approach emphasizes the political and interpersonal problems of organizational development. We shall not emphasize this approach, although we acknowledge its importance and shall accordingly review certain aspects of it. The second approach shall be referred to as the "technical aspects" of implementation. The division between these two areas, as we shall see, is sometimes fuzzy.

POLITICAL AND INTERPERSONAL ASPECTS
OF IMPLEMENTATION

Some insights to the political or interpersonal aspects of implementation is obtained from Machiavelli's Prince. In that treatise Machiavelli states:

There is nothing more difficult to carry out, nor more doubtful of success, nor more dangerous to handle, than to initiate a new order of things. For the reformer has enemies in all who profit by the old order, and only lukewarm defenders in all those who would profit by the new order. This lukewarmness arises partly from fear of their adversaries, who have the law in their favor, and partly from the incredulity of mankind, who do not truly believe in anything new until they have had actual experience of it.

This quotation is not meant to suggest a portrait of a manpower planner as a reformer, at least in the pejorative sense of that term, but rather the quotation is used because it summarizes the feelings that at least two groups of individuals within an organization may have

toward the adoption of a manpower planning process -- some will be for it and some against it.

In considering certain political aspects related to the implementation of a manpower planning system, one sees that it is interesting to try to visualize alternative situations where the attempt is being made to implement a manpower planning system. Consider an organization which at a given point in time does not have a formal manpower planning process. Unless that manpower planning process is to be mandated by future legislation or to be dictatorially imposed by the head of the organization, someone within the organization will need to advocate a manpower planning process and persuade others within the organization to adopt it. Thus implementation of a manpower planning system in this sense requires persuasion. We are ignoring the process by which the individual who wishes to persuade colleagues to adopt a planning process has first become persuaded. We shall simply assume that at some point in time this individual became convinced that manpower planning for his or her organization was worthwhile and would work.

An individual advocating a manpower planning process may attempt to persuade colleagues, either in writing or orally, that if certain general principles were followed, it would increase the probability of success. These principles have been spelled out by Ewing (1974). Before an attempt is made to persuade an individual, it is assumed that the person doing the persuading has an intended message clearly in mind, that he or she understands what should be adopted, and that self-conviction of the merits of the case has been attained. Having

satisfied these rudimentary requirements, the persuader may then consider the following:

1. The advocate of the planning process should consider how much background material is necessary before ideas, directives, or recommendations are presented for the adoption of a planning system. The advocate must determine how certain ideas should be stated: Should certain conclusions and facts be stated immediately, or should they be developed logically on the basis of commonly accepted principles or insights? Which of these strategies is followed depends upon an assessment of the audience. The less receptive the audience is expected to be, the more time might be allocated to developing groundwork. The more receptive the audience, the more direct the description may be.
2. The advocate should assess his or her credibility with colleagues. If the individual recommending the adoption of the manpower planning process within the agency has considerable credibility within the agency, a more direct and succinct view of the advantages and disadvantages of manpower planning might be adequate. If credibility does not exist, the task will be much more difficult, although not impossible. It may be facilitated by attempting to establish credibility. In the case of manpower planning, it would be helpful to establish credibility by citing and documenting the success or merits of the manpower

planning that have existed in other fields -- preferably those similar to the organization in question.

3. If the advocate's colleagues show evidence of disagreement over the need for manpower planning, or at least are uncertain about its usefulness, it is advantageous to present both sides of the argument. Behavioral scientists have generally found that if an audience is friendly to a persuader or has no contrary views on the topic and will get none in the future, a one-sided presentation of a controversial question is most effective. If the audience is not so constituted, a much more effective presentation is one which includes both sides of the argument. Applying this to the implementation of the manpower planning process, the individual should present both advantages and disadvantages -- the benefits and the costs -- of a manpower planning system. It would seem, however, that there are reasons to do this, even if the audience is a friendly one.
4. An advocate attempting to implement a manpower planning process should not attempt to change attitudes by simply offering additional information. This is an application of the saying: "Don't confuse me with the facts; my mind is made up." The point of this is that individuals' opinions are not changed simply by additional information. If colleagues are not always persuaded by facts, how are they to be persuaded? It might be worthwhile, in addition to indicating how other organizations have profited by

manpower planning, to arrange for individuals from such organizations to explain some of the details of their success.

All of the preceding should be considered by someone wishing to see a particular organization adopt a formal manpower planning system. There is of course much more that can be said on this subject, much of which falls within the domain of what is referred to in the business management and psychology literature as the field of "organizational development." We urge the advocate of manpower planning to study the literature in this field, a sample of which is provided in the selected references at the end of this chapter.

A fifth consideration the persuader should consider is: If one or two opponents can be identified in advance, they should be contacted early to win their support. There is danger, however, that if the presenter does not win them over, they will be better prepared to oppose.

In previous chapters the case for the importance of manpower planning has been stated. It has been suggested that among the principal reasons for such importance is the failure of the labor market to provide adequate employment to all people seeking it, as well as a supply of labor for all organizations demanding it. It has also been argued that planning is required in even a well-functioning labor market, as it is in capital or other markets. The extent of such need, and the resulting formalization or absence thereof, of the planning process will depend upon the particular attributes of the organization. Clearly all individuals and organizations plan. What

we are interested in is a formalized manpower planning system. Some member (employee) of the organization will need to determine whether the organization's manpower needs are adequately satisfied by an informal interface with the extended labor market or whether worthwhile improvements can be obtained by developing a formal planning system.

Under certain conditions, planning may be viewed as nothing more than improving the informational flow of the labor market -- a service provided, for example, by several government agencies especially the state employment services. Such agencies may provide information on the availability of certain jobs within a specific labor market, leaving it up to the initiative of the individual to decide whether he or she should apply for the job. Other informational services are more long range than current job opportunities. The Labor Department, for example, in its Occupational Outlook Handbook, provides information pertaining to the long-run prospects for particular occupations. This forecasting, for it is such, provides individuals and educational institutions information that is relevant in helping to prepare for future demand by providing the requisite training. Planning may of course include control. Thus in some situations not only are certain resources allocated to training for given occupations, but individuals are forced (as it were) to accept such. The Selective Service System would be an example of such planning, as would certain internal allocational schemes within branches of the Armed Services.

Some difficulty is experienced in determining how manpower planning will come into an agency that has previously not engaged

in formal manpower planning. For many agencies this function comes about because it is mandated by the legislation that established the organization or enters later through amendments to such legislation. The words and intent of the legislation may not always formally require manpower planning, but the interpretation placed upon legislation is such as to require a manpower planning capability of the type we have described in the previous chapter. This does not of course answer the question of why such legislation was initially adopted. Presumably it was adopted because the legislators were persuaded, in some manner, of the need for manpower planning.

For organizations not having a legislative mandate, the adoption of a formal manpower planning process will depend more heavily upon persuasion. For a planning system to be considered, someone must expect benefits and consequently suggest its adoption. Whether such an individual is within or without the organization would not necessarily affect the claim of the beneficial effects, although it would conceivably affect the method of persuasion. In either case, the absence of a legislative mandate will require that some care, based upon the principles reviewed in the preceding section, will have to be exercised.

TECHNICAL ASPECTS OF IMPLEMENTATION

We may examine certain aspects of implementation by adopting the position of someone either within or without (but having access to) the organization. We begin by asking, "What attributes of an organization would tend to make the manager minimize (or completely ignore) the need for a formal manpower planning system?" Alternatively,

"Why hasn't a manpower planning system already been adopted?" An organization whose work required that it employ people with skills generally found throughout the population would find little need for establishing a formal manpower planning system. Although this might well be the case for the hiring organization, it is not necessarily the case for the organization that, as an example, provides the training and thereby determines the number of typing classes to be taught and the number of students to be allowed in such typing courses. It would also not be the case for the organization that employed a large number of typists. The planning function might be much simpler than we have described, but some rudiments of it would surely exist. Terminations and growth might exist, each of which would call for some plans for their continued replenishment.

In any event, the absence of a need for manpower planning in the employing organization does not imply the absence of planning for such employment somewhere in the economy. Certainly the training source will have to determine its allocation of resources, and this will involve some planning.

Another characteristic of an organization that would minimize the need, or perceived need, for formal manpower planning is one where the organization is confronted with an excess supply of individuals willing to work for it. This may occur because of the prestige of employment in the organization or because of relatively higher wages paid, as compared to similar employment found elsewhere. To say, however, that planning is not needed in such a situation is in error, since some planning must be undertaken in order to decide

what criteria should be followed in choosing from this excessive number of possible employees and what is needed to continue the situation. Such an organization might be characterized as (perhaps fortuitously) engaged in successful manpower practices. It should plan to maintain whatever good things it has been doing. Although a "complete" manpower planning effort would not in all probability be adopted by such an organization, the task of recruitment would remain since, if excess supply of personnel exists, some criteria is required by which to choose from among them.

A third type of organization that may have minimal needs for a formal and complete manpower planning system is one that is small or experiencing a decline in its activities. There is probably some minimum size required to warrant a formal manpower planning effort. Many organizations would not be of that size, although they may join with similarly situated organizations to pool manpower efforts. Such consolidation would probably require the existence of an umbrella agency willing and able to do the planning, since the voluntary performance of manpower planning would prove too costly for any single organization and would, consequently, not be done. For organizations in a declining industry where output, somehow defined, is declining, some may argue that there is little need for manpower planning. One reservation in accepting this proposition, although it is a minor one, is that in the early period some form of manpower planning might be needed in order to derive the optimal way in which to dismantle employment. In any event, there is still a need to get the best use of existing manpower planning.

Organizations fitting the description of those outlined above are poor candidates for the adoption of a formal, full-scale manpower planning system. This would seem to imply that individuals related to such organizations, either internally or externally, should move cautiously in suggesting that a formal planning system be adopted.

Organizations that would be prime candidates for a considerable manpower planning effort would appear to be those having the inverse characteristics of those identified in the preceding discussion. Thus it would be expected that those organizations that employ people having special skills in short supply, and especially those skills which have a long lead time in their development, will do well to engage in formal manpower planning. An industry that is experiencing significant growth, especially if that growth is sporadic rather than constant, should profit by manpower planning. Organizations which have poor job opportunities, and which for some reason are limited in a way that they can adjust to such circumstances, would profit from manpower planning. Thus a certain organization may have undesirable working conditions and, because of budgetary restrictions, not be able to pay sufficient wages to counteract them. The organization may therefore only attract low-quality employees, thus giving rise to abnormally high termination rates, transfer rates, low productivity, and many other manpower problems previously identified. Thus an organization, which by nature of its output is beset by manpower problems, may profit by hiring or developing a staff to attempt to mitigate the problems imposed by the constraints under which it has to operate.

MANPOWER PLANNING DEMONSTRATION PROJECTS

Clearly a manpower planning function should be implemented if the benefits of such a function are greater than the costs and if, satisfying that criterion, the rate of return to such funds are higher, or as high, as the rate of return on other activities in which the organization is engaged. Although this sounds good in principle, it may be difficult to accomplish, not only because of measurement problems but more importantly because some planning might itself have to be conducted in order to demonstrate to management its worth -- the management not wishing to accept evidence of successes elsewhere. If management is not convinced or is cautious about the possible value of planning, a demonstration, rather than full-scale, planning effort would seem to be the most appropriate route to pursue. Should a demonstration project be requested, it will be important to establish beforehand the criteria by which the demonstration will be judged and to agree on measures of success. The individual requesting the demonstration effort should in turn give considerable thought to choosing (1) those aspects of an entire planning effort that will show the process in its best light, or, given a different organizational structure, (2) those segments of the organization among which a complete effort will be divided.

The Degree of Manpower Planning

Although the most important impediment to establishing a manpower planning system is some variant of the difficulty of showing the benefits relative to the costs of operation, once it has been agreed to have a formal manpower planning function, there may be

disagreement on the most appropriate form that the planning function should take. One of the more important disagreements that we have experienced as to the form of the manpower planning function, and one that is closely related to the question of whether the basic need exists, has been that a specifically proposed planning system was too complicated -- at least for the agency in question. We shall analyze such accusations more carefully in order to obtain further insight into some of those issues related to the implementation of the manpower planning process.

Four general reasons why someone might claim that a particular manpower planning process is too complicated for a particular organization can be identified. These reasons are as follows:

1. Critics do not understand the manpower planning process.
2. Although the critics understand the process, they feel that those people who would actually have to conduct the process would not understand it.
3. Critics feel that both they and the practitioner would understand the process but that the process when established would take more resources than are generally available to the agency.
4. Critics argue that manpower planning is a much simpler process than the one under consideration has been defined to be. In fact, they imply that it is so simple that no formal system is required.

Reasons (1) and (2) involve questions concerning the abilities either of those who are in the process of defining and establishing

a manpower planning system to make it understandable to the intended audience or the abilities of the intended audience to understand explanations of a given process. It is possible that the ability to simplify by those charged with establishing a manpower planning process is limited. This of course can be eliminated by changing the staff or the consultant assigned to establish a manpower planning system, or by improving the capability of the existing staff. Alternatively, there may be some limit as to how much a particular process can be simplified; thus, for example, it may be that there are people in the world that cannot understand relatively simple explanations of the theory of relativity or of quantum mechanics. Whatever the reason, we do not accept reasons (1) and (2) as being relevant for the kind of situation we have in mind in the real world. In other words, we feel that the manpower planning process can be made rudimentary enough for any audience to understand. Such simplicity, we should hasten to add, will be done at the expense of some effectiveness within the process.

A failure to accommodate the objections in (1) and (2) is actually an extension, or so it may be viewed, for reason (3) -- the manpower planning process is too complicated because there are insufficient resources allowed to explain and establish the system to those who will have to operate it. This third reason a manpower planning process may be deemed too complicated (i.e., insufficient resources) can be separated into the problem of either not having a large enough staff or, although having a large enough staff, having misplaced or incompetent people on it. The latter point refers back to the discussion on the abilities surrounding reasons (1) and (2),

while the first (size of the staff) implies a need within the manpower planning process itself to establish some priorities of effort or, more correctly, a cost/benefit analysis of the process. Thus if the manpower process, as defined in this book, were to be applied in total to a particular organization it might cost, for example, \$100,000 a year. If only \$50,000 a year is available, some cuts in the process will have to be made. This implies that we will have to develop a method of allocation within the planning process based upon principles similar to those discussed in the planning steps. The art of planning must be applied to the manpower planning process itself.

The final reason that individuals may argue that a particular manpower planning process is too complicated is the perfectly plausible conclusion that the manpower planning process for the agency in question is much simpler than we have made it out to be for the general case. This is of course a question of fact and in principle a testable assertion as to whether the planning process can be made simpler than it has been. If the organization requires a simpler process, will such a process be an abbreviated form of the process developed in this book? We think so. Insofar as this logic applies to large and small systems, then simpler (smaller) systems will be versions of the complete system. We turn to a more thorough analysis of these points because they are related to other issues raised previously -- the allocation of scarce funds to the planning process itself.

Reasons for Failure of Manpower Planning Efforts

In our various experiences we have observed several reasons why manpower planning efforts seem to fail -- or at least fail to

live up to the initial expectations held for such efforts. These reasons are as follows:

1. An insufficient commitment to the manpower planning effort.
2. The manpower planning was poorly done.
3. There was disagreement within the agency over the appropriate methods for doing manpower planning.
4. Significantly high turnover of the leadership within the manpower planning program.

In order for a manpower effort to be successful, a critical mass of effort has to be invested in it. If too few resources are invested or funds are allocated sporadically, manpower planning becomes no more than gazing into a crystal ball. Most initial efforts at what is called manpower planning have been in the form of making gross projections of future employment needs. These projections have most often been based upon procedures, the nature of which are often not revealed to the reader. The procedures have not been repeated, or if they have been repeated have been done so using different assumptions, although the nature of these differences is unclear. Aside from the possible propaganda value of such estimates, the effort invested in them is wasted.

Sometimes evidence for insufficient commitment is found in the type of personnel assigned to the manpower planning staff. Although the number of man-hours devoted to planning might seem adequate to produce a reputable manpower plan, the quality of the personnel assigned to the office might be inferior, as will be the resulting product. Such assignments might be a reflection of the relatively

low esteem that management has for the manpower planning effort. This type of behavior most often would occur, or so it would seem, in those agencies where there has been a legislative mandate to engage in manpower planning but not a wholehearted commitment on the part of the agency leadership that such an effort is worthwhile.

Another aspect of a possibly insufficient commitment to manpower planning is in the response given by management to the plans developed by the manpower planner. If the management does not feel the manpower planning effort is a worthwhile allocation of agency resources, or if there is a lack of faith in the specific manpower planning officer, management may not adopt the recommendations.

One frequent problem in not only implementing but also sustaining any effort in manpower planning is the turnover in the leadership either in the agency or the manpower planning office. When new leaders come to the agency, the order of priorities of things the agency is to do may change, or even if no such changes are introduced, the way in which given priorities are executed might be altered. If priorities change, the manpower function may rise or fall. So far as the manpower planning effort is concerned, it is better that the former rather than the latter occur. But even when the former occurs, the change in leadership -- if the leadership brings new ideas on how manpower planning should be done -- will introduce some inefficiency in executing the manpower planning steps.

A new agency head or a new manpower planning officer may maintain previous priorities, assign considerable emphasis to the establishing of a manpower planning capability, but wish to establish this

capability in a manner at variance with all that has been established prior to assession to the leadership position. Each of these possibilities will test the manpower planner's ability to survive within the organization and to implement a worthwhile program.

The effectiveness of the manpower planning effort is reduced by disagreement within the agency either as to the methods of actually doing the manpower planning or as to the division of authority over who should do it. Often these disagreements are of such a nature that had they been resolved one way or the other, a full-hearted dedication to manpower planning, regardless of the method used, would have been an improvement over what was undertaken in the presence of unresolved differences.

An Order of Manpower Planning Priorities

The task of establishing an order of priorities among the several manpower planning steps is a difficult one and, as suggested in previous chapters, a dangerous one. While we have previously allowed that differences of opinion will exist concerning both the content and sequence of planning steps, to impose some ranking on these steps will invite further controversy. What is important in our subsequent discussion, however, is not so much the particular ranking that we establish or the attaining of some consensus in regard to it, but rather the general rationale for why some ranking might be necessary, if for no other reason than to establish relative weights within the manpower planning process.

It is perhaps misleading to speak of establishing priorities or a ranking among the manpower planning steps. Such terminology might seem to imply the complete elimination of certain steps, when

the budget of the planning office was inadequate. Such complete elimination of tasks is generally not the optimal -- assuming all tasks essential -- way to proceed, as we have explained in chapter 15. When a budget reduction is experienced, all activities should experience some diminution, although possibly in varying amounts. If budgets were permanently increased, the converse would in general be optimal: a variable increase in all essential activities. These common-sense observations are simple verbal explanations of what has been established in optimization theory for a large class of optimization problems. If some objective can be achieved by engaging in several tasks, it will generally be more efficient to engage in all such tasks, rather than rely exclusively upon only a portion of them. Most objectives are often to be achieved under constraint -- the most common constraint being a budgetary one. If constraints are tightened (relaxed), the resulting decreases (increases) in the tasks should be relaxed to the relative effectiveness of such tasks in achieving the given objective.

When we speak of priorities and rankings below, we shall do so in the spirit of trying to weigh the relative effectiveness of the various manpower planning steps in achieving manpower planning objectives. Therefore our ranking or ordering of priorities is simply a weighting scheme which can be used as a guide when the manpower planning effort has to be contracted or expanded.

A possible ranking of the manpower planning steps is as follows:

1. Forecasting of future employment characteristics
2. Measurement of employment characteristics

3. Analysis of manpower problems
4. Development of manpower programs
5. Performance control
6. Inventory of current personnel characteristics
7. Determination of agency objectives

We shall not attempt to fully rationalize this ranking and will not attempt to assign relative weights. We simply offer an ordinal rather than a cardinal ranking.

We should note that when establishing priorities is viewed as a weighting scheme, it is possible to assign equal weights to each manpower planning step. If this is done, then as constraints changed, all tasks would be changed equally. This fact permits some latitude in our analysis, for it implies that it is not required that we always must designate that one step is preferred over, or more effective than, another.

The first position in the ranking appears to be the most difficult to determine (agree upon). In our listing we have assigned the "forecasting of future employment characteristics" to this spot. We have done so for several reasons. Most agencies are concerned about the magnitude of future manpower needs. What they expect to occur in the future will affect their behavior today. Present and future budgets will depend in part upon projections of future manpower conditions, either in the agency or in those activities with which the agency is involved. Many agencies, when they have initiated some slight effort in the manpower planning area, have concentrated on estimating future manpower needs -- most often in the form of

projections of increased manpower requirements. This historical observation lends some merit to assigning this step top priority.

Our second position has been assigned to the measurement task. Good projections of future manpower conditions are no better than the data on which they are based. This would imply that establishing such a base, much of which is accomplished in the measuring of current employment characteristics, is a relatively important task. It is perhaps so important to the projection task that some would assign it a greater weight. A compromise would be to assign equal weights.

When we go beyond the projection and measurement steps, the task of establishing the relative weights becomes more difficult, yet if consensus is achieved on the first two, perhaps less important. The analysis of manpower problems occupies our third position. In measuring and forecasting employment characteristics, one obtains a general feel for manpower needs and issues. To penetrate such general knowledge, one needs an analysis of the data in terms of searching for and identifying possible problems.

The fourth position is the development of manpower programs and the fifth is performance control. Our reasoning here is that it is necessary to attempt to remedy problems when identified and improve upon the planning process whenever possible. Our final priority is that assigned to determining the objectives of the public agency as it reflects in the manpower objectives.

MANPOWER PLANNING STAFF

An important consideration in establishing a manpower planning capability is the establishing of a manpower planning staff. Ideally,

there should be someone within the organization whose job title is "manpower planner." The individual who occupies this position should have his or her own staff, the size and nature of which will depend upon the size of the organization, the type of manpower employed, and the type and condition of the labor market in which the organization must operate. The size will also vary to some extent upon the expectations of management for manpower planning, particularly as such expectations relate to the accuracy and degree of coverage of the planning process.

Evolution of Manpower Planning Staffs

In the initial phases of an organization's involvement with manpower planning, two characteristics are quite common: (1) the requirement to do manpower planning is mandated by legislation, and (2) the persons assigned to do the work either have other responsibilities within the organization or federal monies are involved to hire someone on a demonstration and (hence, unfortunately, oft-times) temporary basis.

It would seem natural to presume that if the individual doing the planning, whether a current employee with other responsibilities or the new federally subsidized employee on a temporary basis, were successful, planning efforts would be expanded through increased funding or staff commitment. Such is not always the case. First, it is difficult to determine, at least in a relatively short period of time, what "success" is. Second, even if success had been made and appropriately measured, the assumption that the planning effort would be expanded assumes that the funds or staff are available and,

if they were, that management was always rational in expending such funds. Although some may decry the waste in certain public agencies, there is, on the other hand, many worthwhile projects that cannot be undertaken because of the absence of appropriate funds.

If success were perhaps less universally agreed upon, although agreement did exist that the planning effort had increased the organization's performance, and funds were available for staff expansion, it is not clear that the planning effort would be so expanded. If funds are available but not earmarked for manpower planning, they become targets for other departments to obtain. Thus the planning office must compete for funds. Allocations of such existing funds may not be made on rational or efficient grounds and may reflect the "political realities" of a situation. They may also reflect the personalities of department heads. Although we may deplore such methods of allocation, to deny that they exist, and plan accordingly, is not wise. The planner must not always shun Machiavellian concepts in competing for funds.

In those fortunate circumstances where a full manpower planning staff can be assembled, certain criteria should be followed. In the same way that human engineers were consulted in the occupational design of given plants, a similar task should be undertaken for the determination of the appropriate size and distribution of a planning staff. At a minimum, however, it would appear that a manpower development staff should consist of a manpower planning officer, a training officer (what we might call a "manpower technician"), and a clerk-typist. Functional descriptions of these occupations, with the exception of the clerk-typist, follow.

Functions of a Manpower Development Staff

The manpower planning staff in a public organization at the state or local level will usually develop and provide for the implementation of programs directed at assuring the continued availability of trained and motivated personnel to the organization. The staff should provide a focal point for matters relating to manpower planning, development, and use. The staff should also coordinate the development of a manpower planning system to relate manpower needs to training requirements; coordinate, develop, and manage programs in the state to train employees; and coordinate a program to develop curricula and training materials in support of programs.

In addition, the staff develops cooperative federal, state, and local intergovernmental relationships, and provides the initiative and leadership in the development of local programs.

Manpower Planners

The general duties of manpower planners are as follows:

1. They obtain measurements of current and forecasts of future manpower and training requirements relative to their organization. They design methods and procedures for producing, processing, storing, and communicating the required data. They foster the establishment of related capabilities in smaller area manpower agencies. They coordinate procedures and information channels with appropriate state planning, labor, and education agencies.
2. In cooperation with appropriate staff within the organization, in education, employment security, and other state agencies,

planners prepare action plans for developing the required work force and for overcoming manpower development and utilization problems. They conduct special studies to identify and overcome problems related to manpower recruitment, retention, and use. They also point up major manpower inadequacies to be dealt with, and suggest specific action plans such as recruitment, training, and job restructuring, to ensure that the numbers and types of manpower needed will be available and properly used. They make sure that all plans are formulated into a cohesive overall manpower program that will best serve the objectives of the organization and be compatible with the goals and arrangements of the programs for manpower development and equal employment opportunities of other public agencies.

3. Planners provide specialized assistance to other staffs within and related to the organization in relation to the development of manpower recruitment, retention, and use. They also keep informed of the state-of-the-art in the field of manpower planning and related policies, programs, and procedures of the federal government and other state agencies. They also identify problem areas and conduct studies to determine the most practicable and feasible remedial action.
4. With the assistance of federal guidelines, manpower planners may develop, coordinate, and implement a statewide system for the production, maintenance, and dissemination of

manpower planning criteria covering those areas for which their organization is responsible.

The qualifications¹ of the manpower planner are as follows:

1. A formal education (college degree) is desirable in a pertinent discipline, including industrial psychology and engineering, business administration, education, economics, and engineering.
2. General requirements of the manpower planner should be:
 - a. Knowledge of the organization. Such knowledge should include its programs, organizational arrangements, policies, objectives, intergovernmental relationships, and managerial processes involved.
 - b. Basic understanding of processes and equipment involved in the employment sectors of the organization and the practices employed for their management.
 - c. Knowledge and ability to apply modern managerial concepts and techniques for planning, information processing, manpower utilization analysis, personnel administration, and so forth.
 - d. Knowledge of federal and state programs directed at ensuring fair employment practices and promoting entry of the disadvantaged into the mainstream of American life.

¹Because of the interdisciplinary aspects, it is probably not practicable to recruit an individual fully qualified for this position. Many of the skills and knowledge identified should be acquired through training, work experience, and reading.

- e. General knowledge of the education and training process and the related roles and responsibilities of government agencies and private institutions in the state.
- f. Knowledge of and ability to apply manpower planning techniques -- developing occupational definitions, relating manpower and training requirements to current and future workloads, determining turnover rates, and so on.
- g. Ability to prepare clear and concise reports of findings and analyses and recommendations.
- h. Ability to establish and maintain effective communications and relationships.
- i. Ability to perform manpower-related duties with other government agencies, private organizations, or the Armed Forces.

Manpower Training Officers

The training officer should be one who works for the organization. While they serve in a versatile capacity as teacher, guidance counselor, and training officer, they also administer and coordinate training programs and grants.

They establish, operate, and control statewide training programs for professional and subprofessional personnel. In addition, they coordinate and maintain continuing liaison with federal, state, and municipal agencies. They also coordinate with other agencies and develop programs to train employees, and coordinate and manage programs throughout the state.

Manpower training officers assist in the development of special training needs and course content and coordinate programs to develop

curricula and training materials in support of programs. They provide assistance to educational institutions to obtain resources for training. They assist educational institutions to implement the curriculum and conduct special training courses when other training resources are not available. In addition to performing direct training-type work and operating special courses for upgrading professional, sub-professional, and technical personnel (primarily in the areas of design, operation, and maintenance), they develop new educational techniques and assist in the selection of instructional material and supplies, such as training and audio-visual aids, and laboratory equipment necessary for training programs.

Training officers serve as training advisers, providing education and guidance assistance, and evaluate procedures, curricula, instructional methods, and techniques, the adequacy and use of training aids, and devices and facilities. They apply their professional knowledge of the principles and practices of education, training, curricula, and organization. They also monitor the effectiveness of training programs and improve the program.

Moreover, training officers review and evaluate methods of instruction, enrollee motivation, and training materials and equipment. They also review agenda and course materials for timeliness, accuracy, content, and educational adequacy. They recommend and implement techniques to be applied in evaluating and predicting trainee progress and in evaluating the effectiveness and relevancy of instructional materials, methods, and techniques.

To qualify as a manpower training officer, individuals should have a bachelor's degree in education or the social sciences. They

should be familiar with training activities in order to set up training programs, and should have experience in dealing with state government, the state department of instruction, the state's vocational education department, local (municipal) governments, and all local employment services operations. The greatest criterion is of course that they should be able to work with manpower planners.

Manpower Planning Technicians

The duties of manpower planning technicians are as follows:

1. To assist the manpower planning specialist to develop forecasts of manpower and training requirements (relating to supply) of governmental and private organizations in the state; and to produce, process, store, and communicate the required data
2. In cooperation with the appropriate organization's staff and staffs of education, employment security, and other state agencies; to contribute to the preparation of action plans for developing the required work force and for overcoming manpower development and utilization problems
3. To provide assistance to the supervisor -- as well as to other organizations -- to local water pollution control agencies and private organizations in relation to the development of manpower forecasts and overcoming problems of manpower recruitment, retention, and use
4. To maintain and disseminate a statewide system of manpower planning criteria
5. To compile, help analyze, and evaluate technical, statistical, and administrative data

A FINAL WORD

This book has been directed to manpower planners working for a public organization. Much of what we have said applies, however, to a planner working within a private firm. Even the content of this final word has universal application, although the specifics we wish to stress are particularly pertinent to someone working in the public sector.

We have referred repeatedly to the planner as being a member of a managerial team. In varying degrees the planner reports to and takes direction from the manager of the organization. More appropriate terminology might be that the planner reports to and is directed by a bureau chief. Whatever the title, the head of the organization is often someone who either holds the position as a result of the political process or has the size of the budget so determined. In some cases the bureau chief or manager will be directly appointed as a result of political considerations rather than those of civil service. Even though the position may be one covered by civil service, nevertheless, important political factors may contribute to appointment. The size of the budget in the majority of cases will be determined by political considerations, and continued support depends upon technical and political success.

The manpower planner should be viewed as an agent of government. As such we need to remind ourselves that a government engages in two primary functions: to provide goods and services, and to manage and resolve conflicts that arise from the provision of such goods and services. The bureau chief, cum politician, is involved in the exercise of these functions. As politician, the manager is often called

upon, therefore, to engage in such activities as representing the electorate to formulate the policy and programs, to be an expositor of certain policies and programs, to serve as critic to alternative policies, to serve as mediator and arbitrator of conflicting claims within the organization, and to engage in compromises between competing policies and programs.

The manpower planner needs to understand this role of the manager not only in the technical aspects of such a job, but also in the political aspects of the job. In a very real sense the manpower planner is an assistant to the manager or bureau chief in those matters relating to manpower policy and programs. The effectiveness of this assistance will be increased with an awareness of the constraints imposed upon the manager. This would imply that in order to increase the probability of a successful implementation of a manpower program, the planner should work at being more effective as an assistant to the manager. To this end, manpower planners must engage in the following general activities:

1. They must assist the politician to see in detail the implications of the politician's goals and the means which are required to attain them. This must be done, even though by the time the manpower plans are ready, the politician or bureau chief may be unable or unwilling to move toward the goals originally specified.
2. Planners must facilitate the politician's decision making. Even if a politician acts by hunch or by intuition, it is useful to have at his or her disposal a certain number of

more apparently scientific methods of reaching decisions.

It is also comforting to the politician to know that others reached the same conclusion through the use of "scientific method" as he or she had reached by a process of combining political instinct and pragmatic assessment!

3. Planners must assist the politician by seeking to identify problems. On many occasions the politician is a man or woman who has a difficulty with every solution. Planners should, however, be able to identify the various problems existing within a given organization and submit to the politician a series of options for dealing with them. They must also assist the executive in implementing the options which the politician has decided to favor. Planners must also seek to monitor the results of the choice made in order that such results might be tested scientifically, as well as politically and pragmatically, at the ballot box.
4. Planners must recognize that the government process often proceeds by crisis, conflict, and resolution. This is a continuing process at the political level of government. Planners will be better able to help politicians if they recognize an individual politician acts out his or her public life and discharges public responsibility within a continuous process of challenge and response.

CONCLUSION

Before establishing a manpower planning process, individuals in a public agency must have a firm notion of why manpower planning

is needed. They must be able to defend manpower planning. There must be a felt need, and once this need has been felt and established, then a commitment to manpower planning can be made. This felt need may be based either upon hard evidence or a "feeling" that such evidence would exist if the appropriate procedures (i.e., manpower planning) were adopted. There may be a "feeling" that there is an insufficient number of trained people or too many vacancies, or that there's a high turnover in personnel. Something of this nature must exist before a documented need for manpower planning exists.

It is advisable not to begin a manpower planning process until there is an effective decision-making process within the agency. This is an extension of what we have previously discussed under the rubric of organization behavior and development. The relationships of the manpower planner with the other members of the management team should be firmly established as soon as possible. This should also be extended to interrelationships of the agency itself with state, regional, and federal agencies, as well as private relationships involved in the various aspects of manpower planning. Although we do not issue this advice as a prohibition to planning if an effective decision-making process does not exist, nevertheless, we caution manpower planners that if they are to effectuate their plans, if the work that they do is to have value through implementation, there must be an effective decision making process into which they can feed the results of their research.

Finally, we suggest that during the initial stages of implementation, the agency and the manpower planning officer not attempt to

do too much. We would not advise that during the first months of the planning effort computer programs for forecasting future manpower conditions be devised and implemented, but rather that the planning be done more incrementally and in general on a more modest level. Within this framework we also suggest that in order to maintain both the morale of the planning staff and the interest of the agency management, concrete results are needed within the initial period of the planning effort. It is our opinion that in order to establish a firm and smoothly working manpower planning function, the planning office needs to consummate at least three cycles of the planning system. This is to establish in the data base an experience in forecasting and some techniques for adjusting. But during the initial stages, certain results are also needed to maintain morale and interest, and for this reason during the first months, some forecasts of the manpower needs should be made -- and some analysis of the manpower problems should also be made. So important is the establishment of a record of success that the selection of a problem upon which success is demonstrable may be of top priority, and in the selection of this problem, it may be well to consult with operating heads to help determine those problems with the greatest priority.

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