

following classifications.

- (a) **Job Shop Production:** In this type of production a wide variety of customised products are made by a highly skilled workforce using general purpose equipment. It is also known as unit-production, one-off production, custom-built or taylor-made production. Ship building, furnace manufacture, tool making and printing orders are some of the examples of jobshop production.
- (b) **Intermittent Flow or Batch Production:** In this type of production, a mixture of general purpose and special purpose equipment is used to produce small to large batch of products. Batch production is one form of intermittent flow production. It is used to produce moderate volumes of similar products. *For example*, ready-made garments and book manufacturers adopt batch production. Ice cream manufacturers produce a batch of ice creams of different flavour such as vanilla and strawberry.
- (c) **Repetitive Flow or Mass Production:** In this type of production several standardised products follow a predetermined flow through sequentially dependent workcentres. Workers typically are assigned to a narrow range of tasks and work with highly specialised equipment. Examples are automobile and computer assembly lines.
- (d) **Continuous Flow or Flow Shop Production:** Continuous processing or continuous production is employed when a highly standardised product or service is produced or rendered. Processing of chemicals, oil refineries, sugar and cement production are some of the examples of continuous flow production. Industries that use continuous processing involving chemical or metallurgical processes are sometimes referred to as **process industries** and the type of production adopted is known as **process production**. Production processes are usually performed **round the clock** in process industries to avoid costly shut-downs and start-ups.

Table 1.6 provides a summary of the characteristics of these four major types of production.

TYPES OF PRODUCTION SYSTEMS

Broadly production systems can be classified as :

- (a) Manufacturing systems and service systems.
- (b) Series and parallel production systems.
- (c) Continuous flow and intermittent production systems.

These production systems are discussed in detail in the following paragraphs.

1. Manufacturing Systems and Service Systems

Production systems that produce goods are often referred to as **manufacturing systems** and the production of tangible goods is called **manufacturing**. Some common examples of manufactured goods are chemicals, steel, cement, automobiles, aeroplanes, beverages, packaged food and furniture.

Production systems that produce services are referred to as **service systems**. Services are intangible products that satisfy some need of a consumer including the enhancement of tangible goods. Examples of services systems are: healthcare services, legal assistance, financial services, accounting services, educational services, transportation services and warehousing services.

Products can also be combination of goods and services. Restaurants produce the tangible products along with the intangible services of delivery, cleaning of dishes and providing pleasant environment to the customers. (More about manufacturing systems and service systems will be discussed later in this chapter.)

2. Series and Parallel Production Systems

Production systems may exist in series; for example, when completed products are shipped from the factory to a warehouse, they are leaving the factory system only to arrive at a second production system, called a warehouse. The factory and the warehouse are two production systems which are in series.

Production system may also exist in parallel, such as when a number of factories produce similar products and supply several market areas. These factories may be considered as one large production system (i.e., an industry). For example, several factories producing automobile spare parts are treated as part of larger system known as automobile spare parts industry.

3. Continuous Flow and Intermittent Production Systems

Continuous Flow Production Systems are those where the facilities are standardised as to routings and flow. A standard set of processes and sequence of processes can be adopted. Continuous flow production systems are represented by production and assembly lines, large scale office operations and chemical processes.

Intermittent Production Systems are those where facilities must be flexible enough to handle a wide variety of products and sizes. In situations such as this no single sequence of operations is appropriate. Transportation facilities between operations must be flexible to accommodate a wide variety of routes that the inputs may require. Considerable storage between operations is required so that individual operations can be carried on somewhat independently, resulting in ease of scheduling and better utilisation of men and machines. Intermittent production is represented by custom or job-order machine shops, hospitals and batch chemical processes.

The production system model shown in Exhibit 1.3 can be made to fit both the intermittent and continuous-flow situations by the specification of some of the detailed characteristics. Exhibit 1.4 represents the intermittent production system.

Nature of Human Resource/Manpower Planning

The following points emerge from the study of the above definitions of human resource planning :

- (i) Human resource planning aims at ascertaining the manpower needs of the organisation both in number and kind.
- (ii) It presents an inventory of existing manpower of the organisation. An analysis of the inventory of manpower helps in ascertaining the status of the available personnel and to discover untapped talent presently available with the organisation.
- (iii) It helps in determining the shortfall (or surplus) of manpower by comparing the total manpower needs with the present supply of manpower. It also helps in projecting future manpower needs.
- (iv) It is concerned with the initiation of various organisation programmes depending upon the demand and supply of human resources. If the future needs exceed presently available talent, this gap becomes the basis for a programme of employment and training. And, if the presently available talent exceeds the future needs, this difference may become the basis for a programme of retirements, discharge, etc.
- (v) Effective human resource planning encompasses the acquisition, utilisation, improvement, and preservation of the organisation's human resources.

Objectives of Human Resource Planning

The major objectives of human resource planning in an organisation are as follows :

- (i) To ensure optimum use of human resources currently employed.
- (ii) To avoid imbalances in the distribution and allocation of human resources.
- (iii) To assess or forecast future skill requirements for the accomplishment of the organisation's overall objectives.

- (iv) To provide control measure to ensure availability of necessary resources when required.
- (v) To control the cost aspect of human resources.
- (vi) To formulate transfer and promotion policies.

Scope or Elements of Human Resource Planning

The basic activities involved in human resource planning are as under :

- (i) Listing of current manpower or human resources with the organisation.
- (ii) Assessing the extent to which the current manpower is utilised to the advantage of the organisation.
- (iii) Phasing out the surplus manpower, if any.
- (iv) Analysing the requirements of manpower in future in the light of expansion plans, retirement of personnel, etc.
- (v) Making manpower procurement plans.
- (vi) Designing training programmes for different categories of manpower.

IMPORTANCE OF HUMAN RESOURCE PLANNING

Manpower planning is a two-phased process by which management can project future manpower requirements and develop manpower plans. It helps in proper recruitment and selection so that right type of people are available to occupy various positions in the organisation. It also facilitates designing of training programmes for the employees to develop the required skills in them. Thus, manpower planning plays an important role in the effective management of personnel.

Systematic manpower planning provides lead time for the acquisition and training of employees to meet future requirements. It is all the more crucial because the lead time for procuring personnel is a time consuming process and in certain cases, one may not always get the requisite type of personnel needed for the jobs. Non-availability of suitable manpower may result in postponement or delays in executing new projects and expansion programmes, which ultimately lead to lower efficiency and productivity. To overcome this, an organisation must plan out its manpower requirements well in advance so that it could compete effectively with its competitors in the market.

Benefits of Manpower Planning

Manpower planning is an important tool of Human Resource Management as it helps in the following ways :

1. Manpower planning results in reduced labour costs as it helps the management to anticipate shortages and/or surpluses of manpower and correct these imbalances before they become unmanageable and expensive.
2. It is a better basis for planning employee development that is designed to make optimum use of workers' skills within the organisation.
3. It enables identification of the gaps of the existing manpower so that corrective training could be imparted. Thus, the training programme becomes more effective.

4. It leads to improvement in the overall business planning process.
5. It helps in formulating managerial succession plan as a part of the replacement planning process which is necessitated when job-change plans for managers are formulated. Besides, this exercise would provide enough lead time for identifying and developing managers to move up the corporate ladder.
6. It leads to a greater awareness of the importance of sound manpower management throughout the organisation.
7. It serves as a tool to evaluate the effect of alternative manpower actions and policies.

Manpower Planning at Different Levels

There are various levels of manpower planning in an industrial enterprise, but each has its own objectives and techniques. It may broadly be carried out at corporate, divisional and plant levels. The purpose of carrying out manpower planning at various levels is the systematic projection of manpower requirements for the future. It is done to determine the effects of anticipated changes in technology, markets and products on manpower requirements and training requirements.

It is better for manpower planning to start at the lowest organisation level and then move upward. There is no doubt that a corporate plan is developed by the body of top executives with the help of corporate staff planners. However, if personnel lower down in the organisation start the planning process, the organisation shall reap the benefits of thinking of persons who are more familiar with the day-to-day problems and will be more interested in fulfilling the plans if they have had a hand in formulating them. Therefore, manpower planning should begin at the lowest organisation level and be reviewed at successively higher organisational echelons.

Manpower planning at the plant level (or other decentralised units such as warehouse, sales office, branch and the like) can be conducted by an operating committee on the basis of past data and future projections. The committee would formulate a manpower plan for the next year, including the number of employees required and the sources which could be utilised to meet these requirements. It would also determine the number of promotable employees for the annual manpower plan. Finally, the committee will evaluate these plans in the light of expected changes of all kinds within the next five years with the help of manpower planning experts. In line with the principles of functional and administrative supervision, this plan would in turn be submitted to the next organisational level which would be the departmental level. Each division or department of the organisation will have the divisional committee which would review the manpower plans submitted by all the plants in the division. The divisional committee would integrate the manpower plans of its plants as well as those of its divisional staff sections into a comprehensive divisional manpower planning report, which in turn would be submitted to the top management. The proforma of staff requirement forecast report has been shown in Exhibit 1.

of various kinds during the next five years. At this level, the committee will have before a person is developed into a better executive. The committee will have at its disposal all the records and statistics regarding employees turnover during the previous years, employees going to retire in future and so on. Past records regarding employees turnover due to death, retirements, resignations, terminations, etc., and absenteeism can be a good guide for manpower planning. After the manpower planning has been done at the top level, it will be integrated with the other organisational plans.

THE PROCESS OF HUMAN RESOURCE PLANNING

The process of manpower planning involves the following steps :

1. Determination of objectives of manpower planning.
2. Preparation of current manpower inventory.
3. Demand forecasting.
4. Supply forecasting.
5. Estimating the net manpower requirements.
6. Action plan for redeployment and redundancy.
7. Determination of job requirements of jobs to be filled.
8. Employment plan.
9. Training and development program.

Manpower planning is a continuous process as shown in Fig. 1. The manager responsible for manpower planning has to be concerned with all the steps at all time. He may have to revise employment plan and training and development programme from time to time depending upon the changes in circumstances such as sudden changes in volume of production, unexpected high rate of labour turnover, obsolescence of existing skills and so on. A brief explanation of the steps in the manpower planning process is given below :

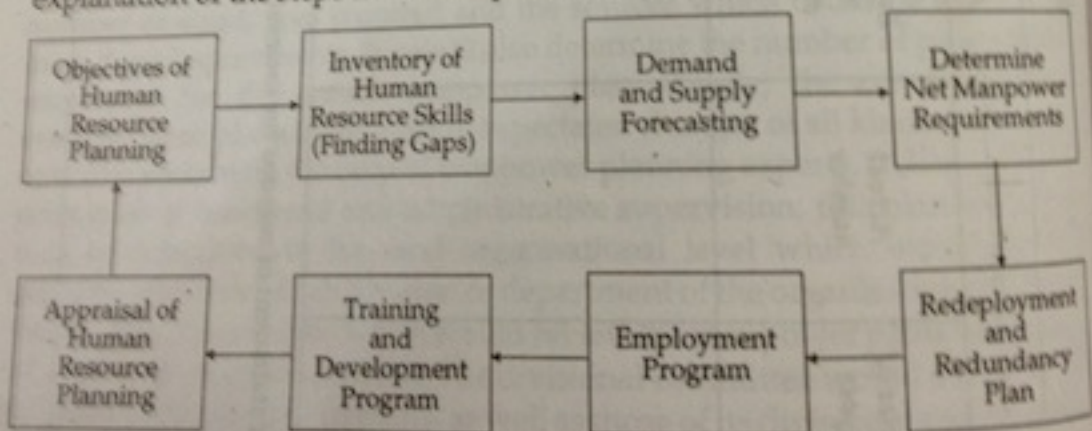


Fig. 1. The Manpower/Human Resource Planning Process.

1. Objectives of Manpower Planning

"The ultimate purpose of manpower planning is to relate future human resources to future enterprise needs so as to maximise the future return on investment in human resources"⁴ Manpower planning must be integrated with the overall organisational plans. Manpower planning should be done carefully as it has got long-term repercussions. Once the wrong forecast of future requirement of human resources and the wrong analysis of the available manpower inventory are made, it may not be possible to rectify the errors in the short-run. Therefore, manpower planning should be more concerned with filling future vacancies with right type of people rather than with matching existing personnel with existing jobs.

2. Current Manpower Inventory

Analysis of current manpower supply may be undertaken by department, by function, by occupation, or by level of skill or qualifications. Appropriate adjustments in these would need to be made in the light of any foreseeable changes in weekly hours of work, holidays, leave entitlements, etc. It may be noted that assessment of demand for the operative personnel presents less problems of uncertainty and current manpower supply can be adjusted accordingly. But projections of manpower requirements for supervisory and managerial levels presents a complex problem because the required talents are not available at a short notice. This explains the need to ascertain the present manpower inventory in the enterprise. This will also help in drawing recruitment and development plans to meet the needs of certain skills in the future.

Systematic steps must be taken in order to ensure that a reservoir of talent is available when vacancies occur. The search for talented employees in the organisation must be continuous. To be sure that available talent has been included, the inventory of various skills in the enterprise should be indexed. Detailed bio-data of each individual included in the manpower inventory must be obtained separately for the purpose of manpower planning. This record will provide the foundation for a programme of individual development. It will also reveal the scarcity or non-availability of certain talents for which outside sources of manpower may be tapped.

3. Demand Forecasting

A proper forecast of manpower required in the future (say, after one year, two years, three years and so on) must be attempted. The factors relevant for manpower forecasting are as follows⁵:

(i) **Employment Trends.** The manpower planning committee at the corporate level should make an examination of number of the employees on the payroll during the past five years to know the trend within each group. With the help of this, it would be possible to determine whether a particular group has been stable or unstable and whether it has been expanding or contracting.

(ii) *Replacement Needs.* The need for replacement arises due to death, retirement, resignation and termination of employees. The examination of replacement needs may relate to specific manpower groups : supervisory, skilled, clerical, unskilled, etc. For some groups like managerial or supervisory, it is very difficult to predict the needs. One of the major difficulties involved in predicting the need for managerial skill is that the management development cycle takes a long time. So the needs for managerial manpower should be anticipated sufficiently in advance.

Forecasts of manpower may be based to a great extent on the analysis of historical data. It is presumed that the factors causing past occurrences will also play a similar role in the future. But these data must be adjusted in the light of other known information about the future. Certain losses of key personnel can be predicted with a substantial degree of accuracy. These include losses from retirement, physical disabilities and cases of sub-standard performance. But retirement is the most common type of anticipated separation which gives rise to the need for replacement. This category would include all employees who will reach the normal retirement age during the period under consideration. In the same way, losses from known physical disabilities and for substandard performance can be predicted. There will, of course, be other losses of personnel. This estimate may also be based upon past experience. An examination of the number of deaths, discharges, releases and quits during the last five years may provide a basis for projecting the need for replacement in the future because of these reasons. Another important factor influencing the replacement needs is transfer of some employees to other departments of the organisation or promotion of some employees to higher jobs. This number can be estimated on the basis of a review of the persons promoted or transferred during the previous years and the records of performance of various employees during the past years.

(iii) *Productivity.* An important area to which the manpower planning is related is the improvement in productivity. Gains in productivity add to the growth potential of the organisation and can make possible healthy wage increase. Gains in productivity will also influence the requirements of manpower.

Planning for productivity gains has several aspects. The first and the important one relates to affecting gains by improvements in existing manpower utilisation. Current levels of utilisation and indications about the needed improvement can be obtained by the application of various analytical techniques of industrial engineering or work study such as activity charts, flow charts, multiple activity charts, activity sampling studies and so on. Methods improvement techniques help reduce work content. Conceptually, similar approaches aimed at upgrading management performance help secure productivity gains at the managerial level.

The second aspect relates to installation of more productive tools equipments or processes. Any anticipated change due to the introduction of

automation will affect manpower needs in the plants as well as in the divisional offices. The manpower planning experts should attempt to learn about such changes with sufficient time to appraise their possible impact on the number and kinds of employees required in the future.

The last aspect relates to the matching of skills with the requirements of the jobs. Job analysis techniques facilitate a clear specification of the skills and experience requirements of jobs. The immediate products of this analysis are job description and job specification which have been discussed in a subsequent chapter.

(iv) *Growth and Expansion.* Another aspect relevant for manpower planning is personnel requirements for growth and expansion of the organisation. The expansion plans of various plants and divisions should be carefully reviewed to assess their probable effects on the number of employees required in each group. The accuracy with which such manpower requirements can be forecast will depend, among other things, on the degree of accuracy which can be achieved in relation to the expansion programme. Where the expansion programme is less specific and the time perspective is larger, uncertainties will also be greater.

A going concern is a living and growing organism. It is not contented with the existing level of production or profits. It also wants to grow and increase its share in the total activities of industry. One of the basic aspirations of most business managers is to perpetuate the enterprise in which they are engaged. In this world of competition, perpetuation would mean that every organisation has its plans ahead of its activities and aims at a better growth rate and at diversification of its activities and at a better image of itself. All these aims and aspirations result in expansion and growth creating numerous positions for work-force at various levels. These aims and aspirations can be fulfilled if there is a sufficient number of capable persons to handle various positions in the organisation.

A good organisation always tries to adapt itself to changes in the methods and techniques of production. Developments in scientific world like the emergence of space science, nuclear science, electronics, etc. has considerably opened up new avenues of business investment and expansion and has also introduced great complexities in the management of companies. These changes have completely thrown out of gear the capacity and ability of existing employees to meet the new situations unless they are adequately educated and trained. Manpower planners should take all these factors into account while studying the impact of various business expansion plans on manpower requirements.

(v) *Absenteeism.* It means a situation when a person fails to come for work when he is scheduled to work. The rate of absenteeism can be calculated by the following formula :

$$\text{Absenteeism} = \frac{\text{Man-days lost}}{\text{Man-days worked} + \text{Man-days lost}}$$