



Extension and Development : Planning Management and Evaluation

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COURSE MAE-004: EXTENSION EDUCATION AND DEVELOPMENT

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-

BLOCK 4 EXTENSION AND DEVELOPMENT: PLANNING, MANAGEMENT AND EVALUATION

Introduction to the Block

This Block deals with different aspects of planning, management and evaluation in the context of extension and development. It highlights the process of planning and developing an extension programme and presents the rationale and elements necessary for people's participation in extension programmes. It discusses the theories of management with focus on their relevance to extension education. It covers the aspects of manpower planning and personnel management and their significance in extension and development. It also touches upon the significance, design, and tools and techniques of monitoring and evaluation in extension and development. It comprises the following four units.

Unit 13 "Planning and Developing Extension Programme" discusses programme development with emphasis on nature, objectives, scope, and principles of programme planning, as well as the steps involved in programme development process. It presents a rationale for creating extension programmes and focuses on essential elements necessary for promoting people's participation in extension programmes.

Unit 14 titled "Concepts and Theories of Management: Their Relevance to Extension Education" focuses on the concept, need, principles, approaches and theories of management and their relevance to extension education. It highlights the historical context of management touching upon classical, behavioural, quantitative and modern approaches to the theory of management. It provides some important guidelines that serve as tips towards managerial excellence and success.

Unit 15 "Manpower Planning and Personnel Management in Extension and Development" discusses the manpower planning, personnel management, staff development and styles of management with emphasis on their concepts, need, features, and significance. It describes the process, benefits and functionalities / personnel and strategies involved in manpower planning; role and functions of personnel management and staff development including different types of training and their relevance to management of extension and development.

Unit 16 on "Monitoring and Evaluation in Extension and Development" presents an overview of the concept, need, importance and types of monitoring and evaluation. It describes the design of monitoring and evaluation along with different methods and techniques of project management and evaluation such as Critical Path Method (CPM), Programme Evaluation and Review Technique (PERT), Event Chain Methodology (ECM) and Gantt Charts.

UNIT 13 PLANNING AND DEVELOPING EXTENSION PROGRAMME

Structure

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- 13.2 Planning and Development of Extension Programme: Essential Aspects and Issues
 - 13.2.1 Some Important Concepts/Terms Used
 - 13.2.2 Nature and Objectives of Programme Planning
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- 13.6 References

13.0 INTRODUCTION

The continuing challenge of extension planners has been to be creative or innovative in their programme development efforts and responsive to the changing needs of farmers and their communities in rural, tribal and other remote areas. In today's world, people's involvement or participation is the cornerstone of change process and its acceleration. People are to be continually involved in it, either as passive or active elements/citizens, but more often as targets of project or as recipients of its benefits. Development projects are delineated to help people adjust to change, for example to new agricultural policies or market demands. Also, at times, these projects are directed to help grass-roots groups and rural communities in building change projects that are relevant to their own needs and aspirations. Both the situations require planning and preparation of different types of extension programmes. In this Unit, we attempt to deal with the concept, scope, principles, process and elements of planning and developing extension programmes.

13.1 OBJECTIVES

After going through this Unit, it is expected that you will be able to:

- Identify the basic concepts and terms used in planning and development of an extension programme;
- Explain the concept, nature and scope of extension programme planning;
- State the objectives of extension programme (planning); and

- Describe the principles and process of planning and developing an extension programme.

13.2 PLANNING AND DEVELOPMENT OF EXTENSION PROGRAMME: ESSENTIAL ASPECTS AND ISSUES

For planning and developing an extension programme, it is necessary to know the essential aspects involved in extension programme development. These aspects are briefly discussed below.

13.2.1 Some Important Concepts/Terms Used

In this section, we present to you some important concepts/terms that we will be using during the course of our discussion in this Unit.

- **Extension programme:** According to Kelsey and Hearne (1967), an extension programme is a statement of situation, objectives, problems, and solutions. It is relatively permanent but requires constant revision. It forms the basis for extension plans.

Leagans (1961) says an extension programme is a set of clearly defined, consciously conceived educational objectives derived from an adequate analysis of the situation, which are to be achieved through extension.

The term 'programme' thus indicates focus, priority and design. A well developed programme to extension workers is like what a compass is to a seaman. The function of extension programme is to provide a clear guide, a blueprint, or a plan useful to extension worker in conducting ongoing extension programmes. Entire programme should be based up on the needs of people and their involvement in it all through.

- **Situation:** Situation is a statement of affairs that includes the cultural, social, economic and physical conditions in which a particular group of people find themselves at a given period of time. The situation, which constitutes the environment for planning, is quite dynamic. The aspects of changing environment are:
 - i) Changes in technology,
 - ii) Changes in Government policy,
 - iii) Changes in overall economic activity including prices, labour, raw materials, etc.,
 - iv) Changes in the nature of competition, and
 - v) Changes in social norms and attitudes.
- **Objectives:** Objectives are expression of the ends of the project/programme towards which our efforts are directed. In other words, an objective is a statement of change in knowledge, feeling or action we want to bring about in people.
- **Calendar of work:** A calendar of work is a plan of work arranged chronologically.

- **Plan of work:** A plan of work is an outline of activities so arranged as to enable efficient execution of the entire programme.
- **Project:** A project is an outline of procedure and pertains only to some phases of extension work.
- **Planning:** Planning is a process, which involves studying the past and the present in order to forecast the future and determining the goals to be achieved and what is to be done to achieve them. Planning is designing a course of action to achieve the ends.
- **Programme Planning:** It is a process of working with people in an effort to recognize the unsatisfactory situation and determine possible solutions or objectives or goals. It is a decision making process, involving critical analysis of the existing situation and the problems, evaluation of the various alternatives to solve these problems and the selection of the relevant ones, giving necessary priorities, based upon local needs and resources, by the cooperative efforts of the people both official and non-official with a view to facilitate the individuals' growth and development. It is a process of bringing planned change.
- **Problem:** Problem is a condition that, the people after study, with or without help, have decided that it needs a change.
- **Solution:** It is a course of proposed action to change an unsatisfactory condition to one that is more satisfying.
- **Programme development process:** Programme development process is defined as a continuous and cooperative activity involving lay people and the extension staff in which problems are identified, objective are set forth and action is taken to reach the objectives (Sanders, 1968).

Extension programme projection: According to National Task Force, USA, "Extension programme projection can be defined as an administratively realistic form of long-range development involving the scientific approach in assembling facts as the basis for intelligent decision-making by a broadly representative group of local people" (Adivi Reddy, 1997, p.128).

In this sub-section, we will focus our discussion on the nature and objectives of extension programme planning.

13.2.2 Nature and Objectives of Programme Planning

Extension programme planning process has some characteristics which give us an idea of its nature. These are as follows.

- 1) *Programme planning is an educational process:* It involves both teaching and learning. It teaches skills to the people in finding, analyzing, deliberating and focusing on the solutions to the problems. It gives more knowledge of the facts to the people. It changes the attitude of the people towards the planning process.
- 2) *Programme planning is an unifying and integrating process:* Through the process of identifying problems, fixing priorities, setting objectives and goals, and providing continuity and monitoring people get a total picture of where they are, what they shall do and where they are likely to reach.

- 3) *Programme planning is a coordinating process*: It requires coordination of the efforts and activities between officials and non-officials, between institutions and organizations, between people and materials, and the like.
- 4) *Programme planning is an evaluating process*: Evaluation of accomplishment is not the only criterion. It also provides for evaluation of the planning process and the organization.

Check Your Progress

Notes: a) Space given below the question is for writing your answer.

b) Check your answer with the one given at the end of this unit under
“Answers to ‘Check Your Progress’ Questions.”

- 1) Define programme planning.

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- 2) What are the characteristics of programme planning?

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Objectives of programme planning: The general objective of having an extension programme is to influence people to make changes in their way of life and in making a better living. The assumption is that there is need for change and if people are not aware of it, it is necessary to make them aware of it and to enable them to develop and meet their needs. Following Kelsey and Hearne (1967), the objectives of programme planning may be stated as follows.

- To ensure careful consideration of what is to be done and why.
- To furnish a guide or straight edge against which to judge all new proposals.

- To establish objectives towards which progress can be measured and evaluated.
- To give continuity, particularly during changes in personnel.
- To aid in the development of leadership.
- To have a means of choosing: a) the important from the incidental problems, and b) the permanent from the temporary changes.
- To prevent mistaking the means for the end, and to develop both felt and unfelt needs.
- To avoid wastage of time and money, and promote general efficiency.
- To coordinate the efforts of the different people working for rural development.
- To encourage the local people to give the extension workers more support, thus ensuring cooperation and financial support.
- To have available in written form a statement for general public use.

The basic objective of extension system is to develop in village people, the ability to make a better living and to live a more satisfying life as individuals, as family members as well as citizens of their community, state and the nation. To attain this objective, the first step in any systematic attempt to promote rural development is to prepare a useful programme. As we know, the term programme indicates focus, priority and design. Programme has to arise from the felt needs of the people, if it is really to be meaningful to them. One of the important jobs of the extension worker is to convert unfelt needs of the people into felt needs. It should be recognized that those felt needs are the motivating forces for their participation and involvement in extension programmes. It assumes the ability among the planners to distinguish important needs from unimportant ones. Such a programme must be based on people's needs to make it significant and on their interests to make it effective. "If we could know where we are now and where we ought to go, we could better judge what to do and how to do it". This statement by Abraham Lincoln lies at the heart of the nature and scope of planning for rural development. Effective programmes for rural improvement do not just happen: they have to be built. (Adopted from Leagans, 1961). Hence, programme planning is basically a process of making decisions that will carry into the future. Decisions have to be made about what the present situation is, how it could and ought to be changed and what means can be used to accomplish the new and more desirable situation.

13.2.3 Assumptions in Programme Development

The world has a complex and uncertain nature. Changes and unexpected failures are important ingredients in the history of both humankind and the local society. Planning, then, is a risk-taking exercise, subject to the unexpected changes and failures. However, without planning life is even more uncertain and the task of reaching a balanced and sustainable development becomes more difficult. So, when talking about extension programme development, we assume the following:

- Planned change may be an important factor for the social and economic progress of rural communities and families;

- Extension service providers/agents must not act mechanically and without a vision;
- Extension programmes can contribute significantly to learning, educational improvement and development;
- It is possible to select, organize and manage programmes that contribute to change and development;
- Extension educators, as change facilitators, can help individuals, families and communities to reflect upon their realities and build relevant programmes, thus improve the quality of their life.

All these assumptions are for developing a programme for planned change.

In this section, we provide you an overview of the programme development process with an emphasis on grass roots level extension work. First, it (we) will look at basic concepts; discuss different ways of approaching the programme development process, and review current ideas. It is important to emphasize that, although in the text we usually use the word “planning,” our discussion is centered on programme development globally, which we see as a set of dynamic cycles necessarily implying planning, implementation, and evaluation stages and activities, interacting and often overlapping, evolving along the programme process and according to the changing circumstances of the physical, socioeconomic, and political-institutional environment. A good extension programme meets the needs and interests of the majority of the people and motivates them to make necessary changes. To be effective every programme must start with people and the situations as they are, and then build towards the ultimate goal of better family living.

13.2.4 Programme Development and Planned Change

When we talk of programme development, we aim at planned change, that is, deliberate efforts to change a given state of affairs. Social, economic, cultural or technological changes are commonly assumed to be the purposes of planned and systematic extension actions. As change facilitators, extensionists should be concerned with the preparation of programmes and projects that are responsive to the needs and interests of rural communities and farm families.

Some argue that planning is a difficult mission, especially in the developing world, where the level of political and economic uncertainty is high. This leads to on-the-spot decisions or very short-term and incipient planning work. However, we strongly argue that the lack of adequate planning and continual evaluation is a major reason for the frequent failure of development projects and extension activities (Koehnen, Portela and Cristovao, 1993, p.207). Other reasons are that: planners do not look at the diversity embedded in most situations; different clientele groups are not systematically involved, and some (surprisingly, major ones) are neglected; alternative solutions are not carefully compared; objectives are too rigid, not clearly defined or not linked to activities; results are not duly studied; and the distribution of benefits is overlooked. So in many situations the challenge seems obvious: to allocate more time for planning and evaluation and to stop acting hastily and mechanically, without direction and purpose, like a clock lacking hands.

Extension authors and professionals strongly support planning. Forest and Baker (1994, p.87), for instance, underline that “program planning helps justify budget appropriations and brings understanding among the public,” and “the planning process offers opportunity to people who participate in it to learn, thus building leadership skills in the community that will likely contribute to self-help, independence, and positive end-results.” In general, adequate planning and evaluation do the following (Maalouf, in Rivera, 1987, p.116).

- Involve an integrated analysis of needs and interests, opening up new horizons for action.
- Promote a concentration of efforts, channeling energies and resources in appropriate directions, and helping accomplish complementarities and synergies.
- Strengthen programme resources and attract funds, thus allowing the sustainability or expansion of activities.
- Improve team and community capacities, motivations, performance, and autonomy.
- Show commitment to address and solve problems.
- Strengthen the quality of projects and staff performance.
- Serve as a means to open dialogue with other organizations involved in development.

In view of these, planning extension programmes has become an increasingly accepted practice among national authorities.

Check Your Progress

Notes: a) Space given below the question is for writing your answer.

b) Check your answer with the one given at the end of this unit under “Answers to ‘Check Your Progress’ Questions.”

3) What are the objectives of an extension programme planning?

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4) What are the assumptions in programme planning and development?

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13.2.5 Principles of Extension Programme Planning and Development

Principles of extension programme planning and development are discussed below.

Extension programmes should be based on an analysis of the past experiences, present situation and future needs. For programme determination adequate information about the people and their situation have to be collected. The present situation is to be analyzed and interpreted on the basis of past experiences, and future needs are arrived at by taking local people into confidence. Extension programmes thus have the definite purpose of improving rural life through individual, group and community actions. Extension programme planning has certain principles which hold good irrespective of the nature of the clientele and the enterprises involved in it, and are discussed below.

- 1) *Extension programmes should have clear and significant objectives which could satisfy important needs of the people.* The ultimate objective of programme building is to satisfy the needs of the people. For this purpose, significant objectives pertaining to important needs of the people should be selected and clearly stated. The emphasis shall be on what is attainable rather than on what is ideal; although one should not lose sight of the ideal.
- 2) *Extension programmes should fix up priority on the basis of available resources and time.* The rural people, particularly in the developing countries, have a multitude of problems. All problems cannot be taken up at a time for solution, because of the limitations of trained personnel; availability of funds, facilities and other resources. Time is also a limiting factor as both the people and the funding agencies cannot wait for an indefinite period of time to get the results. Considering all these parameters it is essential to fix up priorities in the programme.
- 3) *Extension programmes should clearly indicate the availability and utilization of resources.* An extension programme should clearly state wherefrom the funds, facilities, supplies and the needed personnel shall be available and how these shall be utilized. This shall make the programme practical and workable.
- 4) *Extension programmes should have a general agreement at various levels.* Programmes prepared at the various levels such as village, district, State and national levels should conform to each other and shall not work at cross purposes. Similarly, the extension programme of a particular department should not be in conflict or contradiction with the extension programme of other departments.
- 5) *Extension programmes should involve people at the local level.* Extension programmes are implemented at the local level. Local people should, therefore, be involved all through, from programme formulation to programme implementation.
- 6) *Extension programmes should involve relevant institutions and organizations.* Extension programmes cannot be implemented in isolation. It requires the support of many institutions and organizations. The programme should broadly indicate the institutions and organizations to be involved and how they shall contribute in attaining the programme objectives.

- 7) *Extension programme should have definite plan of work.* The plan of work may be separately drawn up or incorporated in the programme. The programme should at least broadly indicate how it will be executed. Unless the plan of work is drawn up, the programme remains a theoretical exercise.
- 8) *Extension programmes should provide for evaluation of results and reconsideration of the programme.* Extension programme is not a static outline of activities. The programme should make provision for periodical monitoring and evaluation of results to judge its progress. On the basis of the findings of evaluation, the programme should be suitably modified to facilitate its reaching the objective within the stipulated period of time.
- 9) *Extension programmes should provide for equitable distribution of benefits amongst the members of the community.* It has been found that, in a community generally the resource- rich persons benefit more in comparison to the resource-poor, from the implementation of extension programmes. As this may generate social disparity and social tensions, the planning of extension programmes should give adequate emphasis on the weaker sections of the community.

13.2.6 Steps in Programme Planning and Development Process

According to Leagans (1961) there are five phases in the concept of extension education process, which can be broken up into the following nine specific steps in programme planning process as shown in Figure 13.1.

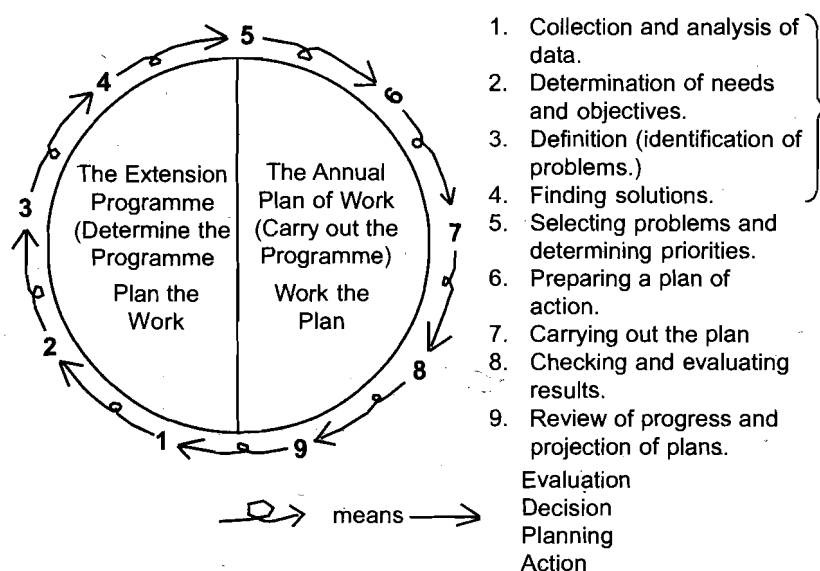


Fig. 13.1: Programme Development Process

In the diagrammatic representation of the programme-building process given in Figure 13.1 the first 4 steps constitute the Extension Programme, and the next 5 steps the Annual plan of work. These nine steps in the process are briefly described below.

- 1) **Collection, analysis and evaluation of data:** Good planning depends on the collection of adequate and reliable data and a scientific elaboration and interpretation of the same. Extension workers must have adequate knowledge

of what farmers produce, how and under what conditions they produce it, and how the production can be stepped up to the maximum for the purpose of formulating plans at the village and Block level. An intimate knowledge of the cropping patterns, procedures of farm management and the factors of production is essential for purposeful programme planning in agriculture in any area. Therefore, it is of great importance that all extension workers possess factual and basic farm and family information required for preparing a sound family, village and Block plans. It is not possible to draw up a comprehensive list of items suitable for all situations or all parts of the country, on which extension workers could collect information. But, in general, information on the following items should be collected.

- A) *Basic information about the village:* This covers the following.
- i) Population.
 - ii) Total number of families.
 - iii) Number of farm families.
 - iv) Other main occupations of the villagers.
 - v) Transport facilities.
 - vi) Schooling facilities.
 - vii) Facilities of medical aid.
 - viii) Drinking water facilities, etc.
 - ix) Attitudes and beliefs of the rural population (social classes, formal and informal groups, etc).
 - x) Nutrition situation (food habits, level of nutrition, etc).
- B) *Information about farm management and production programmes:* This includes the following.
- i) Total area under cultivation in the village.
 - ii) Size of an average agricultural holding.
 - iii) Types and quality of crops grown and types and quality of live-stock.
 - iv) Soil types and problems connected with soil fertility, soil erosion, drainage, etc.
 - v) Cattle feed (feed rations and crops grown as cattle feeds, etc.)
 - vi) Utilization of grass land (arrangement for cattle grazing and grass land improvement).
 - vii) Disease and pest control (important diseases and pests, and their control measures).
 - viii) Agricultural machinery (types of traditional and improved agricultural implements used, etc.).
 - ix) Irrigation resources (types of irrigation sources and problems) and drainage.
 - x) Financial position of the farmers (long and short-term debts, borrowed capital, etc.).

- xi) Credit facilities (sources and facilities of securing credit).
- xii) Position of labour (problems of farm labour, landless labour in the village).
- xiii) Marketing facilities.

The data can be collected by the village level extension workers from the villagers themselves, from the local institutions and from the revenue records. Reliance and adequacy of the data about factual situations are very important considerations in building sound programmes at the family, village and block levels.

It is very important that persons such as the Village level Workers, Extension Officers and Block Development Officers engaged in developing the extension programme strengthen the local institutions like the panchayat, the co-operative society, the school and the rural youth club by collecting the factual data through them and using them for building the programme at the family, village and Block levels. The workers should develop local leadership in such a way that the villagers and the local institution are able to recognize and select problems for action on a priority basis. Thus, it is desirable that the essential factual data collected by these workers is passed on to the village panchayat or Block panchayat samithi for review and action in deciding which problems of the village or Block should be tackled first. Facts and outlook (trends) at the national and state levels should also be considered in this context, in addition to those pertaining to the local level.

- 2) **Determination of needs and objectives:** It is essential in the programme planning process that before deciding on the projects to be undertaken, the basic objectives of the programme are determined by the villagers in consultation with the extension staff. This means that the villagers must have a very clear understanding of their needs and problems and of the project as well so that they are able to set up appropriate objectives for village programmes. Objectives of the programme can be decided upon by the head or active member of the participating family for family plans, and by the village panchayat in the case of activities to be undertaken on a community or village basis. Service co-operatives operating in villages should also take upon themselves the responsibility for deciding the objectives of the programme which promote welfare of rural children, youth and women. In arriving at the objectives for village programmes, the villagers and leaders of the local institutions should take the advice of the extension workers. In many cases, the objectives of the programme may not be clear to the villagers. In such situations the extension staff may give a lead to the villagers in determining the specific objectives. The objectives should specify the behavioural changes in people, besides the social and economic changes aimed at and also satisfy the other criteria.
- 3) **Definition of Problems:** In the process of programme planning at the family, village or Block level, it is desirable that village activities are properly classified. This will give an opportunity to the planner and the participants to assess their potentialities and capabilities for executing the programme. Generally in villages, such problems can be classified into the following categories:

- i) Problems which can be solved by the villagers with their own resources, like improving yields by adopting improved methods of agricultural production, improving the manurial potential by preparing compost manure, organizing Service Co-operatives, Rural Youth Clubs, Mahila Mandals, etc.
- ii) Problems that need community cooperation without involving much outside assistance, like the construction of a village approach road by a voluntary effort, improving village drainage, deepening of tanks, afforestation of common land, etc.
- iii) Problems that require assistance from outside sources on account of high costs involved and the technical knowledge needed such as the construction of a school building, purchase and use of plant protection equipment, supply of fertilizers, construction of metal road, installation of pumping sets, construction of tube wells, etc.

If the villagers and the village institutions are able to classify their problems under such broad heads, it will be easy to plan a clear-cut programme for each individual family and the village. Under these conditions, the internal and external resources can be utilized economically and quicker results can be obtained. In the programme planning process, it is also desirable to break up the complex problems step-by-step into simple problems. For example, in the case of improving village sanitation, the first step can be to organize cleanliness drives periodically in the villages, then have a programme of soakage pits followed by a village drainage programme, etc.

- 4) **Finding solutions to problems:** The extension worker working at the village level and the Extension Officer working as a specialist at the Block level are two very important functionaries who can advise the village families and village institutions on their problems. It is of real importance that these functionaries have a clear understanding of the village problems and keep themselves equipped for offering solutions to the problems and present to them. They must consult their superior specialists on problems they are not able to handle themselves. The solutions offered should be practicable and economical and should result in satisfaction and learning. The best method of convincing the villagers is for the specialists to function in the programme as partners. Specialists at district and state levels who assist the Block level specialists must also be fully oriented and trained with an overall understanding of village problems and programmes.
- 5) **Selecting problems to be tackled with priority:** All the problems cannot be tackled simultaneously, even though the solutions for them are known. Therefore, it is necessary for the extension workers and the village institutions to select problems and concentrate their efforts on projects in a phased way. This will result in appreciable achievements and convince the village people about the utility of the programme. Sporadic efforts sometimes do not end in lasting and convincing impressions on the minds of rural people. Care, therefore, must be exercised by programme committees set-up at village and Block levels to review the situation periodically for determining how much progress has been made on projects under way, which projects are complete and which new projects may be initiated. This would provide opportunities for selecting problems for programme planning in a more methodical and democratic manner.

- 6) **Annual plan of work:** Preparing annual plan of activities directed towards solving selected problems is an important step. A plan of work is the listing of activities by which the objectives already decided upon are to be achieved. It includes the methods of executing the programme such as demonstrations, discussion meetings, family contacts by the extension workers, etc. It indicates the places, timings and persons responsible for carrying out the programme along with the methods of evaluating the progress. Village panchayats, co-operatives, schools, rural youth clubs and individual families can prepare their own annual plans of work in a simple way. The extension agency may provide suitable proformas and guidance for preparing these. In the early stages, the initiative has to come from the extension agency itself in planning programmes because, in India, villagers and village institutions are not habituated to follow a systematic method of preparing annual plans of work. Based on family and village annual plans, it is easy for the Block Panchayat Samithi to prepare an annual plan of work for the entire Block on a realistic basis representing the needs of the villages/villagers.

An adequate training is required for the extension staff to acquire the necessary skills in developing programmes at family, village and Block levels in co-operation with people's institutions like the Panchayat Samithi, the village panchayat, the co-operative society and the village families. The training of the members of village Panchayat, service co-operative societies, rural youth clubs, and Panchayat Samithi will also form an essential element in the process of programme planning.

Each family can keep a simple register for maintaining the annual plan of work, while the Panchayats and co-operatives at the village level can maintain the annual plan of work for village development activities. At the Block level, the Panchayat Samithi can maintain the annual plan of work for the Block. For successful implementation of any programme it is desirable that planning is done well in advance. As the first step towards its implementation, a calendar indicating the activities to be carried out during each month should be prepared.

- 7) **Carrying out the plan:** The success of a programme depends on how well it is carried out. Immediate steps should be taken by the Village Development Officer and local institutions at the village level the Extension Specialist, the Block Development Officer and the Panchayat Samithi at the Block level, to phase every activity in a proper perspective, and arrange all things in time. Proper arrangements for the supply of fertilizers, equipment, credit, audio-visual aids and literature should be made much in advance. A training programme for specialized projects should be organized much ahead. Efforts should be made to select the best type of local leaders who can shoulder the responsibility and multiply the efforts of the extension agency. All steps in carrying out a programme should be discussed with the villagers and their consent obtained at appropriate periods so that a partnership in the programme is built-up and maintained. Steps for assistance and direction should be clearly stated so that there may be no confusion anywhere in launching the extension programmes.

If co-operation and coordination of the village and the Block level institutions with extension workers and the villagers are maintained in the process of

programme planning, the programme so developed will be more realistic and easier to implement. For imparting proper type of training to local leaders, farm leaders and members of panchayats and the Panchayat Samithi seminars should be arranged at village and Block levels.

- 8) **Continuous checking and evaluation of results:** An effective plan of work requires the keeping of adequate records of each activity as a basis for future evaluation. Evaluation of the activities should be undertaken jointly by the extension staff, the village institutions and the Panchayat Samithi. Each future programme should be based on the evaluation results of the previous one. Successful evaluation gives a correct direction to a programme. It should be remembered that evaluation is not mere recording of activities or achievements but is a process of comparing these results with the original objectives.
- 9) **Review of progress and projection of plans:** At the end of each cycle of the programme building process, the situation should be reconsidered in view of the changes in the social and economic levels of the people so that the whole process may begin again with new or modified objectives. Village institutions like the Panchayat, the co-operative and the school and also the Panchayat Samithi should periodically review the progress of plans in co-operation with the staff members of the Block. Programmes which have created an impact on the people and are being accepted by them should be extended to the neighbouring areas where similar agro-climatic and socio-economic conditions occur. Research should be conducted on the programmes which are not being accepted by the people and the reasons for their failure should be ascertained.

Programmes should never be considered as ends in themselves. They are merely tools for doing more effective work. A proper adjustment of time and energy spent in preparing a programme has always to be maintained with the actual implementation of the programme in the field. It should be noted that evaluation, decision, planning and action take place continuously and in varying degrees throughout all steps of the programme-building process.

Check Your Progress

- Notes: a) Space given below the question is for writing your answer.
b) Check your answer with the one given at the end of this unit under "Answers to 'Check Your Progress' Questions."

- 5) What are the principles of extension programme planning?

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6) What are the steps involved in programme development process?

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13.3 CREATING EXTENSION PROGRAMMES WITH THE PEOPLE'S PARTICIPATION: A RATIONALE

Planning is currently recognized not only as a process but also as a social practice. As a process, it is seen as a dynamic effort evolving around problems and implying decisions and actions to achieve goals. As a social practice, it implies a negotiation of interests and the construction of some type of working platform involving different actors such as researchers, subject-matter specialists, rural leaders, representatives of farmers' associations and groups, and so on. "Negotiation" emerges as a key word in current views (Cervero and Wilson, 1994; Sadowske, 1991). That means, more and more programme development is seen as a democratic exercise, implying a dialogue around issues like the following:

- How can a given situation be described and analysed?
- What are the major problems, needs, and expectations?
- What are the alternatives to solve the problems?
- What kinds of resources, information and technologies are required?
- What projects and activities should be implemented?
- When? How? Where? By whom?
- How should evaluation be seen?
- Who should do it and when?
- How and by whom will the programme be managed and controlled?

Democratic planning of extension work implies open discussion of these questions, not necessarily in any exact order, but usually in some kind of iterative way, going back and forth in successive approximations.

Participation of men and women farmers, rural leaders and networks (both formal and informal), community groups, and other development institutions becomes a critical issue requiring creative approaches and continual efforts. The majority

of farming and rural populations, often representing the largest share of production and in words considered central to development, are not actively and systematically brought into the process. It is known that extension work overlooks women and is mostly dedicated to a minority of progressive and large farmers who tend to be relatively well-off. These farmers have more power to influence the system, serve many times as privileged linking elements between the village and government agencies, are actively involved in organizations, and are capable of attracting a good share of project benefits. On the other side, it is also known that often small and medium farmers lack the time, money and motivation to participate. They feel powerless, and very often local history is not encouraging and supports the view that their participation is politically risky.

To summarize, democratic planning of extension work implies:

- A broad understanding of participation, implying the involvement of different groups and organizations in various programme development stages and activities at the decision-making level.
- A different view of rural people and an attitude of respect and humility regarding their knowledge and experience.
- A close attention to the way power is shared and distributed among different social groups, local and regional networks, segments of the population, and between the national and regional power holders (political leaders and parties, for instance).
- An understanding of the way decision-making power is distributed in the official structures or among others dealing with people and development at different levels.
- A recognition of the fact that in any situation, even in small rural communities, the existing needs, interests and aspirations are not homogeneous.
- A clear perspective about the advantages and problems associated with participation.

This rationale is not only politically and ethically sound, because people should be respected and participation is today seen as a basic need and a human right, but it is also economically justified, because experience shows that project success and long-term sustainable results require people-centered approaches.

13.3.1 Five Essential Elements to Promote Participation of People in Extension Programmes

Participatory planning is not a linear, sequential activity. Globally, this is a dynamic and continual process evolving in a succession of actions and cycles. In each step, a number of actors intervene, and planners act as facilitators enabling active participation and ensuring the quality of the outcomes. The adoption of a strategy to promote participation is a critical aspect. In this regard, experience shows, that five major interrelated elements are essential (Bryant and White, 1982; Cernea, 1992):

- 1) Keep extension projects simple and manageable.
- 2) Differentiate various groups in the project area.
- 3) Work with different types of organizations.

4) Take advantage of all possible methods and techniques.

5) Improve people's capacities to participate.

1) **Keep Extension Projects Simple and Manageable:** It is known that small projects developed at the local level which imply relatively simple skills, provide direct benefits to participants and build on self-help arrangements have better chances of mobilizing people's attention and active involvement (Bryant and White, 1982, p.218). When projects are larger and more complex, for instance at the regional or provincial level, the task can be more difficult, but ways can be found to generate participatory dynamics, including decentralization mechanisms that allow a greater input to local extension units and working with rural organizations and groups at different levels.

2) **Differentiate Various Groups in the Project Area:** How can we assure that the needs of particular groups such as landless farmers or poor women are reflected in the extension programming process? The answer to this question implies a clear identification of groups in the project area. In effect, "farmers" or "the rural population" are often taken as the "target group" without any further specification and assume it is a homogeneous group, which does not exist in reality. So identification of specific groups and subgroups to reach and work with becomes a critical element in a participatory planning process. Identification can be accomplished in different ways. Albrecht, et al. (1989, pp.48-49) suggest three common approaches:

i) Classification of holdings according to size, socio-economic features (e.g., full-time employment, extra income, a second job), and production structure (land-use system; management system, etc.). This approach usually requires extensive surveys, which are costly and time-consuming.

ii) Building on local common distinctions: it is simpler and more practical to classify groups according to distinctions that already exist in a particular society. They are less artificial and a more faithful reflection of the problem situation from the angle of the population. The use of key-informant interviews or group discussions is usual procedures in this case.

iii) A third approach, complementary to the previous ones, can be the identification of existing community organizations, looking at membership and leadership, the roles they play, and assessing the kinds of interests they defend and the extent to which they serve particular segments of the local society (Verhagen, 1987, p.1079). This leads us directly to the third element.

3) **Work with Different Types of Organizations:** It is widely recognized that some form of organization is essential to facilitate participation. For instance, Oakley and Marsden (1984, p.69) summarized the methodological approaches to participation in various cases in Brazil, Senegal, Bangladesh and India, and in all of them the formation and role of groups emerge as a crucial aspect. In this regard, four specific recommendations seem important:

i) Working with a wide variety of organizations increases the chances of reaching a wider spectrum of people. The institutional map needs to be done, because in most situations different sorts of organizations exist —

cooperatives, commodity groups, irrigation and credit associations, youth or women's clubs, village committees, leisure and cultural groups, development associations, and others — with a variety of labels and structures representing diverse interests and objectives and working at the local, regional or national levels.

- ii) It is important to consider and work with existing organizations. Indigenous ones in particular, as stressed by Bryant and White (1982, p.129), are an important resource because of their cohesiveness and reliance on mutual trust.
- iii) Creating new organizations is important in many circumstances. In this case, the process should be educational. The concerned people have to feel the need to be organized and have to devise their own objectives and forms of action. A process of reflection, discussion, and decision-making is usually necessary (Korten, 1980). Extension workers and change agencies should be ready to encourage and help, provide counseling and training and facilitate contacts and access to similar experiences.
- iv) In any situation, it is important to analyze the interests represented by existing organizations and their degree of power and influence. In many cases, they are led by better-off farmers or representatives of elite groups and are not at all a reliable support to a participatory strategy aimed at the interests of different groups and attempts to reach the disadvantaged.

Still, in relation to this element of the overall strategy, it must be stressed that the work with advisory committees or councils of different sorts has proven to be advantageous (Albrecht, et al., 1999; Boyle, 1981; Hemp, Kaczor, and Zwilling, 1983). Such organizations involve a small group of selected individuals, usually between twelve and fifteen, and help extension in various ways regarding the development efforts within a given area, being a specific means to assure formal participation in programme development.

4) Take Advantage of all Possible Methods and Techniques: In any situation, either with favourable or unfavourable institutional scenes, something can always be done so that extension programmes are responsive to the local needs and concerns. Some alternatives are the following:

- Conducting community surveys, contacting specific groups, and administering questionnaires at extension meetings, training courses, or other types of public events.
- Collecting information from key informants and other knowledgeable individuals as well as from formal and informal group discussions and meetings at the village or other levels.
- Deliberately contacting hard-to-reach groups and others with less power and visibility that are normally not involved in extension work.
- Obtaining public input through interactive radio or television programmes.
- Communicating with other services in such fields as education and health and exchanging information, experiences and views.
- Keeping a permanent record of needs, concerns, views, values and customs.

5) Improve People's Capacities to Participate: This implies, among other things, education and training. On the extension service side, agents and other officers frequently lack the skills to work with rural people in an interactive manner. Their training is often narrow and stresses the acquisition of technical knowledge and abilities. In-service training may be required so that extension people learn how to act as helpers and facilitators of participation in the different programme phases and moments.

Concerning rural people, and farmers in particular, it is important to act in such areas as education and leadership development. The acquisition of literacy skills, communication abilities and organizational and leadership capacities is vital for establishing strong local institutions and for promoting conscientious and self-sustained problem-solving efforts. As Albrecht, et al. (1989, p.182) underlined, training can increase the efficiency of local organizations, make them assume more responsibilities, and acquire political weight ensuring that their members' interests are taken into account at higher levels. These and other ideas can form the basis of an action plan to create extension programmes with the people, including the following dimensions:

- Change or adjust extension's organizational structure and management in order to favour an internal climate of dialogue, cooperation, and creativity conducive to participatory planning.
- Maintain open communication channels within the extension service, with other related services, and with all involved institutions in order to facilitate a rapid exchange of ideas and joint decision-making.
- Plan for the development of attitudes, knowledge, and capacities essential to promote participation and provide training to extension people and rural citizens.
- Concentrate attention and efforts on small local extension programmes.
- Differentiate groups at the programme area, and understand the diversity of needs, concerns, ideas, potentials and obstacles.
- Consider and work with different types of organizations, formal and informal, to ensure programme quality and responsiveness.
- Establish interlocking advisory committees at the necessary levels and programme areas, and work with them actively throughout the project cycle.
- Use all possible mechanisms to obtain citizens' input.

Creative programme development practice, thus, requires permanent attention to the integration of planning, implementation and evaluation stages and activities, demanding an attitude of cooperation from the concerned actors and often the assumption of interchangeable roles and functions. Otherwise, blueprint or centralized approaches will determine extension practices.

13.4 LET US SUM UP

In this unit, we have discussed the concepts used in programme planning and development as well as the nature, scope, principles and the process of programme planning and development. We have also discussed the five essential elements required to promote participation of people in extension programmes.

13.5 ANSWERS TO 'CHECK YOUR PROGRESS' QUESTIONS

- 1) *Planning* is a process which involves studying the past and the present in order to forecast the future and determine the goals to be achieved and the means to achieve them. Planning is designing a course of action to achieve ends. *Programme Planning* is a process of working with the people in an effort to recognize the unsatisfactory situation and determine possible solutions, objectives or goals. Programme planning is a process of bringing planned change in a situation.
- 2) The characteristics of programme planning process in extension are as follows:
 - Programme planning is an educational process and involves both teaching and learning.
 - Programme planning is an unifying and integrating process.
 - Programme planning is a coordinating process.
 - Programme planning is an evaluating process.
- 3) According to Kelsey and Hearne (1967) the objectives of programme planning are:
 - To ensure careful consideration of what is to be done and why;
 - To furnish a guide or straight edge against which to judge all new proposals;
 - To establish objectives towards which progress can be measured and evaluated;
 - To give continuity particularly during changes in personnel;
 - To aid in the development of leadership;
 - To have a means of choosing a) the important from the incidental problems, and b) the permanent from the temporary changes;
 - To prevent mistaking the means for the end, and to develop both felt and unfelt needs;
 - To avoid wastage of time and money, and promote general efficiency;
 - To coordinate the efforts of different people working for rural development;
 - To encourage local people to give the extension workers more support by, thus ensuring cooperation and financial support; and
 - To have available in written form a statement for general public use.
- 4) Following are the important assumptions kept in mind while planning and developing an extension programme:
 - Planned change may be an important factor for the social and economic progress of rural communities and families;
 - Extension service providers/agents must not act mechanically and without a vision;

- Extension programmes can contribute significantly to learning, educational improvement and development;
 - It is possible to select, organize and manage programmes that contribute to change and development;
 - Extension educators, as change facilitators, can help individuals, families and communities to reflect upon their realities and build relevant programmes, thus improve the quality of their life.
- 5) Principles of extension programme planning are as given below.
- Extension programmes should be based on an analysis of the past experiences, present situation and future needs.
 - Extension programmes -- should have clear and significant objectives which could satisfy important needs of the people.
 - Extension programmes should fix up priority on the basis of available resources and time.
 - Extension programmes should clearly indicate the availability and utilization of resources.
 - Extension programmes should have a general agreement at various levels.
 - Extension programmes should involve people at the local level.
 - Extension programmes should involve relevant institutions and organizations.
 - Extension programme should have definite plan of work.
 - Extension programmes should provide for evaluation of results and reconsideration of the programme.
 - Extension programmes should provide for equitable distribution of benefits amongst the members of the community.
- 6) Steps involved in programme development process are:
- a) Collection, analysis and evaluation of data;
 - b) Determination of objectives;
 - c) Definition of problems;
 - d) Finding solutions to problems;
 - e) Selecting problems to be tackled;
 - f) Annual plan of work;
 - g) Carrying out the plan;
 - h) Continuous checking and evaluation of results;
 - i) Review of progress and projection of plans.

13.6 REFERENCES

- Adivireddy, A. 1997. *Extension Education*. Bapatla, A.P.: Sri Lakshmi press.
- Albrecht, H., Bergman, H., Diederich, G., Grober, E., Hofman, V., Keller, P., Payr, G., and Sülzer, R. 1989. *Agricultural Extension: Basic Concepts and Methods* (Vol.1). Eschborn: BMZ/GTZ/CTA.

- Boyle, P. G. 1981. *Planning better programs*. New York: McGraw-Hill.
- Bryant, C., and White, L. G. 1982. *Managing development in the third world*. Boulder, CO: West view Press.
- Cernea, M. 1992. "The Building Blocks of Participation: Testing a Social Methodology" (pp.96-108), in B. Bhatnagar, and A. C. Williams (Eds.). *Participatory Planning and the World Bank: Potential Directions for Change*, Washington, DC: World Bank.
- Cervero, R. M., and Wilson, A. L. 1994. *Planning for Responsible Adult Education*. San Francisco: Jossey-Bass.
- Forest, L. B., and Baker, H. R. 1994. In D. J. Blackburn, (Ed.), *Extension Handbook: Processes and Practices* (pp.86-99). Toronto, Canada: Thompson Educational Publishing.
- Hemp, P., Kaczor, C., and Zwilling, A. 1983. *Course of Study: Citizen's Advisory Councils in Education*. Champaign, IL: University of Illinois, Department of Vocational and Technical Education.
- Kelsey, L. D., and Hearne, C. C. 1967. *Co-operative Extension Work*. Ithaka, New York: Comstock Publishing Associates.
- Koehnen, T. L., Portela, J., and Cristóvão, A. 1993. "Bilateral Curriculum Development for Assistance in Food Security in Lusophone Africa", in A. Bonano (Ed.), *The agricultural and food sector in the new global era* (pp.195-212). New Delhi: Concept Publishing.
- Korten, D. C. 1980. Community organization and rural development: A learning process approach, *Public Administration Review*, 40 (Sept.-Oct.), 480-512.
- Leagans, J, P. 1961. *Extension Education in Community Development*. New Delhi: Directorate of Extension, Government of India.
- Oakley, P., Marsden, M. 1984. *Approaches to Participation in Rural Development*. Geneva: International Labor Office.
- Sadowske, P. S. 1991. *Towards Futuristic Program Planning in Adult Education*. University of Wisconsin-Madison: Unpublished doctoral dissertation.
- Sanders, H. C. 1968. *The Cooperative Extension Service*. New Jersey, USA: Prentice Hall Inc.
- Verhagen, V. 1987. *Self-help Promotion: A Challenge to the NGO Community*. Amsterdam: CEBEMO/Royal Tropical Institute.

Suggested Readings

- Dahama, O. P., and Bhatnagar, O. P. 2007. *Education and Communication for Development*. Mumbai: Oxford and IBH Publishing Co.
- Jalihal, K. A., and Veerabhadraiah, V. 2007. *Fundamentals of Extension Education and Management in Extension*. New Delhi: Concept Publishing Company.
- Ray, G. L. 2007. *Extension Communication and Management*. Kolkata: Naya Prakash.
- www.fao.org/docrep/w5830e/w5830e09.htm.
- www.comp.dit.ie/.../L05extraSteps%20in%20Program%20Development%20-%20revision.pptmonarch.tamu.edu/d690/d690pdev.htm
- www.uwex.edu/ces/pdande/.

UNIT 14 CONCEPT AND THEORIES OF MANAGEMENT: THEIR RELEVANCE TO EXTENSION

Structure

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- 14.1 Objectives
- 14.2 Need, Concept and Principles of Management: Their Relevance to Extension
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 - 14.2.2 Concept of Management
 - 14.2.2.1 Management as a Science
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- 14.5 Let Us Sum Up
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14.0 INTRODUCTION

In Unit 13, you have learnt about the nature, objectives, scope, principles and process of planning and developing an extension programme. Planning and developing an extension programme requires managerial skills on the part of an extension educationist when he/she has to involve in such an exercise.

Management is an exciting subject because it deals with setting, seeking, and reaching objectives of an organization, an enterprise, a programme or a project. We are all managers of our own lives, and the practice of management is found in every facet of human activity: schools, businesses, churches, government, unions, armed forces, families, etc. Establishing and achieving objectives are challenging and rewarding missions for any enterprise, and these missions face many managerial hurdles that are to be overcome for success of the organizations.

A manager's role extends beyond setting the goals to mobilize and utilize the resources — men, materials, machines, methods, money and markets — to accomplish the desired results within predetermined constraints of time, effort, and cost. All these have great relevance to the field of extension education and development.

14.1 OBJECTIVES

In this unit, we attempt to present you the concept, characteristics and theories of management and their relevance to extension educators. After going through this Unit, we expect you to be able to:

- Explain the concept of management and the underlying principles;
- Describe the nature and characteristics of management;
- Discuss the theories of management and their relevance to extension education and development; and
- Apply the concept, theories and practices of management in the field of extension education and development.

14.2 NEED, CONCEPT AND PRINCIPLES OF MANAGEMENT: THEIR RELEVANCE TO EXTENSION

We will first highlight the need for knowing about the management and its relevance to extension.

14.2.1 Why Study Management?

Some form of management exists in every type of human organization. We are all affected by good or bad management practices at home, in the society, in an organization, in the nation and the world. We should therefore learn to recognize and promote the quality of management.

Management plays crucial role in the establishment and accomplishment of many social, economic and political goals in any country. Improving social standards and achieving more efficient and effective government for making a better economic life possible are challenges to modern managerial ability. Such management is vividly illustrated in the case of the oil-rich countries of the Organization of Petroleum Exporting Countries (OPEC). With their vast and relatively new financial resources, the political managers of these countries are importing American and European technology and management practices to overhaul and upgrade the standard and style of living of their entire population (Drucker, 1954).

Management makes human efforts more productive. It brings better projects, plants, equipment, officers, products, services and human relations to our society. Improvements and progress are its constant watchwords. Management brings order to endeavors by combining isolated events and disjointed information into meaningful relationships. These relationships then work to solve the problems and accomplish the goals. The knowledge of these management aspects will, thus, be useful to the personnel of the extension programmes in effectively achieving the set targets.

14.2.2 Concept of Management

Different people have conceived and defined management in different ways. Probably the one that is most simple, popular and often quoted by many in general is “getting things done through other people.” Let us now look at different definitions that highlight important aspects of management.

Management is a distinct process consisting of activities of planning, organizing, actuating and controlling, performed to determine and accomplish stated objectives with the use of human beings and other resources (Martin, 1977). But, the essence lies in determining worthwhile goals and carefully selecting and utilizing resources through efficient and effective planning, organizing, actuating, and controlling. Keeping in view the required time, good judgment, determination and lots of practice.

There is no substitute for good management. Daniel (1976) has said that “good management is merely the exercise of common sense and the Golden Rule.” The problem with this definition is that good sense is not so common as one might wish, and “whoever owns the gold, makes the rules” in most organizations – for better or for worse. From time to time, gadgets and shortcuts are offered to replace established, proven management practices. But, at best they only assist rather than replace good management.

The six Ms (money, men, materials, methods, machines and marketing) of management or the basic resources, as they are often called, are subjected to the fundamental functions of management – planning, organizing, actuating, and controlling – to achieve stated objectives.

There have been attempts to conceive management in terms of disciplines. One view is that management is an art struggling to become a science. Others contend that the formal study of management began as a science but has been contaminated by too many factors from various disciplines, thus making it at best a “soft” science. Hence, some call it an art while others treat it as science. Actually, management is an eclectic discipline with elements of art and science, as any practicing manager will confirm.

With the above broad conceptualization, let us now examine the following specific characteristic conceptions of the term ‘management’.

14.2.2.1 Management as a Science

There is a body of objective yet incomplete knowledge that is believed to be the best thinking on the subject of management. Management science is a body of systematized knowledge accumulated and accepted with reference to the understanding of general truths concerning management.

Management science is neither so comprehensive nor accurate as a physical science such as maths or chemistry. Physical sciences deal with non-human entities, and it is the inclusion of the human element that raises questions in some minds about management qualifying as a pure science. Different people will not think, act or react in the same manner under identical circumstances. Therefore, management will never become as pure a science as the physical sciences, but great strides have been made in systematizing knowledge and generalizing certain truths. Management indeed is a social science term that accurately describes its true nature (Gulick, 1964).

14.2.2.2 Management as an Art

The art of management is a personal creative power plus skill in performance. The contemplation of problems, events and possibilities develops personal creative power, while experience, observation and study of results contribute to skilled performance. In other words, management art involves envisioning an orderly whole from chaotic parts, communicating the vision, and achieving the goal. It is the “art of arts” because it organizes and uses human talent (Boehringer, 1975).

14.2.2.3 Science and Art of Management

If science teaches one to know, art teaches one to do. Managers to be successful have to know and do things efficiently and effectively, so they are indeed a unique scientific and artistic combination in practice. The old saying “knowledge is power” is true only in its application. This is so because all of us know that these are people who are very intelligent but lazy and unwilling to apply their knowledge to solving problems and accomplishing objectives.

In a sense it can be said that the art of management begins where the science of management stops. Facts are first used; “the known” are given preference, and data on tangibles are considered. The scientific aids are pursued to their limits, but in a given case they may seem inadequate. It is then that the manager must turn to artistic managerial ability to perform a job. Deciding to move ahead at one particular time rather than at another times or to act even though all desirable data are lacking show the ingenuity and involvement of the art of management.

14.2.2.4 Management as a Profession

Since the emergence of separation of management from ownership, the management is being taken as a profession. Actually, it satisfies all the conditions of a profession — It has a well defined body of knowledge. It requires formal training and it is being provided to new entrants. It has various representative bodies and the entrants are joining it as a career with the aim of serving the society, not for money making alone (Kumar, 1982, p.8).

14.2.2.5 Management is a Universal Process

The principles and the techniques of management are not applicable to only business but they have universal application. They can be applied to social, religious, charitable and non-profit organization also as the essence of management is integration of human and other resources in a manner that it leads to effective performance. And, this aim and process is universal. Management seeks to harmonise the individual efforts with organizational goals (Ibid).

Extension educationists and the personnel at different levels in the field of extension are, thus, the managers in their own rights and styles and are part of a management of extension and development.

Check Your Progress

Notes: a) Space given below the question is for writing your answer.

b) Check your answer with the one given at the end of this unit under
“Answers to ‘Check Your Progress’ Questions.”

- 1) What do you understand by ‘management’? What are the basic resources used in management?

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- 2) List out the characteristics conceptions of ‘management’?

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14.2.3 Principles of Management: Keys to Understanding Management

A principle can be defined as a fundamental statement or truth providing a guide to thought or action. The fundamental statement tells what results are expected when the principle is applied. Principles of management are to the manager as a table of materials’ strengths and weaknesses is to a civil engineer. The table gives fundamental truths, expressed as quantitative data based on years of experience and testing. The engineer can predetermine the safe, allowable load for a steel girder of a building simply by using the table and analyzing the design drawings and specifications. Similarly, management principles also have been developed from years of experience and testing, in public and private, in big and small organizations.

By using the management principles, managers can more easily achieve the objectives and avoid making fundamental mistakes in their activities. They are basic but not absolute. They are like working hypotheses that are reasonably

well established, accepted and used in many successful organizations. As more research is conducted, new principles will emerge, some management principles will be modified, and some others will be discarded as not truly representative of management practice today.

The principles emerge based on certain qualities/characteristics that have relevance to management theory and practice. Good management principles should be: i) *practical*, which means they can be applied almost anytime in the organization's life and be appropriate; ii) *relevant* to the broad forms of organizational structure; iii) *consistent* in the sense that for similar sets of circumstances, similar results will occur; and iv) *flexible* in that their application should take into account particular differences or changes in the conditions that affect the organization. For example, consider the statement: "For maximum managerial efficiency, total costs should be kept to a minimum". Although this is usually a valid principle for most organizations, it might be reassessed or abandoned in cases of emergency such as defending our country against a nuclear attack. The use of management principles is intended to simplify, guide and facilitate management work.

Therefore, the *management principles act as keys to what actions should be taken in what contexts and in what manner*. They provide the benchmarks from which one can further one's understanding of the subject and they can be viewed as capsules of what is believed to be major considerations in current management thought.

Given below are **the important principles of management** that will help you in using them as the keys for your better understanding of the management (Kumar, 1982).

- 1) ***Management is purposeful:*** Management deals with the achievement of something specific, expressed as an objective or goal. Managerial success is commonly measured by the extent to which objectives are achieved. Management exists because it is an effective means of getting needed work accomplished. The fact that some executives have subordinates reporting to them does not ipso facto make them managers.
- 2) ***Management makes things happen:*** Managers focus their attention and efforts on bringing about successful action. They know where to start, what to do to keep things moving, and how to follow through. Successful manager has an urge for accomplishment and the members of the group respect the manager and get along with people firmly expecting the best.
- 3) ***Management is an activity, not a person or group of persons:*** Management is not people; it is an activity like walking, reading, swimming, running or doing any specific activity. People involved in management can be designated as managers, members of management, or executive leaders who actually manage a distinct activity/activities. It can be studied, and the knowledge about an activity is obtained, and skill in its application acquired.
- 4) ***Management is accomplished by, with and through the efforts of others:*** To participate in management necessitates relinquishing the normal tendency to perform all things oneself and get tasks accomplished by, with and through the efforts of group members. This is far more difficult than it sounds.

Normally a person acquires ability in a specialized type of work and wins promotions through increasing knowledge and skill in that field of specialization. However, the time comes when further promotion requires shifting from the role of a specialist to that of a management member. The prime measure of success becomes setting or securing agreement on the proper goals and getting all others to accomplish these goals. How successfully this deliberate shift is made determines the potential of the new manager. This characteristic merits recognition by the ambitious specialist when he turns to be a manager. Likewise, the employee with expertise in training when advanced to assistant personnel manager may continue to be a training expert, thus not succeeding in the new managerial post.

- 5) ***Management is usually associated with the efforts of a group:*** It is common to associate management with a group. However, management is also applicable to an individuals' efforts as members of the group. For example, a person manages many personal affairs. However, the group emphasis stems from the fact that an enterprise comes into existence to attain goals, and these are achieved more readily by a group than by one person alone. People become members of an enterprise to satisfy their needs and because they feel their gains will outweigh their losses or burdens as members of a group.
- 6) ***Management is intangible:*** It has been called the unseen force, its presence evidenced by the results of its efforts – orderliness, enthusiastic employees, buoyant spirit, and adequate work output. Strange as it may seem, in some instances the identity of management is brought into focus by its absence or by the presence of its direct opposite, mismanagement. The result of mismanagement also becomes clear.
- 7) ***Management is an idea, not replaced by the computer:*** The computer is an extremely powerful tool of management. It can widen a manager's vision and sharpen insight by supplying more and faster information for making key decisions. The computer has enabled the manager to conduct analyses for beyond the normal human's analytical capacities. It has forced managers to reexamine their analytical processes and judgment in view of the almost unbelievable data processing and feedback facilities of the modern computer.

However, a manager must supply judgment and imagination as well as interpret and evaluate what the data mean in each individual case. For example, it is doubtful that General George Washington would have crossed the Delaware River if he had relied on a computer to help him decide. The data of using leaky boats at night during a snowstorm to face a numerically superior enemy would have indicated a low probability of success. However, despite such rationale, Washington believed he could succeed, seized the initiative, assumed the large risk, and won his objective.

- 8) ***Management is an outstanding means for exerting real impact on human life:*** A manager can do much to improve the work-environment, to stimulate people to do things better, and to make favorable actions to take place. Personal frustrations and disappointments need not be accepted and may be viewed passively as inevitable. A manager can achieve progress, bring hope, and help group members acquire the better things in life.

These principles of management will definitely help you as an extension educationist in applying the same in discharging your roles that you are expected to perform in extension and development. Further, your understanding of these principles will broaden your understanding of the theories of management that we discuss in the section that follows.

Check Your Progress

Notes: a) Space given below the question is for writing your answer.

b) Check your answer with the one given at the end of this unit under “Answers to ‘Check Your Progress’ Questions.”

3) List out important principles of management.

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14.3 APPROACHES TO MANAGEMENT THEORY: THEIR RELEVANCE TO EXTENSION

There are different thoughts of management. According to one school of thought, history has no relevance to the problems faced by the managers today. Some others think that the management theory is too abstract to be of any practical use. However, both theory and history are indispensable tools for managing contemporary organizations. “Within the practices of the past there are lessons of history for tomorrow in a continuous stream. We occupy but one point in this stream. The purpose is to present the past as a prologue to the future” (Daniel, 1976).

So, with the aim of accelerating the development of our management practice at present and for the future let us examine the stream of evolving management thought of the past and its relevance to the present and the future..

14.3.1 The Historical Context of Management

Management and organizations are products of their historical and social times and plans. So, we can understand the evolution of management theory in terms of how people had wrestled with matters of relationships at particular times in history. It is a fact that we can learn from the trials and tribulations of those who preceded us in steering the fortunes of formal organizations. By keeping in mind a framework of relationships and time, we can put ourselves in their shoes as

students of management. The following three forces had a major influence on the concept and evolution of management theory.

- a) **Social Forces:** These forces are the norms and values that characterize a culture. Early social forces allowed workers to be treated poorly. However, more recent social forces have provided for more acceptable working conditions for workers. Social forces have influenced management theory in areas such as motivation and leadership.
- b) **Economic Forces:** These are the ideas behind the concept of a market economy such as private ownership of property, economic freedom, competitive markets, and a limited role for government.
- c) **Political Forces:** Political forces such as governmental regulations play a significant role in how organizations choose to manage themselves. Political forces have influenced management theory in the areas of environmental analysis, planning, control, organizational design and employee rights.

The industrial revolution provided the impetus for developing various management theories and principles. Pre-classical theorists like Robert Owen, Charles Babbage, Andrew Ure, Charles Dupin and Henry R. Towne made some initial contributions that eventually led to the identification of management as an important field of inquiry. This led to the gradual emergence of approaches to management — classical, behavioral, quantitative and modern.

14.3.2 Classical Approach to Management Theory

Classical management thought can be divided into three separate schools — *scientific management*, *administrative theory* and *bureaucratic management*. Classical theorists formulated principles for setting up and managing organizations. These views are labeled “Classical” because they form the foundation for the field of management thought. The major contributors to the three classified schools of management thought viz. scientific management, administrative theory and bureaucratic management are Frederick W. Taylor, Henry Fayol and Max Weber respectively.

14.3.2.1 Scientific Management

Scientific Management became increasingly popular in the early 19th century. Scientific management has been defined as “that kind of management which conducts a business or affairs by standards established, by facts or truths gained through systematic observation, experiment or researching”. In other words, it is a classical management approach that emphasizes the scientific study of work methods to improve the efficiency of the workers. Some of the earliest advocates of scientific management were Frederick W. Taylor (1856-1915), Frank Gilbreth (1868-1924), Lillian Gilbreth (1878-1972) and Henry (1861-1919).

Taylor (1856-1915) felt that the soldering problems could be eliminated by developing a science of management. Scientific management approach uses scientific methods to determine how a task should be done instead of depending on the previous experiences of the concerned worker. Table given below presents the steps in scientific management.

Table 14.1: Steps Involved in Scientific Management

Step	Description
Step – 1	Develop a science for each element of the job to replace old rule of the methods.
Step – 2	Scientifically select employees and then train them to do the job as described in step-1.
Step – 3	Supervise employees to make sure they follow the prescribed methods for performing their jobs.
Step – 4	Continue to plan the work but use workers to actually get the work done.

In essence, scientific management as propounded by Taylor (1856-1915) emphasizes:

- Need for developing a scientific way of performing each job;
- Training and preparing workers to perform that particular job;
- Establishing harmonious relations between management and workers so that the job is performed in the desired way.

The two major managerial practices that emerged from Taylor's approach to management are: the piece-rate incentive system, and the time-and-motion study.

Piece-rate incentive system: Taylor felt that the wage system was one of the major reasons for soldiering. To resolve this problem, he advocated the use of a piece-rate incentive system. The aim of this system was to reward the workers who produced the maximum out-put.

Time and motion Study: Taylor tried to determine the best way to perform each and every job. To do so, he introduced a method called "time-and-Motion" study in which jobs are broken down into various small tasks or motions and unnecessary motions are removed to find out the best way of doing a job.

After Taylor, Frank and Lillian Gilbreth made numerous contributions to the concepts of scientific management. Frank Gilbreth (1868-1924) is considered the "father of motion study". Lillian Gilbreth (1878-1972) was associated with the research pertaining to motion studies. Motion study involves finding out the best sequence and minimum number of motions needed to complete a task. Frank and Lillian were mainly involved in exploring new ways for eliminating unnecessary motions and reducing work fatigue.

Limitations of Scientific Management: Scientific Management has provided many valuable insights into the development of management thought. In spite of the numerous contributions it made, there are a few limitations of scientific management. These are as follows:

- The principles of scientific management revolve round the problems at the operational level and do not focus on the management of an organization from a manager's point of view. These principles focus on the solutions of problems from an engineering point of view.
- The proponents of scientific management were of the opinion that people were rational and were motivated primarily by the desire for material gain.

Taylor and his followers overlooked the social needs of workers and over emphasized their economic and physical needs.

- Scientific Management theorists also ignored the human desire for job satisfaction. Since workers are more likely to go on strike over factors like working conditions and job content rather than salary, principles of scientific management, which were based on the “national worker” model, become increasingly ineffective.

14.3.2.2 Administrative Theory

While the proponents of scientific management developed principles that could help the individual workers perform their tasks more efficiently, the administrative theory focused on principles that could be used by managers to coordinate the internal activities of organizations. The most prominent of the administrative theorists was Henri Fayol.

Henri Fayol (1849-1925), a French industrialist and a prominent European management theorist, developed a general theory of management. Fayol believed that with scientific forecasting and proper methods of management, satisfactory results were inevitable. Fayol was unknown to American managers and scholars until his most important work, “General and industrial management”, was translated into English in 1949. Many of the managerial concepts that we take for granted today were first articulated by Fayol.

According to Fayol the business operations of an organization could be divided into *six broad activities*.

- *Technical*: Producing and manufacturing products.
- *Commercial*: Buying, selling and exchange.
- *Financial*: Search for and optimal use of capital
- *Security*: Protecting employees and property.
- *Accounting*: Recording and taking stock of costs, profits, liabilities, maintaining balance sheets and compiling statistics.
- *Managerial*: Planning, organizing, commanding, coordinating and controlling.

Fayol focused on the last activity i.e. managerial activity. Within this, he identified *five major functions*: planning, organizing, commanding, coordinating and controlling. Fayol's five management functions are clearly similar to the modern management functions – planning, organizing, staffing and controlling. Fayol's concept of management forms the cornerstone of contemporary management theory.

Fayol outlined the following *fourteen principles* of management.

- i) *Division of work*: Work-specialization results in improving efficiency of operations. The concept of division of work can be applied to both managerial and technical functions.
- ii) *Authority and responsibility*: Authority is defined as “the right to give orders and the power to exact obedience.” Authority can be formal or personal. Formal Authority is derived from factors like intelligence and experience.

Authority and responsibility go hand-in-hand. When a manager exercises authority, he should be held responsible for getting the work done in the desired manner.

- iii) *Discipline*: Discipline is vital for running an organization smoothly. It involves obedience to authority, adherence to rules, respect for superiors and dedication to one's job.
- iv) *Unity of command*: Each employee should receive orders of instructions from one superior only.
- v) *Unity of Direction*: Activities should be organized in such a way that they all come under one plan and are supervised by one person.
- vi) *Subordination of the individual interest to the general interest*: Individual interests should not take precedence over the goals of the organization.
- vii) *Remuneration*: The compensation paid to employees should be fair and based on factors like business conditions, cost of living, productivity of employees and the ability of the firm to pay.
- viii) *Centralization*: Depending on the situation, an organization should adopt a centralized or decentralized approach to make optimum use of its personnel.
- ix) *Scalar chain*: This refers to the chain of authority that extends from the top to the bottom of an organization. The scalar chain defines the communication path in an organization.
- x) *Order*: This refers to both material and social order in organizations. Material order indicates that everything is kept in the right place to facilitate the smooth coordination of work activities. Similarly, social order implies that the right person is placed in the right job (this is achieved by having a proper selection procedure in the organization).
- xi) *Equity*: All employees should be treated fairly. A manager should treat all employees in the same manner without prejudice.
- xii) *Stability of tenure of personnel*: A high labor turnover should be prevented and managers should motivate their employees to do better job.
- xiii) *Initiative*: Employees should be encouraged to give suggestions and develop new and better work practices.
- xiv) *Esprit de corps*: This means "a sense of union". Management must inculcate a team spirit in its employees.

14.3.2.3 Bureaucratic Management

Bureaucratic management as one of the schools of classical management emphasizes the need for organizations to function on a national basis. Weber (1864-1920), a contemporary of Fayol, was one of the major contributors to this school of thought. He observed that nepotism (hiring of relatives regardless of their competence) was prevalent in most organizations. Weber (1915) felt that nepotism was grossly unjust and hindered the progress of individuals. He,

therefore, identified the characteristics of an ideal bureaucracy. Derived from the German 'bur', meaning office, referred to organizations that operated on rational basis. According to Weber, "a bureaucracy is a highly structured, formalized and impersonal organization. In other words, it is a formal organization structure with a set of rules and regulations".

The term "bureaucracy" is some times used to denote red-tapism and too many rules. However, the bureaucratic characteristics of organizations outlined by Weber have certain advantages. They help remove ambiguities and inefficiencies that characterize many organizations. In addition, they undermine the culture of patronage that he saw in many organizations.

14.3.3 Behavioral Approach to Management Theory

The behavioral school of management emphasized what the classical theorists ignored i.e. the human element. While classical theorists viewed the organization from a production point of view, the behavioral theorists viewed it from the individuals point of view — their attitudes, behaviours and group process in the work place.

The behavioral approach emerged primarily as an outcome of the Hawthorne studies. Many Parke Follet, Elton Mayo and his associates, Abraham Maslow, Douglas McGregor and Chris Argyris were the major contributors to this school. They emphasized the importance of the human element. These theories could easily be applied to the management of organizations.

Abraham H Maslow (1908-1970), psychologist, theorized that people were motivated by a hierarchy of needs. Maslow (1943) focused on human needs. His theory rested on three assumptions. *First*, all of us have needs which are never completely fulfilled. *Second*, through our acts we try to fulfill our unsatisfied needs. *Third*, human needs occur in the following hierarchical manner: i) physiological needs; ii) safety or security needs, iii) belonging needs or self-fulfillment needs. According to Maslow, once needs at a specific level have been satisfied, they no longer act as motivators of behaviors. Then the individual strives to fulfill needs at the next level. Managers who accepted Maslow's hierarchy of needs attempted to change their management practices so that employees' needs could be satisfied.

14.3.4 Quantitative Approaches to Management Theory

The management perspective emerged during the world war II. During the war, the army (in the U.S and U.K) brought together managers, government officials and scientists to help it deploy its resources more efficiently and effectively. These experts used some of the mathematical approaches to management devised earlier by Taylor and Gantt to solve the logistical problems encountered by the army during the war.

The quantitative approach to management includes the application of statistics, optimization models, information models and computer simulation. More specifically, this approach focuses on achieving organizational effectiveness through the application of mathematical and statistical concepts. The three main branches of the quantitative approach are: i) management science, ii) operations management, and iii) management information system.

- i) **Management science:** The management science approach stresses the use of mathematical models and statistical methods for decision-making. It visualizes management as a logical entity, the action of which can be expressed in terms of mathematical symbols, relationships and measurement data. Another name commonly used for management science is operations research. Recent advances in computers have made it possible to use complex mathematical and statistical models in the management of organizations. Management science techniques are widely used in the following areas.

Capital budgeting and cash flow management: It includes the following.

- Production scheduling.
- Developing product strategies.
- Planning for human resources development programs.
- Maintenance of optimal inventory levels.
- Aircraft scheduling.

Various mathematical tools like the waiting-line theory or queuing theory, linear programming, the Program Evaluation Review Technique (PERT), the critical path method (CPM), the decision theory, the stimulation theory, the probability theory, sampling, time series analysis, etc., have increased the effectiveness of managerial decision-making. To apply a quantitative approach to decision-making, individuals with mathematical, statistical, engineering, economics and business background and skills are required. Since one person cannot have all these skills the quantitative method requires a team approach to decision-making. This approach has been criticized for its overemphasis on mathematical tools. Many managerial activities cannot be quantified because they involve human beings who are governed by many irrational elements as well.

- ii) **Operations Management:** Operations management is an applied form of management science. It deals with the effective management of the production process and the timely delivery of an organization's products and services. Operations management is concerned with: i) inventory management, ii) work scheduling, iii) production planning, iv) facilities location and design, and v) quality assurance. The tools used by operations managers are forecasting, inventory analysis, materials requirement, planning systems, networking models, statistical quality control methods, and project planning and control techniques.
- iii) **Management information systems (MIS):** Management information system focuses on designing and implementing computer-based information systems for business organizations. In simpler term, the MIS converts raw data into information and provides the needful information to each manager at the right time in the needed form.

14.3.5 Modern Approaches to Management Theory

Besides the classical and behavioral approaches to management, there are certain modern approaches to management, viz. the systems theory and the contingency theory. These two approaches have significantly shaped modern management thought and are discussed below.

14.3.5.1 Systems Theory

Those who advocate a systems' view contend that an organization cannot exist in isolation and that management cannot function effectively without considering external environmental factors. The systems approach gives managers a new way of looking at an organization as a whole and as a part of the larger external environment.

According to this theory, an organizational system has *four major components* inputs, transformation process, output and feedback. Inputs — money, materials, men, machines and market other informational sources – are required to produce goods and services. Transformation processes or throughputs, managerial and technical abilities are used to convert inputs into outputs. Outputs are the products, services, profits and other results produced by the organization. Feedback refers to information about the out comes and the position of the organization relative to the environment in which it operates.

The two basic types of the systems are *closed* and *open systems*. A system that interacts with this environment is regarded as an open system and a system that does not interact with its environment is considered a closed system. Frederick Taylor, for instance, regarded people and organizations as closed system. In reality, all organization are open systems as they are dependent on interactions with their outside environment, whether it is a new product decision or a decision related to the employees of the organization, the organization must consider the role and influence of environmental factors.

14.3.5.2 Contingency Theory

This theory is also known as the *situational theory*. It has been widely used in recent years to integrate management theory with the increasing complicity of organizations. According to this theory, there is no one best way to manage all situations. In other words, there is no best way to manage. This theory holds good for several management situations.

The contingency approach to management was developed by managers, consultants, and researchers who tried to apply the concepts of the major schools for management through real life situations. Managers, who follow this approach, make business decisions or adopt a particular management style only after carefully considering all situational factors. According to the contingency approach, “The task of managers is to identify which technique will, in a particular situation or under particular circumstances and at a particular time, best contribute to the attainment of management goals” (Fredrick, 1915).

Check Your Progress

Notes: a) Space given below the question is for writing your answer.

b) Check your answer with the one given at the end of this unit under “Answers to ‘Check Your Progress’ Questions.”

4) What are the forces that have influenced the concept and evolution of management theory?

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- 5) List out the broad approaches to the theory of management.

- 6) What are the principles of management as outlined by Fayol?

14.4 SOME IMPORTANT GUIDELINES FOR YOUR MANAGERIAL EXCELLENCE AND SUCCESS

Management offers abundant opportunities. The choice of careers is steadily broadening and covers a wide range of talent and ability. As an adult educator you will be interested in extending the benefits of education or research to the needy and deprived people in remote areas in tribal and rural areas, and urban slums, among others. You may choose any organization involved in adult education, extension education and/or development activities. Every major

activity in every organisation involves the management of personnel. Whether you become an academic or an administrator in an organization or a worker or a field functionary at any level in any field, the concepts and theories discussed above will be useful to you to adapt them to your work situations for your effective functioning and organizational management or administration. We hope this unit has provided you enough substance that will contribute to success in career of your choice. However, you may keep the following guidelines in mind for enhancing your success, more particularly when you get into a managerial position.

- 1) *Towards realizing the institutional or project/programme goals:* a) Know the goals of your organisation, the programme or the project; b) select effective subordinates; c) delegate by letting subordinates decide issues within their respective spheres of operation; and d) check to ensure that the results being obtained are satisfactory.
- 2) *About managing a team:* a) Select your group members carefully; b) motivate them; c) develop good communication; d) strive to attain effective interpersonal relationships; and e) minimize conflicts among the group members.
- 3) *About maintaining communication and human relations:* a) Strengthen human relations skills; b) learn to speak and to listen effectively; c) set high standards for proposed levels of achievement; d) examine the situations from the other person's viewpoint; e) become effective in decision-making; f) adopt a questioning attitude to discover and use new ideas; g) be a leader by getting involved in the action; h) view management as the opportunity to influence other people favorably; and i) evaluate what's achieved and, if necessary, take remedial action.
- 4) *About improving efficiency:* a) Spend time on matters that are really important; b) plan and follow through on programs; c) express personal feelings and understand the feelings of others; d) look for the best in others – not the worst; e) make sure each group member is assigned the work best suited for that person; f) encourage members to assume responsibility; g) appraise his or her own self and performance honestly; h) evaluate the group members consistently; i) keep expenditures at a minimum compatible with the service required; and j) increase personal overall knowledge.

14.5 LET US SUM UP

In this Unit we have presented you the broad picture of the concept, need, principles, and approaches to theories of management and how the knowledge of these would be helpful to you in your real life or career situations. We have highlighted the historical context of management touching upon diverse views of management — classical, behavioural, quantitative and modern approaches to the theory of management. Towards the end, we have provided you some important guidelines that can help you in your managerial excellence and success.

We hope that you would be in a position to apply this knowledge in your field and real life situations to manage the affairs successfully.

14.6 ANSWERS TO “CHECK YOUR PROGRESS” QUESTIONS

- 1) The concept of management: Management is a distinct process consisting of activities or functions of planning, organizing, actuating, and controlling, performed to determine and accomplish stated objectives with the use of human beings and other resources. The six Ms (money, men, Material, method, machine, marketing) of management, or basic resources, as they are often called, are subjected to the fundamental functions of management – planning, organizing, actuating, and controlling – to achieve stated objectives.
- 2) ‘Management’ is variously conceived by different people. However, the characteristic conceptions of management include the following.
 - i) Management as a science.
 - ii) Management as an art.
 - iii) Management as a science and art.
 - iv) Management as a profession.
 - v) Management as a universal process.
- 3) Important principles of management are listed below.
 - i) *Management is purposeful.*
 - ii) *Management makes things happen.*
 - iii) *Management is an activity, not a person or group of persons.*
 - iv) *Management is accomplished by, with and through the efforts of others.*
 - v) *Management is usually associated with the efforts of a group.*
 - vi) *Management is intangible.*
 - vii) *Management is an idea, not replaced by the computer.*
 - viii) *Management is an outstanding means for exerting real impact on human life.*
- 4) Management and organizations are products of their historical and social times and plans. Thus, we can understand the evolution of management theory in terms of how people have wrestled with matters of relationships at particular times in history. The following three forces had a major influence on the concept and evolution of management theory.
 - i) *Social Forces:* These are the norms and values that characterize a culture. Early social forces allowed workers to be treated poorly. However, more recent social forces have provided for more acceptable working conditions for workers. Social forces have influenced management theory in areas such as motivation and leadership.
 - ii) *Economic Forces:* These are the ideas behind the concept of a market economy such as private ownership of property, economic freedom, competitive markets, and a limited role for government.

- iii) *Political Forces*: Political forces such as governmental regulations play a significant role in how organizations choose to manage themselves. These forces have influenced management theory in the areas of environmental analysis, planning, control, organizational design and employee rights.
- 5) Following are the broad approaches to the theory of management.
- i) *Classical approach*: Classical theorists formulated certain principles for setting up and managing organization. The classical management thought can be divided into three theories — *scientific management*, *administrative theory* and *bureaucratic management*.
 - ii) *Behavioural approach*- The behavioral school of management emphasized what the classical theorists ignored, i.e. the human element. While classical theorists viewed the organization from a production point of view, the behavioral theorists viewed it from the individuals point of view — their attitudes, behaviours and group process in the work place. In this approach human needs were considered.
 - iii) *Quantitative Approaches*: The quantitative approach to management theory includes the application of statistics, optimization models, information models and computer simulation. More specifically, this approach focuses on achieving organizational effectiveness through the application of mathematical and statistical concepts. The three main branches of the quantitative approaches are: i) management science, ii) operations management, and iii) management information system.
 - iv) *Modern Approaches to Management*: Besides the classical and behavioral approaches to management, there are certain modern approaches to management viz. the systems approach and the contingency approach, which have significantly shaped modern management thought.
- 6) The fourteen principles of management as outlined by Fayol are given below.
- i) *Division of work*: The concept of division of work can be applied to both managerial and technical functions. Work specialization results in improving efficiency of operations.
 - ii) *Authority and responsibility*: Authority is defined as “the right to give orders and the power to exact obedience.” Authority can be formal or personal. Formal Authority is derived from factors like intelligence and experience. Authority and responsibility go hand-in-hand. When a manager exercises authority, he should be held responsible for getting the work done in the desired manner.
 - iii) *Discipline*: It is vital for running an organization smoothly. It involves obedience to authority, adherence to rules, respect for superiors and dedication to one’s job.
 - iv) *Unity of command*: Each employee should receive orders of instructions from one superior only.
 - v) *Unity of direction*: Activities should be organized in such a way that they all come under one plan and are supervised by one person.

- vi) *Subordination of the individual interest to the general interest*: Individual interests should not take precedence over the goals of the organization.
- vii) *Remuneration*: The compensation paid to employees should be fair and based on factors like business conditions, cost of living, productivity of employees and the ability of the firm to pay.
- viii) *Centralization*: Depending on the situation, an organization should adopt a centralized or decentralized approach to make optimum use of its personnel.
- ix) *Scalar chain*: This refers to the chain of authority that extends from the top to the bottom of an organization. The scalar chain defines the communication path in an organization.
- x) *Order*: This refers to both material and social order in organizations. Material order indicated that everything is kept in the right place to facilitate the smooth coordination of work activities. Similarly, social order implies that the right person is placed in the right job. This is achieved by having a proper selection procedure in the organization.
- xi) *Equity*: All employees should be treated fairly. A manager should treat all employees in the same manner without prejudice.
- xii) *Stability of tenure of personnel*: A high labor turnover should be prevented and managers should motivate their employees to do better job.
- xiii) *Initiative*: Employees should be encouraged to give suggestions and develop new and better work practices.
- xiv) *Esprit de corps*: This means "a sense of union. Management must inculcate a team spirit in its employees.

14.7 REFERENCES

- Boehringer, Henry, M. 1975. Is Management Really an Art?, *Harvard Business Review*, 53, January-February, 54-64.
- Dale, Ernest. 1964. "The Functional Approach to Management." in Harold Koontz (Ed). *Toward a Unified Theory of Management*. New York: McGraw-Hill.
- Daniel, A. Wren. 1976. *The evolution of management thought* (6th edition). Englewood Cliffs, NJ: Prentice-Hall.
- Donham, Paul. 1962. Is Management a Profession?, *Harvard Business Review*, 40, September-October, pp.60-68.
- Drucker, Peter. 1954. *The Practice of Management*. New York: Harper & Row.
- Fayol, Henri. 1949. *General and Industrial Management*. New York: Pitman Publishing, pp.14-16.
- Fredrick, H. 1915. *Management theory*. New Delhi: Zain books publisher.
- Gulick, Luther. 1965. Management is a Science, *Academy of Management Journal*, 8, March, pp.7-13.

Kumar, Pradeep. 1982. *Principles of Management*. Meerut: Kedar Nath Ram Nath & Co.

Martin, Richard. 1977. The Managers, *The Wall Street Journal*, April 18.

Maslow, A. 1943. *Motivation and Personality*. New York: John Wiley & Sons.

Mintzberg, Henry. 1975. The Manager's Job: Folklore and Fact, *Harvard Business Review*, July-August, pp.49-61.

Sayles, Leonard. 1970. Whatever Happened to Management?, *Business Horizons*, 139, April, pp.25-34.

Weber, M. 1915. *The Principles of Scientific Management*. New York: Harper & Row.

Suggested Readings

Barnett, Rosalind, and Renato Taguiri. 1973. What Young People think about Managers?, *Harvard Business Review*, 51(May-June): 106-16

<http://jeeves.coomerce.Adelaide.Edu.co/courses/mpp2/slides/management-theory.pdf>.

<http://www.amazon.com/evolution-Management-Theory-present-Future/dpl-the> Evolution of management theory; past, present and future.

<http://www.xtra.emerald n sight.com-Evolution of mgt theory>.

Koontz, Harold. 1961. The Management Theory Jungle, *Journal of the Academy of Management*, 4, no.3, (December): 174-88.

Stewart, Rosemary. 1974. The Manager's Job: Discretion vs. Demand, *Organizational Dynamics*, 2 (Winter), pp.67-80.

Van Der Merwe, Sandra. 1978. A Portrait of the Canadian Woman Manager, *Business Quarterly*, 43 (Autumn), pp.45-52.

UNIT 15 MANPOWER PLANNING AND PERSONNEL MANAGEMENT IN EXTENSION AND DEVELOPMENT

Structure

- 15.0 Introduction
- 15.1 Objectives
- 15.2 Manpower Planning in Extension
 - 15.2.1 Concept, Need and Significance of Manpower Planning
 - 15.2.2 Features, Process and Benefits of Manpower Planning
 - 15.2.3 Functionaries / Personnel involved in Manpower Planning
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 - 15.2.5 Manpower Planning in India
- 15.3 Personnel Management in Extension
 - 15.3.1 Concept, Features and Significance of Personnel Management
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15.0 INTRODUCTION

'Manpower' may be thought of as "the total knowledge, skills, creative abilities, talents and aptitudes of an organization's work force as well as the values, attitudes and benefits of individuals involved.... It is the sum total of inherent abilities, acquired knowledge and skills represented by the talents and aptitude of the employed personnel" (Mamoria and Gankar, 2009, p.58).

Of all the 'M's (men, materials, machines, methods and money) in management, the most important is "M" for men i.e. human resources or manpower. It is the most valuable asset of an organization, which controls all other resources. The manpower or human resources may be available in organized or unorganized sectors, employed or working at different levels - supervisors, executives, Government employees, "blue" and "white" collar workers, managerial, scientific, engineering, technical, skilled or unskilled persons involved in creating, designing, developing, managing and operating productive and service enterprises, and other economic activities or capable of employment. Manpower should be utilized to the maximum possible extent in order to achieve individual and organizational goals. An organization's performance and resulting productivity are directly

proportional to the quantity and quality of its manpower. Hence, the importance of manpower is to be realized for its efficient utilization (Ibid).

Thus an organization without good management is like a house built on sand. In this context, manpower planning and personnel management assume greater significance in an organisation, and more so in extension and development.

15.1 OBJECTIVES

In this Unit, we will discuss different aspects of manpower planning and personnel management and their relevance to extension and development. After going through this Unit, we expect you to be able to:

- Explain the concept and significance of manpower planning and personnel management in extension and development;
- Describe the functions, features and process of manpower planning and personnel management in extension;
- Describe different types of training for staff development in extension; and
- Analyse and apply different styles of management in the context of extension and development.

15.2 MANPOWER PLANNING IN EXTENSION

Extension of educational benefits to the diverse categories of needy sections of population calls for effective manpower planning. In this section, our focus will be on different aspects of manpower planning in extension.

15.2.1 Concept, Need and Significance of Manpower Planning

Manpower planning is a double-edged weapon. If used properly, it leads to the maximum utilization of manpower, reduces excessive labour turnover and high absenteeism; it improves productivity and aids in achieving the objectives of an organization.

- i) **Concept of Manpower Planning:** According to Geisler (1967), manpower planning -- including its forecasting, developing and controlling -- is the process by which a firm ensures that it has the right number of people and the right kind of people at the right places at the right time, doing work for which they are economically most useful. From this definition it is clear that manpower planning is a vital tool in the hands of management to control labour costs by avoiding both shortages and surpluses of personnel in an organization. In large organizations, this function is performed by the personnel department. Stainer (1969) defined manpower planning as: “a strategy for the acquisition, utilization, improvement, and preservation of an enterprise’s human resources. It relates to establishing job specifications or the quantitative requirements of jobs determining the number of personnel required and developing sources of manpower.”

Coleman (1970) has defined manpower planning as “the process of determining manpower requirements and the means for meeting those requirements in order to carry out the integrated plan of the organization”. It

is defined as “the process of determining and ensuring that the organization will have an adequate number of qualified personnel” (Dale S. Beach, 1980). Thus, manpower planning is the application of the planning concepts to human resources of business concerns.

Planning the necessary programmes of requirement, selection, training, development, utilization, transfer, promotion, motivation and compensation is essential to ensure that future manpower requirements are properly met. Thus, it will be noted that manpower planning consists in projecting future manpower requirements and development of manpower plans for implementation of the projections. This planning cannot be rigid or static; it is amenable to modification, review and adjustments in accordance with the needs of an organization or the changing circumstances.

Manpower planning can be either short-term or long-term. *Short-term manpower planning* is done to find a temporary match between the existing individuals and the *existing* jobs. It aims at quick removal of anomalies in postings and placements. *Long-term manpower planning* is done to find and promote a proper match between the present and the future jobs and their future incumbents.

ii) Need for Manpower Planning: Manpower planning is deemed necessary for all organizations for the following reasons:

- To carry on its work each organization needs personnel with the necessary qualifications, skills, knowledge, work experience and aptitude for work. These are provided through effective manpower planning;
- Since a large number of persons have to be replaced who have grown old, or who retire, die or become incapacitated because of physical or mental ailments, there is a constant need for replacing such personnel. Otherwise, the work would suffer;
- Manpower planning is essential because of frequent labour turnover which is unavoidable and even beneficial because it arises from factors which are socially and economically sound such as voluntary quits, discharges, marriage, promotions; or from factors such as seasonal and cyclical fluctuations in business which cause a constant ebb and flow in the workforce in many organizations;
- In order to meet the needs of expansion programmes human resource planning is unavoidable (it becomes necessary due to increase in the demand for goods and services with growing population, and rising standard of living requiring larger quantities of the same goods and services;
- The nature of the present workforce in relation to its changing needs also necessitates the recruitment of new labour. To meet the challenge of a new and changing technology and new techniques of production, existing employees need to be trained or new blood injected into an organization; and
- Manpower planning is also needed in order to identify areas of surplus personnel or areas in which there is a shortage of personnel. If there is a surplus, it can be redeployed; and if there is shortage, it may be made good.

- iii) **Significance of Manpower Planning:** Manpower planning is an important part of the overall planning of an organization. It is essential to put the plans of an organization into action for the accomplishment of its objectives. It provides enough opportunity for identifying and developing managers to move up the corporate ladder.

Manpower planning is one of the most pressing responsibilities of personnel management to attract and develop the required number of right personnel for manning various positions in the organization. Thus, planning for human resource requirements is useful in the following ways:

- It enables the organization to have the required personnel at various levels on a continuous basis so as to achieve economy and efficiency.
- It helps the organization to meet its changing requirements of personnel without any problem.
- It makes it easier to find replacements for top managerial positions as and when senior managers retire.

15.2.2 Features, Process and Benefits of Manpower Planning

The features, the process and the benefits of manpower planning are briefly presented below.

A) **Features:** The important features of manpower planning are as follows.

- Manpower planning is concerned with finding out the manpower requirements of the organization both in the right number and of the right kind.
- It is a comprehensive process relating to various aspects of manpower management.
- It takes into account the manpower required at a future date in the organization.
- It deals with effective utilisation of manpower by specifying the various factors to be considered in this respect.

B) **Process:** The process of manpower planning entails consideration of the following steps: i) Job analysis, ii) Skill inventory, iii) Personnel forecasting, iv) Employment plan, and v) Training and development of personnel.

- i) **Job analysis:** It is defined as a process of discovering, identifying and obtaining the pertinent information relating to the nature of a specific job in the organisation.

The process of job analysis involves collection and analysis of data pertaining to the specific jobs in terms of duties, responsibilities, skills, knowledge, etc. These data are classified on the basis of: a) job identification, b) nature of job, c) various operations involved in doing the job, d) personal attributes required to do the job, e) materials and equipment to be used in doing the job, and f) relation with other jobs.

This classification of data provides information relating to two basic things: the nature of the job, and the person performing the job. Hence, job description and job specification can be prepared for various positions.

- **Job description:** It describes a job and specifies the requirements of the job. The job analyst should determine the data to be recorded on the job description document. To make this document more meaningful, the personnel department may invite job description from workers, foremen and supervisors. This document usually contains matters relating to: a) job title, b) job location, c) job summary, d) duties to be performed, e) machines, tools and materials, f) nature of supervision, g) working environment, and h) relation to other jobs. Moreover, the job description document is highly useful to the management for conducting selection, training, performance appraisal, and job evaluation of personnel.
 - **Job specification:** It states the qualities needed in an individual to perform the job description successfully. It prescribes the qualities required for acceptable performance of a particular job such as formal education, experience, psychological attitude, physical measurements, etc. Thus, the qualities as assessed and recorded on the job specification document involve an element of subjectivity.
- ii) **Skill inventory:** It is also known as *manpower inventory*. It involves counting of the number of personnel in the organization and cataloguing their characteristics. Thus, it deals with the intangible items, unlike the normal inventory of tangible items such as raw materials, finished goods, etc. The process of manpower inventory usually consists of: a) names of personnel, b) cataloguing of factual information on each individual, c) systematic and detailed appraisal of these individuals, and d) detailed study of those individuals who have potential for development.
- iii) **Personnel forecasting:** It is a process by which the future personnel requirements of the organization are determined. This is known as *workforce analysis*. It involves many variables such as: a) composition of the present workforce, b) skill required in the potential new venture, c) future sales and service projections, and d) technological changes.
- iv) **Employment plan:** After personnel forecasting, the next phase is to chalk out a detailed programme of recruitment, selection, training and promotion of personnel in each department. This is how the personnel needs of various departments are met.
- v) **Training and development of personnel:** To develop managerial personnel, executive development programmes are organised for both new and old employees to give them the necessary training for learning new skills.
- C) **Benefits/Uses:** Given below are some important uses/benefits of manpower planning.
- Upper management has a better view of the human resources dimensions of business decisions;
 - Personnel costs may be less because management can anticipate imbalances, before they become unmanageable and expensive;
 - More time is provided to locate source talent;

- Better opportunities exist to include women and minority groups in future growth plans;
- Better planning of assignments to develop managers can be done;
- Major and successful demands on local labour markets can be made.

Manpower planning is practically useful at different levels (Narayan Rao, 2009).

- National level:* It is generally done by the Government and covers items like population projections, programme of economic development, educational facilities, occupational distribution and growth, industrial and geographical mobility of personnel.
- Sector level:* It may be done by the Government – Central or State – and may cover manpower needs of agricultural, industrial and service sectors, amongst others.
- Individual unit level:* It may relate to manpower needs for various departments and for various types of personnel in different units.

15.2.3 Functionaries/Personnel Involved in Manpower Planning

Manpower planning is the responsibility of both the line and the staff manager of the personnel department. The line manager is responsible for estimating manpower requirements. For this purpose, (s)he provides the necessary information on the basis of the estimates of the operating levels. The staff manager provides the supplementary information in the form of records and estimates. The staff manager is expected to: i) report about manpower utilization in the present and the past; ii) provide help and advise managers on the assessment of manpower utilization and to develop sources of information and techniques for purposes of comparison; iii) administer the procedure of forecasting or objective setting; iv) present the overall forecasts of departmental managers; and v) to advise line managers on forecasting techniques.

The responsibilities of the personnel department in regard to manpower planning have been stated by Geisler (1967) in the following words:

- To assist, counsel and pressurize the operating management to plan and establish objectives;
- To collect and summarize data in total organization terms and to ensure consistency with long-range objectives and other elements of the total business plan;
- To monitor and measure performance against the plan and keep the top management informed about it; and
- To provide for the research necessary for effective manpower and organizational planning.

At the end, it may be noted that all organizations - those that have a high labour turnover must systematically plan their short-term, medium-term and long-term manpower needs. These requirements need periodical reviews and adjustments to meet changing conditions.

15.2.4 Strategies for Manpower Planning

The objective of manpower planning is to maintain and improve the organization's ability to achieve its goals by developing strategies that will result in optimum contribution of manpower. For this purpose, Stainer (1969) recommended the following nine strategies for the manpower planners:

- i) They should collect, maintain and interpret relevant information regarding human resources;
- ii) They should report periodically manpower objectives, requirements and existing employment and allied features of manpower;
- iii) They should develop procedures and techniques to determine the requirements of different types of manpower over a period of time from the standpoint of organization's goals;
- iv) They should develop measures of manpower utilization as component of forecasts of manpower requirements along with independent validation;
- v) They should employ suitable techniques leading to effective allocation of work with a view to improving manpower utilization;
- vi) They should conduct research to determine factors hampering the contribution of the individuals and groups to the organization with a view to modifying or removing these handicaps;
- vii) They should develop and employ methods of economic assessment of manpower reflecting its features as income-generation and cost, and accordingly improving the quality of decisions affecting the manpower;
- viii) They should evaluate the procurement, promotion and retention of the effective human resources; and
- ix) They should analyze the dynamic process of recruitment, promotion and loss to the organization and control these processes with a view to maximizing individual and group performance without involving high cost.

15.2.5 Manpower Planning in India

Barring only a few big organizations manpower planning has never been seriously done by Indian organizations in the past. However in recent years, focus on manpower planning is increasing due to the following reasons.

- Widespread and rapid change in production technology is causing redundancies and necessitating retraining and redeployment of personnel.
- There is shortage of talented and skilled manpower.
- There is change in the profile of the work force in terms of age, sex, education and social background.
- There is demand for change in recruitment procedures from various pressure groups such as unions, politicians and sons of the soil.
- New laws are being enacted with regard to working conditions of weaker sections, women and children, casual and contract labour, handicapped and scheduled castes and tribes.

- Enormous increase in the number of applicants per vacant post is, on the one hand increasing the expenditure on recruitment and, on the other, making the lead time between receiving applications and recruiting individuals longer.
- Number of misfits who are unable to adjust in the new environment is increasing. Their dissatisfaction is usually finding expression in high rates of absenteeism and turnover.
- There is greater demand for internal promotions and career planning.
- Under the existing laws incompetent employees cannot be easily dismissed. Once recruited they become a permanent liability of the organization.
- Many Indian companies are restructuring their organization structures by thinning their management ranks and expanding their spans of control. Now, the thrust is to flatten layers, expand spans and transform the organizational pyramid from tall and narrow to short and wide.

All these aspects of manpower planning have equal relevance to extension and development.

Check Your Progress

Notes: a) Space given below the question is for writing your answer.

b) Check your answer with the one given at the end of this unit under “Answers to ‘Check Your Progress’ Questions.”

- 1) i) Define manpower planning and explain its significance.

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- ii) What are the salient features of manpower planning?

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iii) List out the steps involved in the process of manpower planning.

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iv) List out the benefits of manpower planning.

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15.3 PERSONNEL MANAGEMENT IN EXTENSION

Once the planned manpower comes into required places in the organisation, personnel management assume greater significance. We need to know about important aspects of personnel management so as to be able to understand its significance in the context of extension.

15.3.1 Concept, Features and Significance of Personnel Management

We will discuss the concept, features and significance of personnel management below.

A) Concept: Personnel management is a rapidly growing discipline. It is a science and an art for controlling manpower. The challenge of personnel administration/management is all about personnel – their development, well-being and satisfaction. It has been defined by some of the authorities on Personnel Management in the following manner.

- Personnel management “is the process of bringing people and organizations together for accomplishing the goals of each.” (Mamoria and Gankar, 2009).
- Personnel management is that part of the management process which is primarily concerned with the human constituents of an organization (Brech, 1972).
- Personnel management is the recruitment, selection, development, utilization and accommodation of human resources by organizations.” (French Wendell, 1974).
- The personnel function is concerned with the procurement, development, compensation, integration and maintenance of the personnel of an organization for the purpose of controlling towards accomplishment of the organizational goals (Flipppo Edwin, 1980).

Personnel management, therefore, is that phase of management which deals with the effective control and use of manpower as distinguished from other sources of power.

B) Features: The analysis of various definitions shows the following features of personnel management.

- *Universal application:* Personnel management has a universal application as it is a part of general management and has roots extending throughout and beyond each organization.
- *Managing people:* Personnel management covers all people including clerical staff, executives, and managers. Thus, it is concerned with managing everyone at work.
- *Concerned with employees.* Since personnel management aims at motivating employees for getting better results from them, it is concerned with employees both as individuals and in groups. It is also concerned with behavioural, emotional and social aspects of personnel.
- *Goal oriented:* Personnel management is goal-oriented as its object is to contribute to achievement of the organizational goals.
- *Continuous application:* Personnel management is not something to be used sparingly. Every manager is required to perform the personnel function on a continuous basis.
- *Development of human resources:* Personnel management is concerned with the development of human resources such as knowledge, capability, skills, potentialities and attaining and achieving employee goals, including job-satisfaction.

C) Significance: The institutional harmony is by far the greatest asset of an organization. It cannot be realized by sheer exercise of authority and enforced from outside. It should come voluntarily through some real common interests among management and the workers/employees.

One of the most significant factors for the success of an organization is the effective management of its people. Unless the right type of people are employed, there will be wastage of materials, time, efforts, money and energy. It is, therefore, important that the right people are recruited and developed in terms of their skills, knowledge and attitude.

Human factor plays a crucial role in the process of management which is the proper combination and application of five Ms, i.e., men, materials, machines, methods and money. Although all these Ms occupy a significant place in management, manpower is the most important and the foundation of every organization. This is made clear from the fact that the best raw-materials, the latest machines and equipment and the amount of capital invested would all remain idle if the workers are not willing to work. It is in fact said that all developments come from the human mind.

In brief, personnel management plays a crucial role in an organization as it helps in the following ways: i) It helps in attracting and retaining the best people in the organization, ii) It helps to motivate organizational members to do outstanding work, iii) It helps to identify the best people to man available jobs through appropriate recruitment and selection activities, and iv) It helps to develop individuals through performance appraisals and training.

15.3.2 Objectives and Functions of Personnel Management

Objectives and functions of personnel management largely determine the quality of the staff and their functioning.

A) Objectives: The basic goal of personnel management is to derive the 'best' out of the people through their wholehearted cooperation. In the light of this emerging trend, let's examine the following major objectives of personnel management.

- *Optimizing the utilization of organization's manpower:* The fundamental purpose of personnel management is the optimum utilization of the manpower to accomplish the goals of the organization. This helps to harness people's strengths and enhance productivity.
- *Maintaining a high morale:* Personnel management tries to prompt and stimulate employees to realize their potential. This ultimately helps to maintain and increase employees' morale.
- *Communicating personnel policies to all employees:* Personnel management is responsible for communicating with customers, non-customers, regulators and other external public for understanding their views of internal human resources.
- *Providing well-trained and well-motivated employees:* It is personnel management which is responsible for providing well-trained and well-motivated employees to the organization. For this purpose, the performance of the employees needs to be evaluated properly so that they can be remunerated on the basis of their contributions to the organization.
- *Developing desirable working relationships:* Personnel management is responsible for creating desirable working conditions so that congenial relationships can be developed among the members of the organization.

The above objectives can be accomplished through the following prerequisites: i) Recruiting right personnel in the right jobs at the right time, ii) Formulating sound organizational policies, iii) Maintaining sound industrial and human relations, and iv) Making the employees aware of the management's view that "people work with us rather than people work for us."

B) Functions: The functions of personnel management can be broadly classified into two categories. They are managerial and operative. These functions are briefly elaborated below. Thus, all managerial functions influence the operative functions.

i) Managerial Functions: These include the following.

- *Planning:* The personnel manager determines personnel programmes in advance. It comprises forecasting of personnel needs, changing values, attitudes and behaviour of employees and their impact on the organization.
- *Organizing:* The personnel manager organises certain personnel functions by establishing relationships among the employees for the attainment of the organizational goals.

- *Directing*: The personnel manager directs the activities of people of the department for getting its functions performed.
 - *Coordinating*: The personnel manager coordinates personnel management function with the other functions of management at different levels.
 - *Controlling*: Controlling helps the personnel manager to adjust the actions and operations in accordance with the pre-determined personnel plans and standards.
- ii) **Operative Functions**: These functions are related to specific activities of personnel management and include the following.
- *Employment*: It is concerned with securing and employing the right kind and number of persons necessary to accomplish organizational goals. It involves the functions such as job analysis, manpower planning, recruitment, selection, placement, induction, and so on.
 - *Development*: It is concerned with the human side of the organization and seeks to change attitudes, values, organization structures and managerial practices for attaining the enterprise goals. Here, the personnel department designs and runs appropriate training programmes for proper development of people at work.
 - *Compensation*: It is the process of providing adequate and equitable remuneration for persons working in the concern. It comprises job evaluation, wage and salary administration, incentives, bonus, fringe benefits, social security measures, etc. Factors such as basic needs of personnel, job requirements, legal provisions regarding minimum wage, capacity of the concern to pay, and the wage level of the competitors should also be borne in mind while the compensation of personnel is fixed.
 - *Integration*: The most important aspect of integration is communication. The personnel manager should establish a proper communication channel at all levels of the organization so that the grievances of personnel can be suitably redressed. This will ultimately help in achieving good industrial relations.
 - *Efficiency*: Workers should be provided with good working conditions which motivate them to not only maintain efficiency but also improve efficiency. These measures comprise health, safety and welfare of the workforce.

If managerial functions deal with planning, organizing, directing, coordinating and controlling the activities of an organization, the operative functions relate to procuring, developing, compensating, integrating and maintaining the workforce for accomplishing the goals of the enterprise.

15.3.3 Personnel Department and Role of Personnel Manager

There is a need for a department of personnel and a manager as its head, if the organisation is reasonably big involving many personnel. Even if the organisation is small with out a department of personnel, the function of a personnel manager does exist but the function is integrated into the overall functions of the organisal head at relevant unit level.

A) Personnel Department: The personnel management has gained a unique status in the modern industrial concerns. The personnel manager organises the personnel department which is generally assigned the operative functions of employment, compensation, training, etc. These functions are performed in consultation with the heads of other departments. The personnel department therefore helps the other departments to contribute towards organizational goals in the following manner.

- **As a specialist:** The personnel department should have staff relationship with other departments of the organization. It advises the management on all areas relating to the personnel management and industrial relations. Personnel department counsels and assists all the line managers in the organization. But, it is not responsible for the end results.
- **As a source of help:** The personnel department should earn the confidence of the line managers as a source of help when it is needed.
- **As a change agent:** The personnel department is generally more concerned with providing information and offering advice to the decision-makers rather than making decisions. The personnel manager should, therefore, be familiar with different disciplines such as management, technology, sociology, psychology and organizational behaviour in order to be able to provide the required information and infrastructure to the line managers.
- **As a controller:** Usually, the personnel manager helps and advises line managers in implementing their programmes and thus exercises the control function.

B) Role of Personnel Manager: A personnel manager is one of the many specialists in the organization. He plays a unique role in the success of an organization. Some of these roles are:

- i) To help top management in preparing, adopting and evaluating personnel programmes and policies.
- ii) To maintain a programme of education and training of personnel.
- iii) To help management in maintaining good communication throughout the organization.
- iv) To develop an effective appraisal system.
- v) To undertake personnel research.
- vi) To establish the mechanism for administration of personnel services that are delegated to the personnel department.
- vii) To achieve and maintain good inter-personal relations in the concern.

Qualities of a personnel manager: The personnel manager is an important functionary of an organization. The functions of the personnel manager vary, both in nature and degree, depending upon the size, the location and the nature of the concern. Some of the important qualities required in any successful personnel manager are as follows.

- *Capacity for leadership:* The personnel manager should have leadership qualities as he has to exercise control over many matters affecting the workers. He/she should be in a position to convince others about his/her viewpoints and face opposition without fear of any kind.
- *Personnel integrity:* The personnel manager should be a person of integrity, i.e. a person who can be trusted completely, as he/she is concerned with human relation problems more than anybody else in the concern.
- *Capacity for persuasion:* The personnel manager should have the capacity to persuade his/her fellow managers of the wisdom of the proposals he/she makes. He/she should have the patience to persuade the employees in the desired direction.
- *Sense of social responsibility:* The personnel manager should be aware of social responsibility of the institution as it is a part of society whose success depends upon the cooperation of the people in it. He/she should treat people working in the concern as social units and deal with them keeping the social background of the business in mind.
- *Professional attitudes:* As the job of personnel manager is getting more and more professionalized, he/she should have some knowledge of various disciplines such as technology, engineering, management, sociology, psychology, philosophy, human physiology, economics, commerce and law. He/she should have the capacity to couple social justice with warm personal interest in people.
- *Dynamic personality:* Apart from the above mentioned qualities, a personnel manager should be dynamic, possessing spontaneity of speech, courtesy, social awareness and personal dignity.

Personnel management in extension and development also involves all the aspects discussed above.

Check Your Progress

Notes: a) Space given below the question is for writing your answer.

b) Check your answer with the one given at the end of this unit under "Answers to 'Check Your Progress' Questions."

2) i) What is personnel management?

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ii) What are the objectives of personnel management?

iii) What are the broad functions of personnel management?

15.4 STAFF DEVELOPMENT

Staff is the collective noun for the personnel involved in execution of various activities at different levels. Staff development assumes greater significance in effective implementation of the programmes. Staff development is essential for improving the quality of the personnel executing their functions at different levels of the system. In the context of extension, it refers to the development of extension staff itself.

15.4.1 Meaning, Purpose and Methods of Staff Development

The term development means ‘growth of the individual in all respects’. In the context of staff development, it refers broadly to the development of the multi-layered teams of employees through the process of *training* and *education*. It is part of management development.

Management development includes all those activities and programmes, when recognized and controlled, which have substantial influence in changing the capacity of the individuals to perform their assignments better and in so doing are likely to increase their potential for future management assignments.

The *purposes* of staff development for executivion of their work are as follows: i) To improve the knowledge and performance of the executives, ii) To develop the executives and others for taking up new assignments in future, iii) To ensure adequate managerial talents for the long-term survival and growth of the organization, and iv) To influence the behaviour of workers through the trained and senior staff.

The **methods** designed for staff development include: i) special courses, ii) special projects, iii) committee assignments, iv) case study, v) conference training, vi) management games, vii) sensitivity training or T-group training, and viii) role playing.

- *Special courses:* Special courses are formally organized by the organisation with the help of experts. The selected staff may be required to attend these courses. They may also be sponsored to attend courses conducted by others concerned.
- *Special projects:* Under this method, a special project is assigned to an executive and he/she is asked to study the whole situation and find solutions related to his/her department. The project would also help in educating the executive.
- *Committee assignment:* Committee assignment is one of the important methods of educating the executives and other senior level functionaries to acquire a general background and to modify their behaviour towards the selected problem. Under this method, an ad hoc committee is constituted and is assigned a subject to discuss and make recommendations. Thus, every member of the committee gets a chance to learn from others.
- *Case study:* It is a means of stimulating experience in the classroom or training programme. Under this method, the trainees are asked to analyze a problem and suggest solutions. The actual decision is known only to the person who conducts the programme. After collecting the views of all the participants, the decision is discussed with the trainees. They can compare their analysis with the real solution.
- *Conference training.* A conference is a group meeting conducted in accordance with an organized plan. The participants express their views on the subject fixed beforehand. As a participant, a person can learn from others by comparing his views with those of others. Thus, conference training is ideally suited to learn about problems and issues and measure them from various angles.
- *Management games:* A management game is a classroom exercise in which teams compete against each other to accomplish common goals. Under this method, the competing teams are asked to make decisions about production cost, research and development, sales, etc.
- *Sensitivity training or T-group training:* The development of awareness and sensitivity to behavioural patterns of oneself and others is called *sensitivity training*. It is generally conducted under controlled laboratory conditions. It is an experience in interpersonal relationships and useful in learning and unlearning certain things. The purpose of this training is to enhance the tolerance power of the individual and his/her ability to comprehend others.
- *Role playing.* Under this method, the trainees are assigned different roles to play. It is used to increase the trainee's skills in dealing with others. It is also used for leadership training. The trainees learn human relation skills through simulated experience and develop insight into one's own behaviour and its effect on others.

These methods are not exhaustive. Depending upon the need and context, other suitable methods can be identified and used accordingly.

15.4.2 Training for Staff Development

After selecting the most suitable personnel for various activities in the organization, the management should make necessary arrangements for their training and development. This is because the efficiency of an organization depends directly on how capable its personnel are and the capability of personnel depends on their ability to do work efficiently which in turn depends on the type of training they receive.

A) Meaning and Significance of Training: Training is “the act of increasing the knowledge and skills of an employee for doing a particular job.” It imparts specific skills for specific objects. Its basic purpose is to bring about a change in the behaviour of the workers. Training is mainly job-oriented and offered to both new and old employees.

Training is a process of learning a sequence of programmed behaviour. It attempts to improve the trainees’ performance on the current job or prepare them for an intended job. It covers not only those activities which improve job performance but also those which bring about growth of the personality; help individuals in the progress towards maturity and actualization of their potential capacities so that they become not only good employees but better men and women. And this may well include not only imparting specific skills and knowledge but also inculcating certain personality and attitudes. In organizational terms, it is intended to equip persons to earn promotion and hold greater responsibility. Training a person for a bigger and higher job is part of staff development.

The basic purpose of training is to bring a change in the behaviour of the employees. This fundamental objective can be accomplished only through positive change in knowledge, skills and attitudes of employees. While the increased knowledge would help employees know facts, policies, procedures and bye-laws pertaining to their jobs, the increased skills would help them perform their jobs more efficiently. A good training should also mould the attitude of an employee towards other co-workers, the supervisor and others in the organization.

Training should be a continuous process as it improves the quality and quantity of work. It facilitates better utilization of equipment, reduces cost and boosts the morale of the employees. Training therefore is beneficial both to employers and employees in the collective efforts of staff development in the organisational set up.

i) *Benefits of Training to the Organization*

- *Better Performance.* The quantity and quality of work is high when the workers/staff are given proper training.
- *Reduced Cost of Production.* Since training enables workers to make the most economical and best use of materials and equipment, the cost of production can be reduced.
- *Less Supervision.* The supervisor can increase his span of management because the trained employees need less supervision.
- *Long-term Stability and Flexibility.* The availability of trained personnel ensures long-term stability and flexibility in the organization.

- *Good Human Relations.* Training will develop confidence in the workers that they are being properly cared for. This will improve relations between the employers and the employees.
- *Uniformity of Procedures.* With the help of training, the best available methods of performing the work can be standardized to make them and made available to all employees.

ii) Benefits of Training to Employees

- *Advancement in Career.* Training helps employees to advance in their careers as it provides new knowledge and skills.
- *Increased Productivity.* Training helps to improve the performance of employees. Because of this they can earn higher salaries/wages and bonus.
- *Safety.* The trained employees are less prone to accidents as they know the use of various safety devices.
- *High Morale.* The trained employees should have greater job-satisfaction as they know their jobs. This helps to increase their morale.
- *Opportunity for Promotion.* Second line competent officers can be built through training. This helps them to try for promotion to higher jobs.
- *Increased Mobility.* The trained workers can move from one job to another or even from one organization to another for advancing their career.

B) Types of Training: The most common types of training used in industry are: i) Induction training, ii) Refresher training or re-training, iii) Training for promotion, iv) Apprenticeship training, and v) Internship training.

- Induction or Orientation Training:*** Induction training refers to the initial training given to a new employee in an organization. It is essential to ensure that initial placement of an employee is faultless. Its purpose is to familiarize the employee with the organization, its set-up, procedures, rules and regulations. The range of information that can be covered under this training is: i) history of the organization, ii) products of the organization, iii) location of departments, iv) personal policies and practices, v) employees' activities, vi) rules and regulations, vii) standing orders, viii) grievance redressal procedure, and ix) safety measures.
- Refresher Training or Re-training:*** Refresher training is meant for the existing/old workers of the organization to acquaint them with the latest methods of performing their jobs. In the words of Dale Yoder (1972), "Refresher training programmes are designed to avoid personnel obsolescence." The skills of the existing workers become obsolete on account of technological changes and the tendency of the human beings to forget. As a result, they are required to undergo a training programme in order to be able to introduce new products and services in accordance with the changing technological methods.

- iii) **Training for Promotion:** Training is imparted to the employees who are promoted to superior positions in the organization.
- iv) **Apprenticeship Training:** Apprenticeship training is one of the traditional methods of training and is meant to give trainees sufficient knowledge and skill in technical or professional jobs. Under this method, trainees are placed under the charge of a qualified instructor. This type of training is very common in skilled trades such as electricians, plumbers, carpenters, etc.
- v) **Internship Training:** Internship training refers to the joint programme of training in which the training institution and field level organisation cooperate with each other. It is usually meant for such vocations where advanced theoretical knowledge is to be backed up by practical experience on the job. With this end in view, students are sent to big industrial enterprises for practical training in between their terms in college.

Check Your Progress

Notes: a) Space given below the question is for writing your answer.

b) Check your answer with the one given at the end of this unit under “Answers to ‘Check Your Progress’ Questions.”

- 3) i) Explain the concept of staff development.

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- ii) What are the different methods of staff development?

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- iii) Explain the significance of training in staff development.

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15.5 STYLES OF MANAGEMENT

Management styles depend upon the leadership styles of the managers. So, the management styles are not much different from the leadership styles. There are three most talked about management styles — democratic, autocratic, consultative and laissez-faire management styles. Selecting the correct management style may lead to greater motivation and productivity of the staff. Manager's personalities and characteristics will influence the type of style adopted. Hence, the management style is not as easy as just 'picking' it from those available ones. Extension educationists and educators must be very careful in choosing from or adopting any particular management style(s) discussed below.

15.5.1 Management Styles based on the Leadership Styles

Management styles based on the leadership styles are as follows.

- i) **Democratic Management Style:** A democratic manager delegates authority to his/her staff, giving them responsibility to complete the task assigned to them. It is also known as empowerment of staff. Staff will complete the tasks using their own work methods. However, the task must be completed on time. Employees are involved in decision-making with a sense of belongingness and motivation. Because staff feels a sense of belongingness and are motivated the quality of decision-making and work also improves. Although popular in business today, a democratic management style can slow down decision-making because staff needs to be consulted. Also, some employees, by not working to their full potential may take advantage of the fact that their manager is democratic and allow other group members to 'carry' them.
- ii) **Autocratic Management Style:** In contrast to the above style, an autocratic manager dictates orders to their staff and makes decisions without any consultation. The leader likes to control the situation they are in. Decisions are quick because staff are not consulted and work is usually completed on time. However, this type of management style can decrease motivation and increase staff turnover because staff are not consulted and do not feel valued.
- iii) **Consultative Management style:** A consultative management style can be viewed as a combination of the above two styles. The manager will seek views and opinions from their staff, allowing them to feel involved but will ultimately make the final decision.
- iv) **Laissez-Faire Management style:** A laissez-faire manager sets the tasks and gives staff complete freedom to complete the task as they see it fit. There is minimal involvement from the manager. The manager however does not sit idle and watch them work! He/she is there to coach or to answer questions, or to supply information, if required. There are benefits; staff again is developed to take responsibility which may lead to improved motivation. However, with little direct guidance from the manager, staff may begin to feel lost and not reach the goals originally set within the time frame.

15.5.2 Management Styles based on Management Theories and Concepts

Management styles depend upon the nature and process of management as well. There are different theories that explain the concept of management including its nature and process. Adoption these theories in the functional context of an organization will influence or determine the general work environment of that particular organization or set-up. Different management styles can vary a little bit with a change in leadership; however, the crux of the style based on a theory mostly remains the same. Through the years, economists and business leaders have fostered and developed several management styles, each surfacing from a different school of thought. However, they all — be it Maslow, Mayo or Drucker — had the same bottom line, that is profit! They may have followed different routes but all headed to the same destination, good business! Different “styles” are also propounded with reference to the leadership style that a manager follows. Styles of management have seen an evolution of sorts due to the dynamism of the corporate world as an entity. We touch upon these different management styles and the extension educationists and extension educators need to select suitable style(s) depending on their contexts.

1) **Management Style based on Scientific Management:** This is one of the earliest management styles. Propounded and developed by Frederick Winslow Taylor in 1900, the concept of scientific management is also known as “Taylorism”. This method believed in the concept of “One best method” to perform a certain task. In general, Taylorism believed in the following principles:

- It believed that decision-making should be under the purview of the management. This ensures that emotions do not form the governing factor for a business. More so, decision-making can be more professional when it is in the hands of managers. This is because they can be unbiased and have a scientific approach towards management.
- It also believed in developing a standard method to perform each job. This helps in having uniformity in the production. Taylorism caters more to shop floor management. Standard methods speed-up the production process and create an environment of expertise.
- Taylorism believed in selecting workers with appropriate abilities for each job. This ensured a general environment of excellence and complete understanding of the task at hand.
- As per Taylorism, workers used to be trained along the standard methods that were previously developed and fine-tuned to have the “one best method”. This aspect of Taylorism is still being followed in many organizations. However, it is facing a lot of opposition.
- Taylorism believed in providing complete support to the employees in order to plan their work and eliminate interruptions. This was to ensure that when at work, the employee would not think of anything but the job at hand. This was believed to be very good for efficiency.
- The concept of wage incentives was, in fact, first propounded by Taylor. As per this management style, it was believed that in case of increased

output by a certain employee, he/she was rewarded with a wage incentive or a bonus. This was to ensure that the employees were motivated to perform as much as they could.

Scientific management style is the first official management style that came into existence. It greatly impacted the world economy and led to several organizational reforms.

2) **Management Style based on Process Approach:** This is the second of the early business management styles. The process approach was propounded by Henry Fayol in the 1920s. As such it is popularly known as "Fayolism". Fayolism is a modification of Taylorism. However, its modifications made this management style very different from Taylorism, as it was broader in perspective. It defined management in a different manner. Stability of personnel tenure. Fayolism believed and propounded that each organization has 16 management duties. They are:

- i) To give serious thought to activity plans and have them firmly executed.
- ii) To have people employed and equipment used to be relevant to the goal, the resources and the needs of the organization.
- iii) To set up a unique direction (top management) which is skilled and vigorous.
- iv) To consult others before taking actions in order to coordinate efforts.
- v) To work at formulating decisions in a clear, clean and precise way.
- vi) To have an efficient recruitment, each department needing to be led by a skilled and active person, each employee being at the place where he/she can provide the most services.
- vii) To define clearly the job description.
- viii) To encourage people for taking initiatives and responsibilities.
- ix) To pay appropriately, fairly and expertly for the services provided to the organization.
- x) To correct faults and errors.
- xi) To ensure discipline.
- xii) To aim at having individual interests subordinated to the organization's interest.
- xiii) To give special attention to the unity of command.
- xiv) To supervise the material order and social order, to keep the place tidy and to avoid strikes.
- xv) To verify everything by applying quality control on every operation.
- xvi) To conquer the "red ribbon" attitude.

The process approach to management style really simplified several production as well as service functions and is still widely followed and studied. In fact, it is known as one of the most effective management styles.

3) **Management Style based on Hawthorne Effect:** Developed in the 1930s and 1940s by Elton Mayo (1946), the Hawthorne experiments were the basis of this management style. This management style believes in the concept of: "a happy worker, is a good worker". This is why, as per this management style, majority of the concentration was to keep the workers happy by providing them with required amenities. Adequate light, healthy diet and conducive environment should be provided to the employees to ensure optimum output from the employees. This concept was developed on the basis of two beliefs:

- People are not the rational and economic beings assumed by classical theorists.
- Social interaction is important and people work well if they feel valued.

The Hawthorne experiments were in 3 parts.

- i) In the first part, *a set of changes* were made to the general work environment and timings.
 - They changed the pay rules so that the group was paid for overall group production, not for individual production.
 - The employees were given two 5-minute breaks (after a discussion with them on the best length of time) and then changing to two 10-minute breaks (not their preference). Productivity increased but when they were given six 5-minute rests, they disliked it and reduced output.
 - The employees were provided food during the breaks.
 - They tried shortening the day by 30 minutes (output went up); shortening it more (output per hour went up, but overall output decreased); returning to the first condition (where output peaked).
- ii) The second part were *interviews with each of the employees*. This was to verify the impact of the experiments. As a result of the interview, it was concluded that the changes were welcome and the productivity and morale were high.
- iii) The third part was to see if the *payment incentives* had any impact on the productivity. As a result, it was found that peer compatibility and comparison had more consequential impact as compared to payment incentives.

The Hawthorne experiments and the Hawthorne effect highlighted to the corporate world that human beings were the main resources for any organization and had to be kept happy to ensure high productivity.

4) **Management Style based on Human Needs and Motives:** Maslow's theory on the 'hierarchy of needs' had many implications for management style. According to Maslow (1954) every individual's needs are divided into a certain hierarchy.

- *Physiological needs:* These are basic primal needs that every individual feels. They include: Food, Shelter, Clothing, Warmth, etc. These needs are the basic needs. According to this theory, a person's motivation begins with sufficiently satisfying these needs.

- *Safety needs:* Once the physiological needs are met, an individual then aims at meeting his/her safety needs. They include: personal security, financial security, health and well-being, safety net against accidents/illness and the adverse impacts. It is natural for any individual to see importance in these needs.
- *Social needs:* Once the safety needs are met, an individual would then graduate further to the social needs. This is when they will feel the need and requirement for friends, intimacy, relationships, family, etc..The individual is now in a position to “indulge” in these aspects. The individual also requires a feeling of belongingness and support.
- *Esteem needs:* Now we come to the need for self-esteem. By this stage, the individual feels the need for acceptance and status. This is when some people feel the need for fame and popularity as well. Maslow stated two types of esteem needs. A lower one and a higher one. The lower one is the need for the respect from others, the need for status, recognition, fame, prestige, and attention. The higher one, on the other hand, is the need for self-esteem, strength, competence, mastery, self-confidence, independence and freedom.
- *Self-actualization need:* Once the esteem needs are met, an individual goes higher up the ladder. This is when he/she feels the need for self-actualizing. This is where he/she needs to identify and realize the maximum of his/her potential. This is the ultimate motive that all the lower motives lead to. People who are at this stage have a high level of self- motivation. Self-actualization is the final step in the motivation ladder.

Maslow’s hierarchy of needs is studied in management and education even today and followed to quite an extent by many organizations. It is used as a guide for employee-satisfaction and general need allocation in life as well.

5) **Management Style based on Complex Man:** This management style is a critique on all the previous management styles. It believed in safety culture. Propounded by E. H. Schein in the 1960s, safety culture was developed because:

- No single management style can succeed in improving the performance of all workers.
- The motives of an individual may be extremely complex and liable to change over time.
- A high level of satisfaction does not necessarily lead to increased productivity (the other way round?).

Further, it was also seen that the other management styles were too simplistic, whereas man is a very complex being. It is believed that safety is the one common requirement of all human beings. As per safety culture, the following were required to be committed by the management for the ideal safety culture management.

- Prioritization of safety over production.
- Maintaining a high profile for safety in meetings.

- Personal attendance of managers at safety meetings and in walk-about
- Face-to-face meetings with employees that feature safety as a topic
- Job descriptions that include safety contracts
- Communication about safety issues, including pervasive channels of formal and informal communication and regular communication between management, supervisors and the workforce.
- Involvement of employees, for empowerment, as well as delegation of responsibility for safety and encouragement to commit to the organization.

This style is used to a moderate extent with certain organization-specific modifications.

6) **Management Style based on Management by Objectives:** This is one of the recent management styles and in today's diverse market it is very useful. It was popularized by Peter Drucker in 1954. The objective of Management by Objectives is "to create empowered employees who have clarity of the roles and responsibilities expected from them, understand their objectives to be achieved and thus help in the achievement of organizational as well as personal goals." It has the following advantages.

- *Motivation:* Participative environment that included employees in goal-setting, etc., led the employees to being more motivated to come to work and increase the output.
- *Better-communication and coordination:* This method has made general communication and coordination much easier and smoother. Regular reviews, feedback and a general open-door policy help create an amicable environment in the organization.
- *Clarity of goals:* With MBO, the objectives are "SMART":
 - S — Specific
 - M — Measurable
 - A — Achievable
 - R — Relevant
 - T — Time-bound

This makes them very clear-cut. It also forges a link between the company as well as the individual personal goals. However, MBO has a few limitations. It concentrates on goals more than outcome. More so, it fails to state the context in which the goals are set. Appraisals are based on "what an employee should be" not "what an employee should do" and a few other organization-specific limitations. However, principles of this management style are kept in mind for a general management benefit.

As management encompasses man, money and material, there are several aspects that govern and are governed by management styles. Since man is the first and foremost consideration, the leadership styles followed by different managers has led to forging effective link between human behaviour and different management styles. Given below are a few such popular management styles.

- 7) **Management by Coaching and Development (MBCD):** In this management style, the manager is more like a coach in nurturing role. The employees have a long learning curve and the general work experience is more like a learning experience. In this management style, the manager leads not by ordering but by coaching and in this way performs his/her role of employee-training.
- 8) **Management by Competitive Edge (MBCE):** In this management style, the concept of healthy competition is duly fostered. In an organization following such a management style, all the employees are encouraged to compete with each other. This is mostly done with the help of R & R strategies (Rewards and Recognition strategies).
- 9) **Management by Consensus (MBC):** This management style is more along the lines of democratic style. It encourages the employees to offer their opinions, suggestions and feedback. This helps the organization in taking adequate employee-centric decisions. It is followed to quite an extent in organizations these days.
- 10) **Management Style by Decision Models (MBDM):** In this management style, decision models are prepared in order to work as precedent. These decision models are prepared with the help of hypothetical situations and projections made therefrom. This kind of a plan of action can work at many times; however, in case of a contingency, it would fail.
- 11) **Management Style by Exception (MBE):** The concept of delegation of authority is the focus in this management style. Each manager delegates as much responsibility and authority down the ladder, as possible. He/she only steps in as an end responsible, and when consulted.
- 12) **Management Style by Information Systems (MBIS):** As the name of the management style amply suggests, this style is based on results generated out of a data base. The IS is depended upon for decision-making and inter-relatedness. It is used for efficiency analysis and to increase efficiency as well.
- 13) **Management Style by Matrices (MBM):** In this management style, decisions and policies are made with reference to charts and variables. These charts help the management to figure out the efficiency, productivity, interrelation and other factors.
- 14) **Management by Organizational Development (MBOD):** In this management style, the managers work on improving the employee communication and relations. It is like the paternalistic style, but the organization's priority is profit rather the "employee satisfaction". Nonetheless, an organization following this management style, will work on having good employee relations and communication as well.
- 15) **Management by Performance (MBP):** In this management style, the key is performance. The managers believe that profitability is a derivative of performance. Hence, the emphasis is on motivating the employees to achieve higher and higher performance. They do this with the help of R & R combined with employee-satisfaction techniques.

- 16) **Management by Styles (MBS):** This is probably the most flexible of all management styles. It believes in changing the management style and adapting it as per the changing scenario and requirement. As such, this management style is prepared for contingency inspite of being flexible.
- 17) **Management by Walking Around (MBWA):** Yes, it sounds a little “out there”, but Dave Packard, co-founder of Hewlett-Packard, developed this management style. It believes in the manager walking around the office interacting with the employees. This not only helps the manager get the feel of the employee sector, but also makes the employees feel cared for and connected to the management. It helps motivate the employees and results in better output and loyalty from the employees. This style is based on the premise that communication is the key.
- 18) **Management by Work Simplification (MBWS):** This management style believes in only one method. Simplification! So if it means that the work gets divided to double the number of people or bring in change in a policy. This is a very liberal method, yet it leads to a lot of discipline and control. Further, employees feel secure and satisfied.
- 19) **Management by Intercourse:** Now, before you start imagining, this management style is known as *Management by Interaction*. This management style believes that both male and female employees are required in an organization, to achieve a balance and optimum equilibrium of performance and profitability. Hence, it works on having conducive interpersonal relations between all employees.

To conclude, any management needs to keep in mind that along with profits, it needs to ensure employee-satisfaction as well. The perfect blend of all the positive and conducive aspects of all the management styles and techniques can lead to a harmonious and profitable organization-specific management style. As a person involved or interested in the extension education and development you can choose from or have a blend of management styles or to evolve your own style suitable to the given context in the field.

Check Your Progress

- Notes:** a) Space given below the question is for writing your answer.
b) Check your answer with the one given at the end of this unit under “Answers to ‘Check Your Progress’ Questions”.

- 4) i) What are the management styles based on leadership styles?

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- ii) List out the management styles based on the management theories or concepts.

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15.6 LET US SUM UP

In this unit we have discussed the concept of manpower planning its need, features, Significance, Process, Benefits, Functionaries/ Personnel involved, strategies for manpower planners, Manpower planning in India, Personnel Management in Extension, its Meaning and concept, Features, Objectives, Significance, Functions, Role of Personnel Department, Role of Personnel Manager, Staff Development, its Meaning and concept, Objectives of executive development, Methods of executive development, Training, Meaning of training, Objectives of training, Importance of training, Types of training, Methods of training and Methods/styles of management. It is hoped you are very clear about what we have discussed here.

15.7 ANSWERS TO 'CHECK YOUR PROGRESS' QUESTIONS

- 1) i) *Manpower planning* is defined as “a strategy for the acquisition, utilization, improvement and preservation of an enterprise’s human resources. It relates to establishing job specifications or the quantitative requirements of jobs determining the number of personnel required and developing sources of manpower.”

Significance of manpower planning: Manpower planning is one of the most pressing responsibilities of personnel management. Its significance lies in attracting and developing the required number of right personnel for manning various positions in the organization.

- ii) Salient features of manpower planning include the following:
- Manpower planning is concerned with finding out the manpower requirements of the organization both in the right number and of the right kind.
 - It is a comprehensive process relating to the various aspects of manpower management.

- It takes into account the manpower required at a future date in the organization.
 - It deals with effective utilisation of manpower by specifying the various factors to be considered in this respect.
- iii) The steps involved in the process of manpower planning are: a) Job analysis, b) Skill inventory, c) Personnel forecasting, d) Employment plan, e) Training and development of personnel.
- iv) The benefits of manpower planning include the following:
- Upper management has a better view of the human resources dimensions of business decisions;
 - Personnel costs may be less because management can anticipate imbalances, before they become unmanageable and expensive;
 - More time is provided to locate source talent;
 - Better opportunities exist to include women and minority groups in future growth plans;
 - Better planning of assignments to develop managers can be done;
 - Major and successful demands on local labour markets can be made.
 - It enables the organization to have the required personnel at various levels on a continuous basis so as to achieve economy and efficiency.
 - It helps the organization to meet its changing requirements of personnel without any problem.
 - It makes it easier to find replacements for top managerial positions as and when senior managers retire.
- 2) i) Personnel management is the recruitment, selection, development, utilization and accommodation of human resources by the concerned organizations.
- ii) The objectives of personnel management include the following:
- *Optimizing the utilization of organization's manpower:* The fundamental purpose of personnel management is the optimum utilization of the manpower to accomplish the goals of the organization. This helps to harness people's strengths and enhance productivity.
 - *Maintaining a high morale:* Personnel management tries to prompt and stimulate employees to realize their full potential. This ultimately helps to maintain and increase employees' morale.
 - *Communicating personnel policies to all employees:* Personnel management is responsible for communicating with customers, non-customers, regulators and other external public for understanding the views of internal human resources.
 - *Providing well-trained and well-motivated employees:* It is personnel management which is responsible for providing well-trained and well-motivated employees to the organization. For this

purpose, the performance of the employees needs to be evaluated properly so that they can be remunerated on the basis of their contributions to the organization.

- *Developing desirable working relationships:* Personnel management is responsible for creating desirable working conditions so that congenial relationships can be developed among the members of the organization.

iii) *Functions of personnel management:* The functions of personnel management can be broadly classified into two categories. They are managerial and operative. If managerial functions deal with planning, organizing, directing, coordinating and controlling the activities of an organization, the operative functions relate to procuring, developing, compensating, integrating and maintaining a workforce for accomplishing the enterprise goals. Thus all managerial functions influence the operative functions.

3) i) Staff development means the development of the multi-layered teams of employees through the process of *training* and *education*. It is part of management development. Management development all those activities and programmes, when recognized and controlled, which have substantial influence in changing the capacity of the individual employees to perform their assignments better and in so doing are likely to increase their potential for future management assignments.

ii) *Staff development* can be done in different ways. They are: a) special courses, b) special projects, c) committee assignments, d) Case study, e) conference training, f) management games, g) sensitivity training or T-group training, and h) role playing.

iii) Training assumes greater significance because it improves the quality and quantity of work. It facilitates better utilization of equipment, personnel and facilities reduces cost and boosts the morale of the employees. Training therefore is beneficial both to employers and employees.

a) Benefits of Training to the Organization

- *Better performance.* The quantity and quality of work is high when the workers are given proper training.
- *Reduced cost of production.* Since training enables workers to make the most economical and best use of materials and equipment, the cost of production can be reduced.
- *Less supervision.* The supervisor can increase his/her span of management because the trained employees need less supervision.
- *Long-term stability and flexibility.* The availability of trained personnel ensures long-term stability and flexibility in the organization.
- *Good human relations.* Training will develop confidence in the workers or employees that they are being properly cared for. This will improve relations between the employers and the employees.

- *Uniformity of procedures.* With the help of training, the best available methods of performing the work can be made available to all employees.

b) Benefits of Training to Employees

- *Advancement in career.* Training helps employees to advance their careers as it provides new knowledge and skills.
- *Increased productivity.* Training helps to improve the performance of workers. Because of this the workers can earn higher salary/ wages and bonus.
- *Safety.* The trained workers are less prone to accidents as they know the use of various safety devices.
- *High morale.* The trained employees should have greater job-satisfaction as they know their jobs. This helps to increase their morale.
- *Opportunity for promotion.* Second line competent officers can be built through training. This helps them to try for promotion to higher jobs.
- *Increased mobility.* The trained workers can move from one job to another or even from one organization to another for advancing their career.

4) i) Management styles based on leadership styles include the following.

- a) Democratic Management Style.
- b) Autocratic Management Style.
- c) Consultative Management style.
- d) Laissez-Faire Management style.

ii) Management Styles based on Management Theories and Concepts include

- a) Management Style based on Scientific Management.
- b) Management Style based on Process Approach.
- c) Management Style based on Hawthorne Effect.
- d) Management Style based on Human Needs & Motives.
- e) Management Style based on Complex Man.
- f) Management Style based on Management by Objectives.
- g) Management Style by Coaching and Development (MBCD).
- h) Management Style by Competitive Edge (MBCE).
- i) Management Style by Consensus (MBC).
- j) Management Style by Decision Models (MBDM).
- k) Management Style by Exception (MBE).
- l) Management Style by Information Systems (MBIS).

- m) Management Style by Matrices (MBM).
- n) Management Style by Organizational Development (MBOD).
- o) Management Style by Performance (MBP).
- p) Management Style by Styles (MBS).
- q) Management Style by Walking Around (MBWA).
- r) Management Style by Work Simplification (MBWS).
- s) Management Style by Intercourse.

15.8 REFERENCES

Brech, E. F. L. 1972. *Principles and Practices of Management*. London: Pitman.

Coleman B. P. 1970. *An Integrated System for Manpower Planning*. Michigan, USA: Elsevier Inc.

Dale, S. Beach. 1980. *Personnel: The Management of People at Work*. New York: Macmillan- Business & Economics.

Dale Yoder. 1972. *Personal Management and Industrial Relations*. New Delhi: Prentice-Hall of India.

Drucker, Peter. 1954. *The Practice of Management*. New York: Harper and brothers.

Elton Mayo 1946. *The Human Problems of an Industrial Civilization*. (2nd edition), Boston, Mass: Harvard University.

Flippo, Edwin B. 1980. *Personal Management*. New York: Mc Graw Hill.

French Wendell. 1974. *The Personnel Management Process*. USA: Alibris.

Geisler, E. B. 1967. *Manpower Planning: An Emerging Staff Function*. New York: American Management Association.

Mamoria C.B., and Gankar S.V. 2009. *A Textbook of Human Resouce Management*. New Delhi: Himalaya Publishing House.

Maslow A. H. 1954. *Motivation and Personality*. New York: Harper and brothers.

Narayana Rao, K.V. S. S. 2009. *Human Resource Planning and Management - HRM - Revision* [Internet]. Version 3. Knol. 2009, Feb 22.

Schein, E. H. 1960. *Organizational Culture and Leadership*. San Fransisco: Jessy Boss.

Stainer, George A. 1969. *Top Manmanagement Planning*. New York: Mac millan.

Taylor, Frederick Winslow. 1856-1915. *The Principles of Scientific Management*. New York: Harper & Brothers.

Suggested Readings

Armstrong, Michael. 2006. *A Handbook of Human Resource Management Practice*. (10th ed). London: Kogan Page.

Jucious, M. J. 1973. *Personnel Management*. Richard D Irwin, Illinois: Homewood.

Robbins, Stephen P. 1978. *Personnel - the Management of Human Resources*. New Jersey: Prentice-Hall Inc.

Rao, V. S. P., and Narayana, P. S. 1997. *Principles and Practices of Management*. New Delhi: Konark Publishers Pvt Ltd.

Rudrabasavaraj, M. N. 1969. *Personnel Administration Policies in India*. Pune: V. M. N. Institute of Cooperative Management.

Subbarao, P. 2008. *Essentials of Human Resource Management and Industrial Relations*. Mumbai: Himayalaya Publishing House.

Tripathi, P. C., and Reddy, P. N. 2006. *Principles of Management*. New Delhi: Tata McGraw Hill.

www.learnmanagement2.com/leadership%20styles.htm.

www.buzzle.com/.../management-styles-list-of-different-types-of-management-styles.html.

www.managementstudyguide.com/manpower-planning.htm.

www.manpowerindia.net.

UNIT 16 MONITORING AND EVALUATION IN EXTENSION AND DEVELOPMENT

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16.0 INTRODUCTION

In the preceding units of this Block (i.e. Block 4), we have discussed planning and developing extension programme, concepts and theories of management, and manpower planning and personnel management in extension and development. Monitoring and evaluation is an essential aspect of extension and

development, without understanding which our study of extension and development would be incomplete. Hence, in the present Unit (i.e. Unit-16), which is the last Unit of Course MAE - 004 we will discuss different aspects of monitoring and evaluation essentially focusing on the concepts, objectives, need and importance and types of monitoring and evaluation and methods and techniques for project management and evaluation such as Critical Path Method (CPM), Programme Evaluation and Review Technique (PERT), Event Chain Methodology and Gantt Charts.

16.1 OBJECTIVES

After having gone through this unit, we expect you to be able to:

- Explain the concept, need and importance of monitoring and evaluation;
- Describe different aspects, types and steps involved in monitoring and evaluation;
- Conceptualise and formulate monitoring and evaluation design; and
- Discuss and distinguish the techniques of Critical Path Method (CPM), Programme Evaluation and Review Technique (PERT), Event Chain Methodology and Gantt Charts.

16.2 CONCEPT, NEED AND SIGNIFICANCE OF MONITORING AND EVALUATION

In this section, we will focus on the concepts, need and significance of monitoring and evaluation.

16.2.1 Concept of Monitoring and Evaluation

Concept of monitoring: ‘Monitoring’ means comparing actual progress in activities and results towards the objectives formulated in advance. Monitoring is the systematic collection, analysis and use of information from projects and programmes for three basic purposes: learning from the experiences acquired (*learning function*); accounting internally and externally for the resources used and the results obtained (*monitoring function*); and taking decisions for effective progress towards the set targets (*steering function*) (War Child, 2006). Generally, this will give us little more than a broad indication of whether the set objectives were achieved or not.

Bamberger, et al (1986) define *monitoring* as: “an internal project activity designed to provide constant feedback on the progress of a project, the problems it is facing and the efficiency with which it is being implemented.” Monitoring is undertaken or performed while a project or a programme or a scheme is being implemented. It is done with the aim of improving its design and functioning while in action. An example given in the World Bank Technical Paper, *Monitoring and Evaluating Urban Development Programs: A Handbook for Program Managers and Researchers*, describes that a monitoring study, by way of rapid survey, was able to determine that the amount of credit in a micro-credit scheme for artisans in Brazil was too small. The potential beneficiaries were not participating due to the inadequacy of the loan size for their needs. This information was then used to make some important changes in the project (Ibid).

In the context of the Non-Formal Education or extension education and development, the term monitoring is generally used to denote a process of watching periodically the progress of the programme or project with a view to identifying the weaknesses or shortcomings, if any, and taking corrective measures in order to optimise the effectiveness of the programme or project. But, if there is any misreporting of information by the persons involved, the monitoring system will lose its credibility and will fail to serve any meaningful purpose.

Concept of Evaluation: Unlike monitoring, 'evaluation' is more comprehensive. In a literal sense, evaluation is the determination of value to an object or a phenomenon. Evaluation is a study of the outcome of a project (changes in income, housing quality, benefits distribution, cost-effectiveness, etc) with the aim of informing the design of future projects. Bamberger et al (1986) describes evaluation as a process "mainly used to help in the selection and design of future projects. Evaluation studies can assess the extent to which the project produced the intended impacts (increase in income, better housing quality, distribution of the benefits between different groups, etc) and can evaluate the cost-effectiveness of the project as compared with other options." An example from *'Monitoring and Evaluating Urban Development Programs: A Handbook for Program Managers and Researchers'* (Bamberger, et.al., 1986) describes an evaluation of a cooperative program in El Salvador that determined that the cooperatives improved the lives of the few families involved but did not have a major impact on overall employment.

Based on the above discussion, we can now clearly summarise the general objectives of monitoring and evaluation as follows:

- i) to identify the merits and demerits.
- ii) to provide feedback to the implementing agency.
- iii) to know the physical arrangements being made.
- iv) to find out the problems to be remedied.
- v) to know the extent of achievement of the set targets.
- vi) to find out the appropriateness of utilization of the allocated funds
- vii) to know whether the project or programme is going on right lines.

Monitoring and evaluation compared: Monitoring consists of routine collection of information relating to the on-going programmes, schemes or projects. Both, monitoring and evaluation are indispensable vis-à-vis a programme, a scheme or a project. The main purpose of evaluation is to improve the programme by identifying merits and demerits of the programme but not to discourage the workers and the programme. It is a process concerned with final checking and improving the programmes. Evaluation covers pre-planning, planning and implementation stages of the programmes. In other words, evaluation deals with such aspects that occur before the implementation of the programme, during the operation of the programme and after the completion of the programme. In scientific terms, evaluation is an important procedural basis for discovering what has been accomplished, which intended outcomes have been achieved, what weaknesses or failures have occurred and what importance should be ascribed to each of these. Educational evaluation from a technological view point has much in common with the concerns of any other social process evaluation.

The technological uses of evaluation in education, for example, are committed to the view that “failures” (non-learning or ineffective learning) are less a matter of inadequacy in the learner than a matter of flaws in the instructional system. Even the problem created by the student who lacks pre-requisite knowledge is seen as a failure of the instructional systems screening for remediation procedures. In this era of technology, evaluation is socially more respectable and expected. Evaluation – especially testing of students — has long been a standard part of formal education. As more and more organizations, producers, publishers and distributors become involved in the supplying of educational materials and resources, they become caught up in the demands for evaluation.

Evaluation is assessing as systematically and objectively as possible an ongoing or completed project, programme or policy. The object is to be able to make statements about their relevance, effectiveness, efficiency, impact and sustainability. Based on this information, it can be determined whether any changes are to be made at a project, programme or policy level, and if so, what they are – in a nutshell, what went well, where is there room for improvement? Evaluation thus has both a learning function — the lessons learned need to be incorporated into future proposals or policy; and a monitoring function — partners and members review the implementation of policy based on objectives and resources mobilised.

16.2.2 Need and Significance of Monitoring and Evaluation

Monitoring and evaluation (M & E) of extension and development activities provide government officials, development managers, and civil society with better means for learning from past experience, improving service delivery, planning and allocating resources, and demonstrating results as part of accountability to key stakeholders. Within the development community there is a strong focus on results which helps explain the growing interest in M & E (World Bank, 2004).

Monitoring and evaluation mechanisms assume great significance in the following context/situations:

- *Provide constant feedback* regarding the extent to which the projects are achieving their goals.
- *Identify potential problems* at an early stage and propose possible solutions.
- *Monitor the accessibility of the project* to all sections of the target population.
- *Monitor the efficiency* with which different components of the project are being implemented and suggest improvements, if any, required.
- *Help in formative evaluation* on the extent to which the project is able to achieve its general objectives.
- *Form the basis for formulation of effective guidelines* for the planning of future projects (Bamberger et al, 1986).
- *Influence sector assistance strategy*: Relevant analysis from project and policy evaluation can highlight the outcomes of previous interventions, and the strengths and the weaknesses of their implementation.
- *Improve project design*: Use of project design tools such as the log frame (logical framework) results in systematic selection of indicators for

monitoring project performance. The process of selecting indicators for monitoring is a test of the soundness of project objectives and can lead to improvements in project design.

- *Incorporate views of stakeholders:* Awareness is growing that participation by project beneficiaries in design and implementation brings greater “ownership” of project objectives and encourages the sustainability of project benefits. Ownership brings accountability. Objectives should be set and indicators selected in consultation with stakeholders, so that objectives and targets are jointly “owned”. The emergence of recorded benefits at the earliest helps reinforce ownership, and early warning on emerging problems allows action to be taken before costs rise.
- *Show need for mid-course corrections:* A reliable flow of information during implementation enables managers to keep track of progress and suitably adjust the operations.

Monitoring and evaluation are complementary. During an evaluation, as much use as possible is made of information from previous monitoring. In contrast to monitoring, where emphasis is on the process and results, evaluation is used to provide insight into the relationships between results (for example, the strengthened capacity of an organisation), effects (for example, improved services/products) and impact (for example, improved living conditions for the ultimate target group).

Now, to sum up, monitoring and evaluation can be used for three reasons:

- *steering:* steering and adjusting current programmes and projects;
- *learning:* learning more about what works and what does not;
- *monitoring:* accounting for the resources used in the light of objectives formulated in advance and results achieved.

Monitoring and evaluation can be regarded essentially as tools for identification of the strengths and weaknesses of a system and designed to make the objectives operationally more realistic in order to ensure effective implementation of the redesigned programmes.

Check Your Progress

Notes: a) Space given below the question is for writing your answer.

b) Check your answer with the one given at the end of this unit under “Answers to ‘Check Your Progress’ Questions”.

- 1) Explain the concepts of ‘monitoring’ and ‘evaluation’.

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16.3 IMPORTANT ASPECTS OF MONITORING

Monitoring of the Non-Formal Education or extension programme, in general, include the collection of information related to the following main aspects, among other things.

- *Physical aspects:* Information relating to the geographical area being covered, number of centres in operation, location of centres, target people and personnel involved, adequacy of arrangements made including the equipment, participation of the people, coverage of special groups like women and persons belonging to SC & ST and other disadvantaged sections.
- *Academic/Technical aspects:* Information on programme content, availability and sustainability of instructional and learning materials and other inputs, training of personnel including provision for orientation and periodical in-service training.
- *Financial aspects:* Information relating to timely release of funds from the highest to lowest levels, and timely utilisation of sanctioned/released funds, adherence to procedures, payment of honorarium to the functionaries and others concerned, etc.
- *Administrative aspects:* Information pertaining to appointment and placement of personnel, arrangement for coordination between different departments, transparency, sincerity, adherence and commitment to the laid-down procedures, etc.

16.4 TYPES AND PROCESS OF EVALUATION

Even for planning and developing a programme or a project, evaluation is done of the context in which it is being contemplated. Once the project or programme is launched, its implementation involves many inputs – physical, human, financial and technical — which are subjected to certain processes directed at achieving the set objectives and seen in the form of outcome, product or effects of different kinds. And an evaluation may take into account all these as a whole or may focus on selected aspect(s) of a given programme. Evaluation can, however, be done by internal people (those involved in implementation of a policy, a scheme, project or a programme) or by outside persons or agencies, so as to ensure more validity, objectivity and fairness in the process of evaluation. In this section, we will therefore, focus on types and process of evaluation.

16.4.1 Types of Evaluation

Evaluation is of different types depending upon different aspects or criteria considered thereof and are discussed in detail below.

16.4.1.1 Types based on the Aspects Covered

The true context of a programme precedes its planning and development. After launching a programme or a project different activities happen which involve different inputs and processes leading to the effects or impact or output/outcome. Thus, the aspects of the programme include: the context, inputs, processes and effects/impact. Evaluation can be general and holistic covering all these aspects

or it can be selective covering specific aspect of the programme. So, based on the aspect(s) of the programme or project covered, evaluation can be categorized into the following types:

- i) **Context evaluation:** It evaluates or studies the context and the feasibility of developing a programme or a project. It is done prior to developing a programme based on the perceived need. It takes into account different aspects of the existing situation and the ground realities in terms of the needs, requirements of the people and the physical aspects of the area in the given context.
- ii) **Input evaluation:** It takes into account different types of inputs – physical/material, human, financial, technical – involved since beginning of implementation of a programme or a project. It helps in assessing the nature, quantity, quality, adequacy and timeliness of different inputs into the programme.
- iii) **Process evaluation:** This involves judging the nature and quality of activities or strategies of the project. It evaluates what has been done, who has done what and to what extent, the range and quality of the activities, etc. It seeks answers to questions such as the following.
 - Are all the project activities going on as per the schedule/plan? If not, why?
 - Were any changes made to the intended activities? If so, why?
 - Are materials, information and their presentation in good quality?
 - Is the project reaching the intended target people through appropriate activities?
 - Are the involved participants and the key functionaries satisfied?
- iv) **Impact / outcome evaluation:** This involves judging the extent to which the project had shown its effects vis-avis those expected or sought. In other words, the extent to which the relevant project has realized its goal and objectives. Thus, impact evaluation judges how far and how well the objectives were achieved and outcome evaluation judges how well the goal has been achieved. It seeks answers to questions such as:
 - To what extent has the project met its objectives?
 - How effective has the project been at producing desired/intended changes?
 - Are there any factors outside the project that have contributed to or prevented the desired change?
 - What progress has been made towards achieving the goal?
 - Has the project resulted in any unintended change or effect?

16.4.1.2 Types based on the Stage at which Evaluation is Done

Evaluation may be done of a programme, project or scheme when it is going on or at the end of or after its completion. Accordingly, the evaluation is of the following types.

- i) **Formative evaluation:** Formative evaluation, including pre-testing, is designed to assess the strengths and weaknesses of materials or campaign strategies or selected process before and during implementation. Formative research tailors the programme to the target audience. Messages, processes or products are tested on a small group before they are implemented on a large scale. This type of evaluation permits necessary revisions before the full effort goes forward. Its basic purpose is to maximize the change or effect of particular activity for programme success before the activity is taken up on a large-scale or to improve the quality of the activity.

Formative evaluation begins during project development and continues throughout the span of the project. Its intent is to assess the ongoing project activities and provide information to monitor and improve the quality of the project. It is done at several points during the developmental period of a project and its activities. An evaluation theorist Bob Stake (Mentioned in Blank, 1993) very rightly emphasizes:

- When the cook tastes the soup, that's formative;
- When the guests taste the soup, that's summative.

It has come into use largely because of recent terminology. In terms of its purpose – getting information that can lead to improvement of an educational programme, material or experience – it is hardly new. One of the time-honoured uses of evaluation is to make changes. It is intended to provide information based on which judgments can be made about the effectiveness and worth of educational experience and the materials and procedures that produced it.

Traditionally, the role of evaluation in educational and other institutions of social change has been to detect, assess, and weigh the importance of the consequences or effects of what has been done. How well, how much, for whom, at what cost are the typical issues examined by the evaluative efforts. Most of the users of evaluation in the past were summative, in that they were concerned with summations or conclusions about consequences and end products. Today evaluation is also designed to serve as an aid to the planning and development process; formative evaluation is designed to provide feedback data that will shape and reshape the educational operation until its procedures are appropriate for reaching its goals.

The basic assumptions underlying formative evaluation are the following:

- 1) An educational programme, in general, is an imperfect venture, achieving somewhat less competently than what its operators intend; and
- 2) The most important purpose of evaluation is improvement of operations; the important judgments to be made are those that relate to factors which can be altered.

Thus, the purpose of formative evaluation is to provide data/information and judgments, which will be useful in making an imperfect operation better. The logic of formative evaluation is to be altogether consistent with real world of needed social action and contextual uncertainties: it relates to systems in process, and seeks to provide ways and means of bringing improvement in it rather than only passing judgment that will discourage and defeat the motivated efforts of those involved in the process.

ii) **Summative evaluation:** This is done at the end of the project, scheme or programme and involves considering the project/scheme/programme as a whole, from its beginning to end. It is meant to summarise and inform decisions about whether to continue the project (or parts of it), whether it is valuable to expand it into other settings. It involves seeking answers to questions such as:

- what were the main benefits and disappointments?
- what factors/things helped and hindered the project?
- in retrospect, what could have strengthened it?
- what could be the advice to others willing to embark on something similar?
- what aspects can and will be sustained and how?
- is it worth continuing in its current form? Why/why not?
- what recommendations have emerged about where to from here?

Summative evaluation is thus holistic and collects information and makes judgments about all related aspects — strategies, processes, activities and outcomes — thus provide an insight into resultant impact/outcome. The evaluation is an appraisal of worth or merit of the given scheme, project or programme. Usually this type of evaluation is needed for decision-making. The decision alternatives may include the following: disseminate the intervention to other sites or agencies; continue funding; increase funding; continue on probationary status; modify and try again; or discontinue it, if it does not merit continuation.

Any combination of measurements and judgments permit concrete or effective conclusions to be drawn about impact, outcome or benefits of a program or method. Evaluation is, thus, intended to provide a basis of judgment of the worth of effects of the instructional, extension or developmental programme. Hence, summative evaluation is generally based upon the measurements of the final outcomes/effects. What actually results from a programme is compared with what was intended and is judged to have reached or not reached satisfactory levels of outcome.

16.4.1.3 Types based on the Agency Conducting Evaluation

Based on the agency involved in conducting evaluation, it is conveniently divided into the following two types.

- i) **Internal evaluation:** It is the evaluation conducted by the implementing agency itself to know the progress of the programme and its outcomes.
- ii) **External evaluation:** It is the evaluation conducted by an external agency by following the same procedures and guidelines of evaluation in measuring the programme and its outcomes.

Suchman (1976) identified five different types of measurements as part of evaluation: i) Measurement of effort; ii) Measurement of performance; iii) Measurement of adequacy of effort; iv) Measurement of project efficiency; and v) Process evaluation — assesses overall functioning of the project in all its dimensions of co-ordination, structure, planning, leadership roles and other aspects as its collective measures.

16.4.2 Steps Involved in Evaluation Process

For conducting evaluation, we need to know the steps involved in evaluation process. Most competent evaluation encompass a series of four essential operations best described as steps or stages. They include: *description*, *measurement*, *assessment* and *evaluation*, which are described hereunder.

- 1) **Description:** The descriptions of phenomena to be evaluated form the first step. Usually these descriptions are verbal, graphic and pictorial and are often more meaningful.
- 2) **Measurement:** This step is necessary if clear-cut assessment is to follow. Most scientists in physical and social science domains insist that descriptions that have not been quantified form an inadequate basis for comparative analysis. The differences that may exist can sometimes be determined “by inspection”, but without measurements (expressions of the descriptions in numerical terms) the significance of the contrasts can be stated only subjectively.
- 3) **Assessment:** Comparisons of two or more measurements constitute *assessment*. Two scores representing two different learners, for example, can be used to assess that one has achieved more than the other. Two measurements taken on the same learners at two different times can also be used to assess that a learning change has taken place. Even the statistical significance of these differences (gains, losses, relative competencies, etc.) can be determined as assessment activities. But, to say that the gain is important and the learners have achieved well, or that the competency is adequate requires a step beyond assessment; such judgments are representations of outcomes of evaluation.
- 4) **Evaluation:** It is the process of putting a value judgment on the conclusions of an assessment. Or, putting it in another way, evaluation is the judgment of the worth or importance of an empirical finding.

16.5 MONITORING AND EVALUATION DESIGN

In this section, we will touch upon the components and indicators of good monitoring and evaluation design. Good monitoring and evaluation design has the following five components (World Bank, 1996):

- i) Clear statements of measurable *objectives for the project* and its components, for which indicators can be defined.
- ii) A *structured set of indicators*, covering outputs of goods and services generated by the project and their impact on beneficiaries.
- iii) Provisions for *collecting data and managing project records* so that the data required for indicators are compatible with existing statistics, and are available at reasonable cost.
- iv) *Institutional arrangements* for gathering, analyzing and reporting project data, and for investing in capacity-building to sustain the M & E service.
- v) *Strengthening decision-making* through proposals for the ways in which M & E findings will be fed-back into decision-making.

The following examples will help you in better understanding the above components of the design.

- i) **Project objectives:** Projects are designed to further long-term sectoral goals, but their immediate objectives should be readily measurable. Thus, for example, a health project might be designed to further the sectoral goals of reduction in child mortality and incidence of infectious diseases, but have an immediate measurable objective of providing more equitable access to health services. So, the objectives should be specific to the project interventions, realistic in the time-frame for their implementation and measurable for evaluation.

India's *District Primary Education Project*, for example, set out its objectives at the district level in clear statements linked directly to indicators such as the following:

- *Capacity building:* District sub-project teams would be fully functional, implementing sub-project activities and reporting quarterly on progress. In-service teams would be functioning, with augmented staff and equipment, providing support for planning and management in-service teacher training, development of learning materials, and programme evaluation.
- *Reducing dropout and improving learning achievement:* School and the community organizations would be fully functional for at least half the schools, and dropout rates would be reduced to less than 10 per cent. Learning achievements in language and mathematics in the final year of primary school would be increased by 25 per cent over baseline estimates.
- *Improving equitable access:* Enrollment disparities by gender and caste would be reduced to less than 5 per cent.

- ii) **Indicators:** Broadly speaking, the indicators of monitoring and evaluation design include the following. *Input indicators* are to be quantified and time-bound statements of resources to be provided. Information on these indicators comes largely from accounting and management records. Input indicators are often left out of discussions of project monitoring, though they are part of the management information system. A good accounting system is needed to keep track of expenditures and provide cost data for performance analysis of outputs. Input indicators are used mainly by managers closest to the tasks of implementation, and are consulted frequently, as often as daily or weekly. For example, vehicle operating costs for the crop extension service; levels of financial contributions from the government or co-financiers; appointment of staff; provision of buildings; status of enabling legislation, etc.

- *Process indicators* measure what happens during implementation. Often, they are tabulated as a set of contracted completions or milestone events taken from an activity plan. Some examples are: date by which building site clearance must be completed; latest date for delivery of fertilizer to farm stores; number of health outlets reporting family planning activity; number of women receiving contraceptive counseling; status of procurement of school textbooks, etc.

- *Output indicators* show the immediate physical and financial outputs of the project: physical quantities, organizational strengthening, and initial flows of services. They include performance measures based on cost or operational ratios. Some examples are: kilometers of all-weather highway completed by the end of September; percentage of farmers attending a crop-demonstration site before fertilizer top-dressing; number of teachers trained in textbook use; cost per kilometer of road construction; crop yield per hectare; ratio of textbooks to pupils; time taken to process a credit application; number of demonstrations managed per extension worker; etc.
 - *Impact indicators* refer to medium or long-term developmental change. It is also referred to a further class of outcome indicators, more specific to project activities than impact indicators, which may be sectoral statistics, and deal more with the direct effect of project outputs on beneficiaries). Measures of change often involve complex statistics about economic or social welfare and depend on data that are gathered from beneficiaries. Some examples include: incidence of low birth weight, percentage of women who are moderately or severely anemic (health); continuation rates from primary to secondary education by sex, proportion of girls completing secondary education (education); per cent decrease in area harvested, per cent increase in household income through sales of wood and non-wood products (forestry). Early indications of impact may be obtained by surveying beneficiaries' perceptions about project services. This type of leading indicator has the twin benefits of consultation with stakeholders and advance warning of problems that might arise. Examples of beneficiary perceptions are: proportion of farmers who have tried a new variety of seed and intend to use it again; percentage of women satisfied with the maternity health care they received.
- iii) **Collecting data and managing project records:** The achievement of project objectives normally depends on how project beneficiaries respond to the goods or services delivered by the project. Evidence of their response and the benefits they derive requires consultation and data collection that may be outside the scope of management. It is important to identify how beneficiaries are expected to respond to project services, because managers will need evidence of that response if they are to modify their activities and strategy. Indications that beneficiaries have access to, are using, and are satisfied with project services give early indication that the project is offering relevant services and that direct objectives are likely to be met. Such evidence-market-research may be available sooner and more easily than statistics of impact such as changes in health status or improvements in income. Market research information is an example of a leading indicator of beneficiary perceptions that can act as a proxy for later substantive impact. Other examples include: price levels used for economic analysis, passenger-load factors in transport projects, and adoption of healthcare practices. When planning the information needs of a project, the difference between the detailed information needed for day-to-day management by the implementing agency and that required for impact evaluation to summarize overall progress in reports to higher management levels needs to be kept in mind. For example, during construction of village tube-wells, project managers will need to keep

records about the materials purchased and consumed, the labor force employed and their contracting details, the specific screen and pump fitted, the depth at which water was found, and the flow rate. The key indicators of impact, however, might be just the number of wells successfully completed and their average costs and flow rates.

There are always *exogenous indicators* that cover factors outside the control of the project but which might affect its outcome, including risks (parameters identified during economic, social, or technical analysis, that might compromise project benefits); and the performance of the sector in which the project operates. Concerns to monitor both the project and its wider environment call for a data collection capacity outside the project and place an additional burden on the project's M & E effort. One needs to keep in mind this clarity on the distinction between indicators of implementation progress and indicators of development results. The data collection for this purpose may be done from project field records, surveys and studies, data comparability, and participatory methods, among others.

- iv) ***Institutional arrangements - Capacity building:*** Good M & E should develop the capacity of the borrower and build on existing systems. Capacity building is widely acknowledged to be important but is often poorly defined. It means: upgrading skills in monitoring and evaluation which include project analysis, design of indicators and reporting systems, socio-economic data collection, and information management; improving procedures to create functional systems that seek out and use information for decisions; and strengthening organizations to develop skilled staff in appropriate positions, accountable for their actions.
- v) ***Strengthening decision-making through feedback based on findings of monitoring and evaluation:*** In projects where operating performance standards are quoted as an objective, or where decentralized processes call for localized capacity to plan and manage work-programmes and budgets, designers will need to describe how and when M & E findings will be used to shape work-plans and contribute to program or policy development. In Mexico, for example, the Second Decentralization and Regional Development Project has no specific monitoring and evaluation unit. Instead, each management sub-unit responsible for technical oversight of a component is responsible for ensuring the quality and timeliness of data collection, and for producing and analyzing reports. These reports will be presented by project component and be used to help diagnose technical and institutional implementation issues, propose and conduct studies, and plan institutional development and training.

Experience with Implementation: Even with a good design for M & E, the World Bank's experience shows that success during implementation depends heavily on a sense of ownership by the borrower, adequate capacity in borrower institutions, and sustained interest from the task and project managers throughout the life of the project. Two factors are important here. One, the borrower's sense of ownership of the project provides a stimulus to transparent management and good information about progress. The other is that, often borrowers doubt the value of adopting what may be costly and time-consuming procedures to collect, analyze, and report information. In such circumstances sound design is especially important, with monitoring

information providing a clear input to management decision-making and, often, an emphasis on the early gains to be had from monitoring and on institutional procedures that encourage the use of monitoring data to trigger further implementation decisions.

Check Your Progress

Notes: a) Space given below the question is for writing your answer.

b) Check your answer with the one given at the end of this unit under “Answers to ‘Check Your Progress’ Questions.”

2) i) What are the important aspects of monitoring of an extension programme?

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ii) What are different types of evaluation?

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iii) What are the steps involved in evaluation process?

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iv) Write in brief about Monitoring and Evaluation Design.

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16.6 METHODS AND TECHNIQUES OF MONITORING AND EVALUATION

Various methods, techniques and tools are used for monitoring and evaluation of extension projects. Some of the methodologies which are popular among the project managers are: Critical Path Method (CPM), Programme Evaluation and Review Technique (PERT), Event Chain methodology and Gantt charts. In this section, we will focus on these methods, techniques and tools which are more relevant in the context of monitoring and evaluation of extension projects.

16.6.1 Critical Path Method (CPM)

The Critical Path Method (CPM) is an important tool for effective project management. It is one of several related techniques for doing project planning. CPM is for projects that are made up of a number of individual “activities”. If some of the activities require other activities to finish before they can start, then the project becomes a complex web of activities. The Critical Path Method (CPM) is an algorithm for scheduling a set of project activities (Kelley James, 1961).

16.6.1.1 Origin of the CPM

The Critical Path Method (CPM) is a project modeling technique developed in the late 1950s by Morgan R. Walker of DuPont and James E. Kelley, Jr. of Remington Rand to address the challenge of shutting down chemical plants for maintenance and then restarting the plants once the maintenance had been completed. Kelley and Walker (1959) related their memories to the development of CPM in 1989. Kelley attributed the term “critical path” to the developers of the Program Evaluation and Review Technique which was developed at about the same time by Booz Allen Hamilton and the US Navy. The precursors of what came to be known as *Critical Path* were developed and put into practice by DuPont between 1940 and 1943 and contributed to the success of the Manhattan Project. Given the complexity of the process, they developed the Critical Path Method (CPM) for managing such projects.

CPM is commonly used with all forms of projects, including construction, aerospace and defense, software development, research projects, product development, engineering, and plant maintenance, among others. Any project with interdependent activities can apply this method of mathematical analysis. Although the original CPM program and approach is no longer used, the term is generally applied to any approach used to analyze a project network logic diagram.

16.6.1.2 Basic Purpose of CPM

CPM can help us figure out:

- how long a complex project will take to complete; and
- which activities are “critical,” meaning that they have to be done on time or else the whole project will take longer.

If you put in information about the cost of each activity, and how much it costs to speed up each activity, CPM can help us figure out:

- a) whether one should try to speed-up the project, and, if so,
- b) what is the least costly way to speed-up the project.

As we know an activity is a specific task. It gets something done. An activity will have two important properties:

- i) names of any other activities that have to be completed before this particular one can start.
- ii) its projected normal time duration.

For doing any speed-up cost analysis, we need to know the above two properties about each activity which will help us to determine:

- additional cost required to complete;
- a shorter time within which it is to be completed on a crash basis; and
- the higher cost of completing it on a crash basis.

CPM analysis starts after figuring out all the individual activities in the project.

CPM provides the following benefits:

- Provides a graphical view of the project.
- Predicts the time required to complete the project.
- Shows which activities are critical to maintaining the schedule.

CPM network diagram: CPM models the activities and events of a project as a network. Activities are depicted as nodes on the network and events that signify the beginning or ending of activities are depicted as arcs or lines between the nodes. The following is an example of a CPM network diagram:

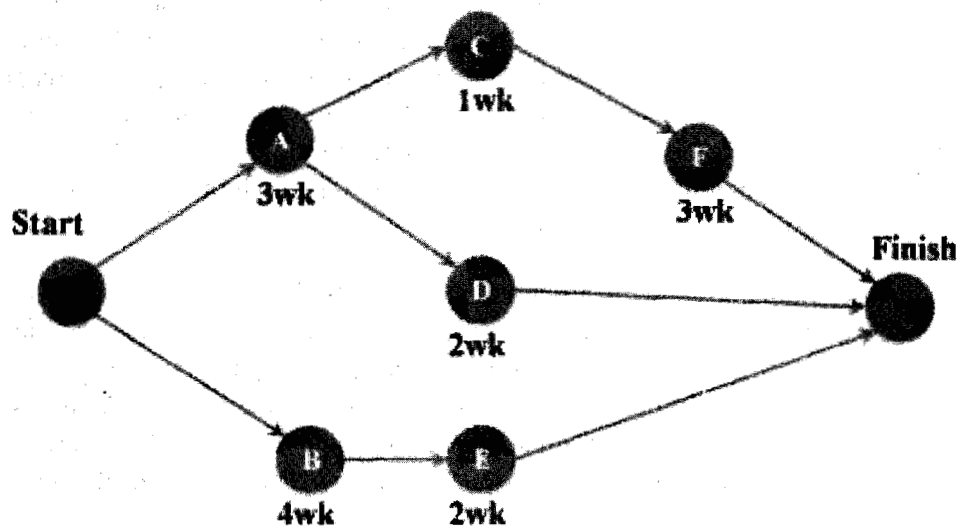


Fig. 16.1: CPM Diagram

16.6.1.3 Steps in CPM Project Planning

The following steps are involved in planning the CPM Project:

- i) **Specify the individual activities:** From the work-breakdown structure, a listing can be made of all the activities in the project. This listing can be used as the basis for adding sequence and duration information in later steps.

- ii) **Determine the sequence of the activities:** Some activities are dependent on the completion of others. A listing of the immediate predecessors of each activity is useful for constructing the CPM network diagram.
- iii) **Draw a network diagram:** Once the activities and their sequencing have been defined, the CPM diagram can be drawn. CPM network is originally drawn as an Activity on Node (AoN) network, but some project planners prefer to specify it as the Activities on Arcs (AoA).
- iv) **Estimate the completion time for each activity:** The time required to complete each activity can be estimated using past experience or the estimates of knowledgeable persons. CPM is a deterministic model that does not take into account variation in the completion time, so only one number is used for an activity's time estimate.
- v) **Identify the critical path (longest path through the network):** The critical path is the longest-duration path through the network. The significance of the critical path is that the activities that lie on it cannot be delayed without delaying the project. Because of its impact on the entire project, critical path analysis is an important aspect of project planning.

The critical path can be identified by determining the following four parameters for each activity:

- a) **ES (Earliest Start) time:** The earliest time at which the activity can start given that its precedent activities must be completed first.
- b) **EF (Earliest Finish) time:** It is equal to the earliest start time for the activity plus the time required to complete the activity.
- c) **LS (Latest Start) time:** It is equal to the latest finish time minus the time required to complete the activity.
- d) **LF (Latest Finish) time:** It is the latest time at which the activity can be completed without delaying the project.

The *slack time* for an activity is the time between its earliest and latest start time, or between its earliest and latest finish time. *Slack is the amount of time that an activity can be delayed past its earliest start or earliest finish without delaying the project.*

The *critical path* is the path through the project network in which none of the activities have slack, that is, the path for which $ES=LS$ and $EF=LF$ for all activities in the path. *A delay in the critical path delays the project.* Similarly, to accelerate the project it is necessary to reduce the total time required for the activities in the critical path.

- vi) **Update the CPM diagram as the project progresses:** As the project progresses, the actual task-completion times will be known and the network diagram can be updated to include this information. A new critical path may emerge, and structural changes may accordingly be made in the network if project requirements change.

CPM helps us identify a complex project's critical paths. One can find out how long a project will take and which activities must be on time. If we also have

information about costs and crash costs and times, CPM helps us determine how long the project should take, and which activities should be speeded up (“crashed”) to complete it early. To sum-up, the steps in brief are:

- a) Have a list of the activities.
- b) Draw the network diagram.
- c) Put activity names, node numbers, times, and costs in a spread-sheet.
- d) Use path find to generate code for the paths.
- e) Put the path information into the spread-sheet.
- f) Calculate the paths’ times.
- g) Identify the critical paths and the activities in each path.
- h) Set up the formula to calculate the project’s total cost.
- i) Fill in the Tools Solver... form.
- j) Solve, and fix errors, if any.
- k) For an economic analysis, change the maximum time constraint and solve again. Repeat until costs, including penalties and bonuses, start to go up.

16.6.1.4 Limitations of CPM

CPM was developed for complex but fairly routine projects with minimal uncertainty in the project completion times. For less routine projects there is more uncertainty in the completion times, and this uncertainty limits the usefulness of the deterministic CPM model.

An alternative to CPM is the PERT project planning model, which allows a range of durations to be specified for each activity.

Check Your Progress

Notes: a) Space given below the question is for writing your answer.

b) Check your answer with the one given at the end of this unit under “Answers to ‘Check Your Progress’ Questions.”

3) i) Explain the origin of Critical Path Method (CPM).

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ii) What are the activities of CPM?

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iii) What are the steps involved in planning the CPM Project?

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16.6.2 Programme (or Project) Evaluation and Review Technique (PERT)

Program (or Project) Evaluation and Review Technique (PERT) is a method to analyze the tasks involved in completing a given project, especially the time needed to complete each task, and identifying the minimum time needed to complete the total project. It is commonly used in conjunction with the critical path method or CPM. The PERT is a network model that allows for randomness in activity completion times. *It has the potential to reduce both the time and cost required to complete a project.*

PERT was developed primarily to simplify the planning and scheduling of large and complex projects. It was developed for the U.S. Navy Special Projects Office in 1957 to support the U.S. Navy's Polaris nuclear submarine project having thousands of contractors. It was able to incorporate uncertainty by making it possible to schedule a project while not knowing precisely the details and durations of all the activities. *It is more of an event-oriented technique rather than start- and completion-oriented, and is used more in projects where time, rather than cost, is the major factor.* It is applied to very large-scale, one-time, complex, non-routine Infrastructure and Research and Development projects. An example of this was for the 1968 Winter Olympics in Grenoble which applied PERT from 1965 until the opening of the 1968 Games.

This project model was the first of its kind, a revival for scientific management, founded by Frederick Taylor (Taylorism) and later refined by Henry Ford (Fordism). DuPont Corporation's critical path method was invented at roughly the same time as PERT. *It is a project management tool that provides a graphical representation of a project's time-line.* PERT charts allow the tasks in a particular project to be analyzed, with particular attention to the time required to complete each task, and the minimum time required to finish the entire project.

16.6.2.1 PERT Chart

Investopedia (<http://www.investopedia.com/terms/p/pert-chart.asp#axzz1hqiqRQvK>) explains a PERT chart as a graph that represents all the tasks necessary to a project's completion, and the order in which they must be completed along with the corresponding time requirements. Certain tasks are dependent on serial tasks, which must be completed in a certain sequence. Tasks that are not dependent on the completion of other tasks are called parallel or concurrent tasks and can generally be worked on simultaneously. PERT charts are preferable to Gantt charts because they identify more clearly the task dependencies; however, the PERT chart is often more challenging to interpret. As such project managers frequently employ both the methodologies, CPM and PERT.

PERT is a widely used method for planning and coordinating large-scale projects. As Kerzner Harold (2003) explained in his book *Project Management*, "PERT is basically a management planning and control tool. It can be considered as a road map for a particular program or project in which all of the major elements (events) have been completely identified, together with their corresponding interrelations. *PERT charts are often constructed from back to front because, for many projects, the end date is fixed and the contractor has front-end flexibility.* A basic element of PERT-style planning is to identify critical activities on which others depend. The technique is often referred to as PERT/CPM, the CPM standing for "critical path method."

PERT was developed during the 1950s through the efforts of the U. S. Navy and some of its contractors working on the Polaris missile project. Concerned about the growing nuclear arsenal of the Soviet Union, the U. S. government wanted to complete the Polaris project as quickly as possible. The Navy used PERT to coordinate the efforts of some 3,000 contractors involved with the project. Experts credited PERT with shortening the project duration by two years. Since then, all government contractors have been required to use PERT or a similar project analysis technique for all major government contracts.

Conventions: Following are the important conventions of PERT chart.

- A PERT chart is a tool that facilitates decision-making. The first draft of a PERT chart will number its events sequentially in 10s (10, 20, 30, etc.) to allow the later insertion of additional events.
- Two consecutive events in a PERT chart are linked by activities which are conventionally represented as arrows (see the diagram in Figure 16.2).
- The events are presented in a logical sequence and no activity can commence until its immediately preceding event is completed.
- The planner decides which milestones should be PERT events and also decides their "proper" sequence.
- A PERT chart may have multiple pages with many sub-tasks.

PERT is valuable tool to manage where multiple tasks are occurring simultaneously to reduce redundancy.

Network Diagrams: The chief feature of PERT analysis is a network diagram that provides a visual depiction of the major project activities and the sequence in which they must be completed. Activities are defined as distinct steps toward completion of the project that consume either time or resources. The network

diagram consists of arrows and nodes and can be organized using one of two different conventions. The arrows represent activities in the *activity-on-arrow convention*, while the nodes represent activities in the *activity-on-node convention*. For each activity, managers provide an estimate of the time required to complete it.

The sequence of activities leading from the starting point of the diagram to the finishing point of the diagram is called a *path*. The amount of time required to complete the work involved in any path can be figured by adding up the estimated times of all activities along that path. The path with the longest total time is then called the “*critical path*”, hence the term CPM. The critical path is the most important part of the diagram for managers: it determines the completion date of the project. Delays in completing activities along the critical path necessitate an extension of the final deadline for the project. If a manager hopes to shorten the time required to complete the project, he or she must focus on finding ways to reduce the time involved in activities along the critical path.

The time estimates managers provide for the various activities comprising a project that involve different degrees of certainty. When time estimates can be made with a high degree of certainty, they are called *deterministic estimates*. When they are subject to variation, they are called *probabilistic estimates*. In using the probabilistic approach, managers provide three estimates for each activity: a) an optimistic or best case estimate; b) a pessimistic or worst case estimate; and c) the most likely estimate. Statistical methods can be used to describe the extent of variability in these estimates, and thus the degree of uncertainty in the time provided for each activity. Computing the standard deviation of each path provides a probabilistic estimate of the time required to complete the overall project.

In a project, *an activity is a task that must be performed* and *an event is a milestone* marking the completion of one or more activities. Before an activity can begin, all of its predecessor activities must be completed. Project network models represent activities and milestones by arcs and nodes. PERT originally was an activity-on-arc network, in which the *activities are represented on the lines and milestones on the nodes*. Over time, some people began to use PERT as an activity-on-node network.

The PERT chart may have multiple pages with many sub-tasks. The following is a very simple example of a PERT diagram:

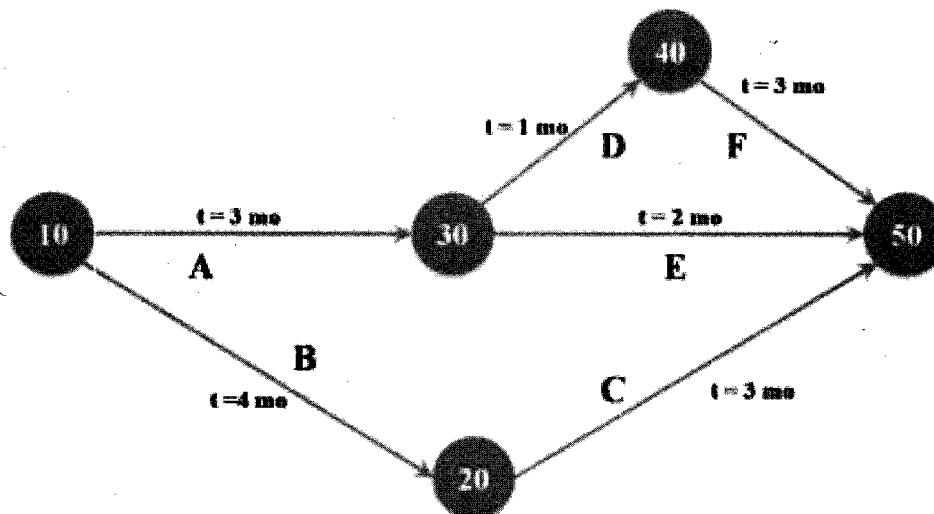


Fig. 16.2: PERT Chart

The milestones generally are numbered so that the ending node of an activity has a higher number than the beginning node. Incrementing the numbers by 10 allows for new ones to be inserted without modifying the numbering of the entire diagram. The activities in the above diagram are labeled with letters along with the expected time required to complete the activity.

16.6.2.2 PERT Analysis

Managers can obtain a great deal of information by analyzing network diagrams of projects. For example, network diagrams show the sequence of activities involved in a project. From this sequence, managers can determine which activities must take place before others can begin, and which can occur independently of one another. Managers can also gain valuable insight by examining paths other than the critical path. Since these paths require less time to complete, they can often accommodate slippage without affecting the project completion time. The difference between the length of a given path and the length of the critical path is known as *slack*. Knowing where slack is located helps managers to allocate scarce resources and direct their efforts to control activities.

For complex problems involving hundreds of activities, computers are used to create and analyze the project networks. The project information input into the computer includes the earliest start time for each activity, earliest finish time for each activity, latest start time for each activity, and latest finish time for each activity without delaying the project completion. From these values, a computer algorithm can determine the expected project duration and the activities located on the critical path. Managers can use this information to determine where project time can be shortened by injecting additional resources like workers or equipment. Needless to say, the solution of the algorithm is easy for the computer, but the resulting information will only be as good as the estimates originally made. Thus, PERT depends on good estimates and sometimes inspired guesses.

PERT offers a number of advantages to managers. For example, it forces them to organize and quantify project information and provides them with a graphic display of the project. It also helps them to identify which activities are critical to the project completion time and should be watched closely, and which activities involve slack time and can be delayed without affecting the project completion time. The *chief disadvantages* of PERT lie in the nature of reality. Complex systems and plans, with many suppliers and channels of supply involved, sometimes make it difficult to predict precisely what will happen. The technique works best in well-understood engineering projects where sufficient experience exists to predict tasks accurately in advance.

16.6.2.3 Steps in the PERT Planning Process

PERT planning involves the following steps:

- 1) Identify the specific activities and milestones.
- 2) Determine the proper sequence of the activities.
- 3) Construct a network diagram.
- 4) Estimate the time required for each activity.
- 5) Determine the critical path.
- 6) Update the PERT chart as the project progresses.

- i) **Identify the specific activities and milestones:** The activities are the tasks required to complete the project. The milestones are the events marking the beginning and end of one or more activities. It is helpful to list the tasks in a table so that in later steps they can be expanded to include information on sequence and duration.
- ii) **Determine the proper sequence of the activities:** This step may be combined with the activity identification step since the activity sequence is evident for some tasks. Other tasks may require more analysis to determine the exact order in which they must be performed.
- iii) **Construct a network diagram:** Using the activity sequence information, a network diagram can be drawn showing the sequence of the serial and parallel activities. For the original activity-on-arc model, the activities are depicted by arrowed lines and milestones are depicted by circles or “bubbles”. If done manually, several drafts may be required to correctly portray the relationships among activities. Software packages simplify this step by automatically converting tabular activity information into a network diagram.
- iv) **Estimate the time required for each activity:** Weeks are a commonly used unit of time for activity completion, but any consistent unit of time can be used.

A distinguishing feature of PERT is its ability to deal with uncertainty in activity completion times. For each activity, the model usually includes three time estimates:

- **Optimistic time:** This is generally the shortest time in which the activity can be completed.
 - **Most likely time:** The completion time having the highest probability. Note that this time is different from the expected time.
 - **Pessimistic time:** The longest time that an activity might require.
- v) **Determine the critical path:** The critical path is determined by adding the times for the activities in each sequence and determining the longest path in the project. The critical path determines the total calendar time required for the project. If activities outside the critical path speed up or slow down (within limits), the total project time does not change. The amount of time that a non-critical path activity can be delayed without delaying the project is referred to as slack time.

If the critical path is not immediately obvious, it may be helpful to determine the following four quantities for each activity: a) ES (Earliest Start) time, b) EF (Earliest Finish) time, c) LS (Latest Start) time, and d) LF (Latest Finish) time.

These times are calculated using the expected time for the relevant activities. The earliest start and finish times of each activity are determined by working forward through the network and determining the earliest time at which an activity can start and finish considering its predecessor activities. The latest start and finish times are the latest times that an activity can start and finish without delaying the project. LS and LF are found by working backward through the network. The difference in the latest and earliest finish of each

activity is that activity's slack. Then, *the critical path is the path through the network in which none of the activities have slack.*

Since the critical path determines the completion date of the project, the project can be accelerated by adding the resources required to decrease the time for the activities in the critical path. Such a shortening of the project sometimes is referred to as *project crashing*.

- vi) ***Update the PERT chart as project progresses:*** Make adjustments in the PERT chart as the project progresses. As the project unfolds, the estimated times can be replaced with actual times. In cases where there are delays, additional resources may be needed to stay on schedule and the PERT chart may be modified to reflect the new situation.

16.6.2.4 Advantages and Disadvantages of Using PERT

Advantages: The advantages include the following.

- PERT makes planning much easier. The PERT chart comes in handy when identifying relationships between tasks and task dependencies. Thus, answering some major questions regarding the time required to complete each task and which task should precede or follow that particular task becomes easy.
- There is an important related aspect called the 'Critical Path in the Program Evaluation and Review Technique'. This term refers to the longest possible continuous pathway taken from the initial event to the terminal event. Since the Critical Path determines how much time it is going to take to complete the entire project, it helps managers in decision-making. Sometimes, if there are delays to be made in some tasks, the Critical Path helps in deciding how the task can be delayed without affecting the project completion time.
- For projects in which time matters the most, this technique can help reduce the project duration by helping the planners better understand the activities and their dependencies which in turn can potentially be made into overlapping tasks. In the long run, the power of the PERT is the chart which contains project data and serves as a vital tool for decision-making.

Disadvantages: These include the following.

- The charts tend to be quite complex as the size of the project increases. In fact, in certain situations it wouldn't be uncommon to end up with thousands of activities and so many dependencies that someone brand new to project planning could become quickly confused and overwhelmed. On top of that, developing, maintaining and updating this chart can be expensive and difficult all at the same time. And, sometimes, the PERT chart can even extend to multiple pages with a number of sub-tasks thus making it all the more complex.
- At times the prediction inaccuracies occur in using this technique for project planning. Unless someone with significant experience is planning the project using this technique, many of the predictions can go horribly wrong, thus interfering with the entire time required to complete the project. The estimation can go wrong due to human error or unforeseen risks and unfortunate events.

- **Uncertainty in project scheduling:** During project execution, however, a real-life project will never execute exactly as it was planned due to uncertainty. It can be ambiguity resulting from subjective estimates that are prone to human errors or it can be variability arising from unexpected events or risks. The main reason that the Project Evaluation and Review Technique (PERT) may provide inaccurate information about the project completion time is due to this schedule uncertainty. This inaccuracy is large enough to render such estimates as not helpful.

To conclude, one possibility to maximize solution robustness is to include safety in the baseline schedule in order to absorb the anticipated disruptions.

Check Your Progress

Notes: a) Space given below the question is for writing your answer.

b) Check your answer with the one given at the end of this unit under “Answers to ‘Check Your Progress’ Questions”.

4) i) What is the PERT Chart?

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ii) What are the steps involved in PERT planned process?

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iii) What are the advantages and disadvantages of PERT?

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16.6.3 Event Chain Methodology

Sometimes a project is affected by a large number of events (risks), which can significantly change its course. These events may form groups of related events or event chains. The event chain methodology can contribute to reducing uncertainties in project scheduling through mitigation of psychological biases and significant simplification of process of modeling, tracking and analysis of project schedule.

16.6.3.1 Definition of Event Chain Methodology

Event chain methodology is an uncertainty modeling and schedule-network analysis technique that is focused on identifying and managing events and event chains that affect project schedules. Event chain methodology is the next advance beyond critical path method and critical chain project management (Virine and Trumper, 2007).

Event chain methodology helps to mitigate effect of motivational and cognitive biases in estimating and scheduling (Robyn and Bernard, 1974; Tversky and Kahneman, 1972). In many cases, project managers intentionally or unintentionally create project schedules that are impossible to implement (Flyvbjerg, 2006; Flyvbjerg, Holm and Buh, 2002). The methodology also simplifies the process of defining risks and uncertainties in project schedules, particularly by improving the ability to provide reality checks and to visualize multiple events. *Event chain methodology is used to perform more accurate quantitative analysis, while taking into account such factors as relationships between different events and actual moments of the events.*

16.6.3.2 Principles of Event Chain Methodology

Event Chain Methodology is based on *six major principles* which are given below.

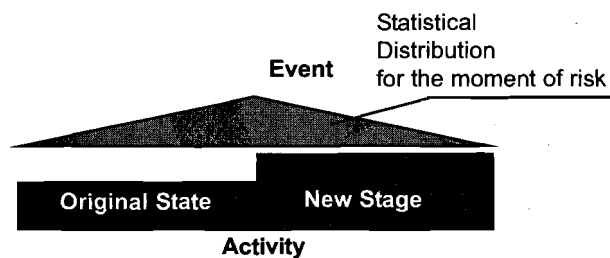


Fig. 16.3: Moment of Risk and State of Activity

- 1) **Moment of risk and state of activity:** An activity (task) in most real life processes is not a continuous uniform procedure. It is affected by external events, which transform an activity from one state to another. It is important to point out that these events occur during the course of an activity. The moment, when an event occurs, in most cases is probabilistic and we can define it using statistical distribution. Events (risks) can have a negative impact on the project. For example, the event “delayed arrival of component” can cause a delay in an activity. However, the opposite is also true, that is, events can positively affect an activity, e.g. reduce costs.

- 2) **Event chains:** Events can cause other events, which will create event chains. These event chains can significantly affect the course of the project. For example, requirement changes can cause a delay of a task. To accelerate the activity, a resource is allocated from another activity; which can lead to a missed deadline. Eventually, this can lead to the failure of the project. Events may instantly trigger other events or transform an activity to another state. The notion of state is very important as states can serve as a precondition for other events. For example, if a change of requirements causes a delay, it transforms the activity to a different state. In this state, the event “reallocate resource” can occur. Alternatively, it is possible, if the task is in certain state, an event cannot occur.
- 3) **Monte Carlo simulations:** Once events and event chains are defined, we can perform quantitative analysis using Monte Carlo simulation to determine uncertainties and quantify the cumulative impact of the events. Probabilities and effects of risks are used as input data for Monte Carlo simulation of the project schedule (Williams, 2006). Sometimes, we can supplement information about uncertainties expressed as an event with distributions related to duration for start time, cost, and other parameters, as done in classic Monte Carlo simulations. However, in these cases it is important to discriminate between the factors that are contributing to the distribution and the results of events to avoid a double count of the same factors.
- 4) **Critical chains of events:** The event chains that have the most potential to affect the projects are the “critical chains of events.” By identifying critical chains of events, we can mitigate their negative effects. We can identify these critical chains of events by analyzing the correlations between the main project parameters, such as project duration or cost, and the event chains.
- 5) **Performance tracking with Event Chains:** Monitoring the activity’s progress ensures that updated information is used to perform the analysis. During the course of the project, the probability and time of the events can be recalculated based on actual data. The main issue with performance tracking is forecasting an activity’s duration and cost if an activity is partially completed and certain events are assigned to the activity. The simple heuristic approach to this problem is to analyze the moment of risk, which is defined as one of the event parameters. In addition, during the course of the project, we can recalculate the probability and time of the events based on actual data.
- 6) **Event Chain Diagrams:** Event Chain Diagrams are visualizations that show the relationships between events and tasks and how the events affect each other. The simplest way to represent these chains is to depict them as arrows associated with certain tasks or time intervals on the Gantt chart, which we will discuss in the sub-section (16.6.4) that follows. Different events and event chains can be displayed using different colors. Events can be global (for all tasks in the project) and local (for a particular task). By using Event Chain Diagrams to visualize events and event chains, the modeling and analysis of risks and uncertainties can be significantly simplified.

16.6.3.3 Phenomena of Event Chain Methodology

The application of Event Chain Methodology can lead to some interesting phenomena. Here are some examples that explain the phenomena.

- 1) Sometimes events can cause the start of an activity that has already been completed. This is a very common scenario for real life projects; sometimes a previous activity must be repeated based on the results of a succeeding activity. Modeling of these scenarios using event chain methodology is very simple. We do not have to update the original project schedule, we just need to create an event and assign it to an activity those points to the previous activity. In addition, we need to define a limit to the number of times an activity can be repeated.
- 2) Events can generate other activities that are not in the original project schedule. These are activities related to the mitigation plan. They are modeled outside of original project schedule and assigned to the event. The original schedule is augmented with these activities when the event occurs.
- 3) Event Chain Methodology offers a new way of resource-leveling and modeling of resource allocation as when an event is the reassignment of a resource from one activity to another, which can occur based on certain conditions. For example, if an activity requires more resources to complete it within a fixed period of time, this will trigger an event to reallocate the resource from another activity.
- 4) An event can cause other events to occur either immediately or with a delay. The delay is a property of the event. The delay can be deterministic, but in most cases, it is probabilistic. If we know the time of the original event and the delay, it is possible to determine when the new event can happen and in some cases, the activity that will be associated with it.

Check Your Progress

Notes: a) Space given below the question is for writing your answer.

b) Check your answer with the one given at the end of this unit under “Answers to ‘Check Your Progress’ Questions”.

- 5) i) Define Event Chain Methodology.

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- ii) What are the principles of Event Chain Methodology?

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iii) Explain the application of Event Chain Methodology.

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16.6.4 Gantt Chart

A Gantt chart is a horizontal bar chart developed as a production control tool in 1910's by Henry Laurence Gantt, an American engineer and social scientist. Though the Gantt chart was first introduced by him around the years 1910–1915 (Gantt, 1910; and Peter, 1994) similar charting methods were employed by a Polish steelworks expert named Karol Adamiecki during the 1890s. The Gantt chart we know and use today was nevertheless named after Henry Gantt (1861–1919), and has been used continuously by project managers since its inception. Medium-sized projects, as well as monumental projects such as the construction of the Hoover Dam – all enjoyed the benefits brought by the Gantt chart.

One of the first major applications of Gantt charts was during the First World War. On the initiative of General William Crozier, the then Chief of Ordnance these included that of the Emergency Fleet, the Shipping Board, etc (Wallace Clark and Henry Gantt, 1922). The Gantt chart is arguably the most popular tool used by project managers for project management. Its application is particularly useful in the scheduling phase of the project, when deciding on the flow of the tasks is critical.

In the 1980s, personal computers allowed for widespread creation of complex and elaborate Gantt charts. The first desktop applications were intended mainly for project managers and project schedulers. With the advent of the internet and increased collaboration over networks at the end of the 1990s, Gantt charts became a common feature of web-based applications, including collaborative groupware.

16.6.4.1 Using Gantt Chart for Project Management

A Gantt chart is basically a bar or a line chart oriented horizontally. The vertical axis is used for the list of tasks, while the horizontal axis represents the timeline. At the very top of the Gantt chart are divisions of time; the length of which is the project's estimated duration. At the left part of the Gantt chart, tasks are listed down to occupy one row each. Adjacent to these bars, just under the timeline are the actual schedules, represented by either bars or lines. The positions of these bars or lines correspond to the planned start and end dates for this task. Critical paths and interdependencies may be represented by lines, and all parts may be color-coded according to different criteria.

The Gantt chart helps to remove the hazards of overlapping multiple tasks of a business operation. Some of the components are the positive ideas he included in the chart, like motivational schemes, as well as highlighting of the rewards owed to the workers who work dedicatedly. Frequently used in project management, a Gantt chart provides a graphical illustration of a schedule that helps to plan, coordinate and track specific tasks in a project.

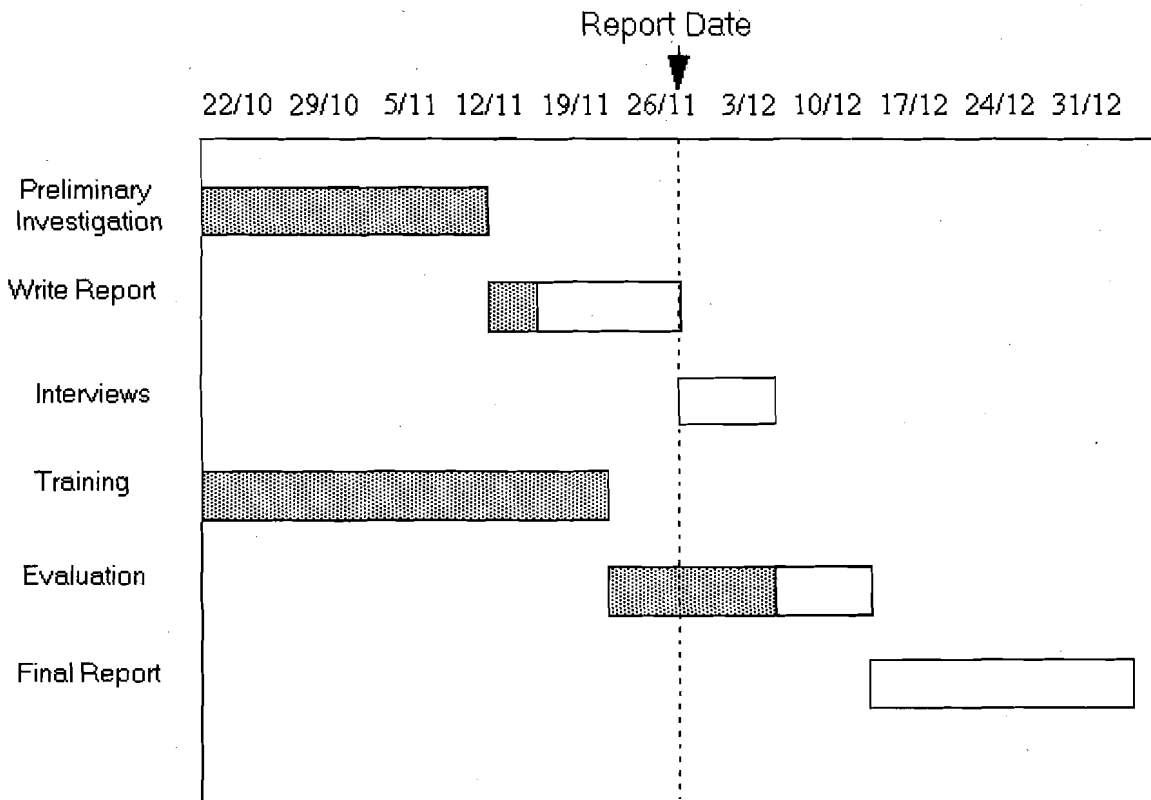


Fig. 16.4: Gantt Chart

A Gantt chart is constructed with a horizontal axis representing the total time span of the project, broken down into increments (for example, days, weeks, or months) and a vertical axis representing the tasks that make up the project (for example, if the project is outfitting your computer with new software, the major tasks involved might be: conduct research, choose software, install software). Horizontal bars of varying lengths represent the sequences, timing, and time-span for each task. Using the same example, we need to put “conduct research” at the top of the vertical axis and draw a bar on the graph that represents the amount of time you expect to spend on the research, and then enter the other tasks below the first one and representative bars at the points in time when you expect to undertake them. The bar spans may overlap, as for example, we may conduct research and choose software during the same time-span. As the project progresses, secondary bars, arrowheads, or darkened bars may be added to indicate completed tasks, or the portions of tasks that have been completed. A vertical line is used to represent the report date.

Gantt charts give a clear illustration of project status, but one problem with them is that they don't indicate task dependencies – it is difficult to tell how one task falling behind schedule affects other tasks. The PERT chart, another popular project management charting method, was designed to do this. Automated Gantt

charts store more information about tasks such as the individuals assigned to specific tasks and notes about the procedures. They also offer the benefit of being easy to change, which is helpful. Charts may be adjusted frequently to reflect the actual status of project tasks as almost inevitably; they diverge from the original plan.

When and when not to use a Gantt chart: When a project calls for precise scheduling, then it calls for a Gantt chart. A Gantt chart can help us analyze the flow of the tasks in a project, since it provides a display of more or less the entire project. Gantt charts are very useful in large projects in the sense that they allow us to spot any possible problems during the project. This, in turn, allows us to correct the problem before it occurs. Some, more complex Gantt charts will also help us make sure that a task does not use up the resources allotted for another task. Probably the most important benefit of the Gantt chart is that it will enable us to visualize the dependencies between tasks, ensuring that the project runs smoothly. For instance, if a number of tasks are dependent on the completion of a prerequisite task, then we can focus on the prerequisite task in the meantime. This is because delaying the prerequisite task creates a *domino effect* – all other tasks dependent on it will also be delayed.

Of course, not every project needs to have a Gantt chart. A Gantt chart is most effective when used for medium to large projects, particularly when there are many tasks that need to be carefully plotted and scheduled. Small projects with only a handful of tasks often do not need to employ a Gantt chart, as it may be sufficient, and in some cases more practical to just write down everything on a piece of paper. If you can even just memorize the flow and the schedules of the tasks, then it would be better not to use Gantt charts.

While the Gantt chart shows the dependencies between tasks, it does not display the relationship between one task's progress with another task. For cases where we need such a feature, it is often better to use other charting methods such as a PERT chart.

16.6.4.2 Advantages and Limitations of Gantt Charts

Gantt charts have become a common technique for representing the phases and activities of a project Work-Breakdown Structure (WBS) so that they can be understood by a wide audience all over the world.

A common error made by those who equate Gantt chart design with project design is that they attempt to define the project work-breakdown structure at the same time they define schedule activities. This practice makes it very difficult to follow the 100% Rule. Instead, the WBS should be fully defined to follow the 100% Rule, then the project schedule can be designed (Project Management Institute, 2003).

Although a Gantt chart is useful and valuable for small projects that fit on a single sheet or screen, they can become quite unwieldy for projects with more than about 30 activities. Larger Gantt charts may not be suitable for most computer displays. A related criticism is that Gantt charts communicate relatively little information per unit area of display. That is, projects are often considerably more complex than can be communicated effectively with a Gantt chart.

Gantt charts only represent part of the triple constraints (cost, time and scope) of projects, because they focus primarily on schedule management. Moreover, Gantt charts do not represent the size of a project or the relative size of work elements, therefore, the magnitude of a behind-schedule condition is easily miscommunicated. If two projects are behind schedule by the same number of days, the larger project has a larger impact on resource utilization, yet the Gantt does not represent this difference.

Although project management software can show schedule dependencies as lines between activities, displaying a large number of dependencies may result in a cluttered or unreadable chart. Because the horizontal bars of a Gantt chart have a fixed height, they can misrepresent the time-phased workload (resource requirements) of a project, which may cause confusion especially in large projects. A related criticism is that all activities of a Gantt chart show planned workload as constant. In practice, many activities (especially summary elements) have front-loaded or back-loaded work plans, so a *Gantt chart with percent-complete shading may actually miscommunicate the true schedule performance status.*

16.7 LET US SUM UP

In this unit, we have presented to you an overview of the concept, need, importance and types of monitoring and evaluation. We have described the design of monitoring and evaluation as well as the methods and techniques of project management and evaluation such as Critical Path Method (CPM), Programme Evaluation and Review Technique (PERT), Event Chain Methodology (ECM) and Gantt Charts. With this unit, you have completely studied Course MAE-004 and we hope that you have achieved the overall objectives of the course.

16.8 ANSWERS TO ‘CHECK YOUR PROGRESS’ QUESTIONS

- 1) Monitoring is the systematic collection, analysis and use of information related to implementation of the projects, programmes or schemes. It is a means of knowing and comparing actual progress in activities and results towards the objectives formulated in advance. Bamberger, et al define it as: “an internal project activity designed to provide constant feedback on the progress of a project, the problems it is facing and the efficiency with which it is being implemented”. In the context of non-formal education or extension education and development, the term monitoring is used to denote a process of watching periodically the progress of the programme or project with a view to identify the weaknesses or shortcomings, if any, and taking corrective measures in order to optimise the effectiveness of the programme’.

Unlike monitoring, *evaluation* is more comprehensive and in a literal sense, it is the determination of value to an object or a phenomenon. Evaluation is a study of the outcome of a project with the aim of informing the design of future projects. It is a process concerned with checking and improving the programmes. Evaluation covers pre-planning, planning, implementation and post-implementation stages of the programmes.

2) i) There are four important aspects of monitoring of non-formal education or extension programmes and are as follows.

- *Physical aspects:* Information relating to the geographical area being covered, the number of centres in operation, the location of centres, the target people and the personnel involved, adequacy of arrangements made including the equipment, participation of the people/community, coverage of special groups like women and persons belonging to SCs & STs and other disadvantaged sections.
- *Academic/Technical aspects:* Information on the programme content, availability and sustainability of the instructional and learning materials and other inputs, training of personnel including provision for in-service training.
- *Financial aspects:* Information relating to timely release of funds from the highest to the lowest levels, and timely utilisation of sanctioned/released funds, adherence to the procedures, payment of honorarium to the functionaries and others concerned, etc.
- *Administrative aspects:* Information pertaining to appointment and placement of personnel, arrangement for coordination between different departments, transparency, sincerity, adherence and commitment to the laid-down procedures, etc.

ii) *Types of Evaluation:* Depending upon the aspects, stages or agencies involved evaluation can be categorised into the following types.

- *Based on the aspects covered* evaluation is categorized as: a) context evaluation, b) input evaluation, c) process evaluation, and d) impact/outcome evaluation.
- *Based on the stage at which it is conducted* evaluation is categorized as: a) formative evaluation, and b) summative evaluation.
- *Based on the agency conducting it*, evaluation is categorized as: a) external evaluation, and b) internal evaluation.

iii) *Steps involved in evaluation:* Most competent evaluations are based on a series of four operations best described as a series of steps or stages. They include: *description, measurement, assessment, and evaluation*. The first step in the evaluation is description of phenomena to be evaluated. Usually these descriptions are verbal, graphic and pictorial. Secondly, measurement step is necessary if clear-cut assessment is to follow. It is an important basis for comparative analysis. The differences may exist but without measurements, the significance of the contrasts can be stated only subjectively. The assessment is in comparisons of two or more measurements. Two scores representing two projects can be used to assess as to which one has achieved better than the other. Evaluation is the process of putting a value judgment on the conclusions of an assessment or judgment of the worth or importance of an empirical finding.

- iv) *Monitoring and Evaluation design*: Good monitoring and evaluation design has five components, viz. a) Clear statements of measurable objectives for the project and its components, for which indicators can be defined, b) A structured set of indicators, covering outputs of goods and services generated by the project and their impact on beneficiaries, c) Provisions for collecting data and managing project records so that the data required for indicators are compatible with existing statistics, and are available at reasonable cost, d) Institutional arrangements for gathering, analyzing, and reporting project data, and for investing in capacity-building, to sustain the M & E service, and 5) Proposals for the ways in which M & E findings will be feedback into decision-making.
- 3) i) *Origin of Critical Path Method (CPM)*: The CPM is a project modeling technique developed by Morgan R. Walker and James E. Kelley, Jr. to address the challenge of shutting down chemical plants for maintenance and then restarting the plants once the maintenance had been completed in the late 1950s. Kelley attributed the term "critical path" to the developers of the Program Evaluation and Review Technique which was developed by Booz Allen Hamilton and the US Navy. To reduce the complexity of the process, they developed the Critical Path Method (CPM) for managing such projects. CPM is commonly used with all forms of projects including construction, aerospace and defense, software development, research projects, product development, engineering, and plant maintenance. Any project with interdependent activities can apply this method of mathematical analysis. This method is generally applied to any approach used to analyze a project network logic diagram.
- ii) *Activities of CPM*: An activity can have the properties such as the names of any other activities that have to be completed before the particular one can start and projected normal time duration. Further, if we want to do a speed-up cost analysis, we have to know the things such as a shorter time to complete on a crash basis and the higher cost of completing it on a crash basis about each activity.
- iii) *Steps involved in planning the CPM Project*: The steps involved in planning the CPM Project are: a) Specify the individual activities, b) Determine the sequence of these activities, c) Draw a network diagram, d) Estimate the completion time for each activity, e) Identify the critical path (longest path through the network), and f) Update the CPM diagram as the project progresses.
- 4) i) *PERT Chart*: A Program Evaluation and Review Technique (PERT) chart is a graph that represents all the tasks necessary to a project completion, and the order in which they must be completed along with the corresponding time requirements. PERT was developed during the 1950s through the efforts of the U. S. Navy and some of its contractors working on the Polaris missile project.

The PERT is a widely used method for planning and coordinating large-scale projects. It is basically a management planning and control tool. It can be considered as a road-map for a particular program or project in which all the major elements (events) have been completely identified,

together with their corresponding interrelations. PERT charts are often constructed from back to front because, for many projects, the end date is fixed and the contractor has front-end flexibility. A basic element of PERT-style planning is to identify critical activities on which others depend.

ii) *Steps involved in PERT planning process:* PERT planning involves the steps such as: a) Identify the specific activities and milestones, b) Determine the proper sequence of the activities, c) Construct a network diagram, d) Estimate the time required for each activity, e) Determine the critical path, and f) Update the PERT chart as the project progresses.

iii) PERT is useful because it has the following *advantages*:

- PERT chart explicitly defines and makes visible dependencies (precedence relationships) between the WBS elements,
- PERT facilitates identification of the critical path and makes this visible,
- PERT facilitates identification of early start, late start, and slack for each activity,
- PERT provides for potentially reduced project duration due to better understanding of dependencies leading to improved overlapping of activities and tasks where feasible, and
- The large amount of project data can be organized and presented in diagram for use in decision-making.

However, PERT has certain *disadvantages* such as the following.

- There can be potentially hundreds or thousands of activities and individual dependency relationships, which PERT chart may not accommodate clearly.
- The network charts tend to be large and unwieldy requiring several pages to print and requiring special size paper.
- The lack of a time-frame on most PERT/CPM charts makes it harder to show status although colours can help (e.g. specific colour for completed nodes).
- When the PERT/CPM charts become unwieldy, they are no longer used to manage the project.

51 i) *Event Chain methodology* is an uncertainty modeling and schedule-network analysis technique that is focused on identifying and managing events and event chains that affect project schedules. It is the next advance beyond critical path method and critical chain project management (Virine and Trumper, 2007). Event chain methodology is used to perform more accurate quantitative analysis while taking into account such factors as relationships between different events and actual moments of the events.

ii) *Principles of Event Chain Methodology:* Event Chain Methodology is based on six major principles. They are: a) Moment of risk and state of activity - an activity (task) in most real life processes is not a continuous

uniform procedure and it is affected by external events, which transform an activity from one state to another; b) Events can cause other events, which will create event chains. These event chains can significantly affect the course of the project. For example, requirement changes can cause a delay of a task. To accelerate the activity, a resource is allocated from another activity; which can lead to its missed deadline; c) Perform quantitative analysis by using Monte Carlo simulations to determine uncertainties and quantify the cumulative impact of the events; d) The event chains that have the most potential to affect the projects are the “critical chains of events.” By identifying ‘critical chains of events’, we can mitigate their negative effects. We can identify these critical chains of events by analyzing the correlations between the main project parameters, such as project duration or cost, and the event chains; e) Performance Tracking with Event Chains — the performance tracking is forecasting an activity’s duration and cost if an activity is partially completed and certain events are assigned to the activity. The simple heuristic approach to this problem is to analyze the moment of risk, which is defined as one of the event parameters. During the course of the project, we can recalculate the probability and time of the events based on actual data; and f) Event Chain Diagrams — these are visualizations that show the relationships between events and tasks and how the events affect each other. The simple way to represent these chains is to depict them as arrows associated with certain tasks or time intervals on the Gantt chart. By using these diagrams to visualize events and event chains, the modeling and analysis of risks and uncertainties can be significantly simplified.

- iii) *Application of Event Chain Methodology*: The application of Event Chain Methodology can lead to some interesting phenomena. Some of the examples are given below: a) Sometimes, events can cause the start of an activity that has already been completed. This is a very common scenario for real life projects. Sometimes a previous activity must be repeated based on the results of a succeeding activity. Modeling of these scenarios using event chain methodology is very simple. We do not have to update the original project schedule, we just need to create an event, assign it to an activity and those points to the previous activity. In addition, we need to define a limit to the number of times activity can be repeated. b) Events can generate other activities that are not in the original project schedule. These are activities related to the mitigation plan. They are modeled outside of the original project schedule and assigned to the event. The original schedule is augmented with these activities when the event occurs.

16.9 ABBREVIATIONS AND GLOSSARY OF CERTAIN TERMS USED

- *PERT event*: It is a point that marks the start or completion of one or more activities. It consumes no time and uses no resources. When it marks the completion of one or more tasks, it is not “reached” (does not occur) until all of the activities leading to that event have been completed.

- *Predecessor event*: It is an event that immediately precedes some other event without any other events intervening. An event can have multiple predecessor events and can be the predecessor of multiple events.
- *Successor event*: It is an event that immediately follows some other event without any other intervening events. An event can have multiple successor events and can be the successor of multiple events.
- *PERT activity*: It is the actual performance of a task which consumes time and requires resources (such as labor, materials, space, machinery). It can be understood as representing the time, effort, and resources required to move from one event to another. A PERT activity cannot be performed until the predecessor event has occurred.
- *Optimistic time (O)*: It is the minimum possible time required to accomplish a task, assuming everything proceeds better than is normally expected.
- *Pessimistic time (P)*: It is the maximum possible time required to accomplish a task, assuming everything goes wrong (but excluding major catastrophes).
- *Most likely time (M)*: It is the best estimate of the time required to accomplish a task, assuming everything proceeds as normal.
- *Expected time (T_E)*: It is the best estimate of the time required to accomplish a task, accounting for the fact that things don't always proceed as normal (the implication being that the expected time is the average time the task would require if the task were repeated on a number of occasions over an extended period of time). $T_E = (O + 4M + P) \div 6$
- *Float or Slack*: It is the amount of time that a task in a project network can be delayed without causing a delay — Subsequent tasks (free float) or Project Completion (total float).
- *Critical Path*: It is the longest possible continuous pathway taken from the initial event to the terminal event. It determines the total calendar time required for the project; and, therefore, any time delays along the critical path will delay the reaching of the terminal event by at least the same amount.
- *Critical Activity*: It is an activity that has total float equal to zero. Activity with zero float does not mean it is on the critical path.
- *Lead time*: It is the time by which a predecessor event must be completed in order to allow sufficient time for the activities that must elapse before a specific PERT event reaches completion.
- *Lag time*: It is the earliest time by which a successor event can follow a specific PERT event.
- *Slack*: The slack of an event is a measure of the excess time and resources available in achieving this event. Positive slack would indicate ahead of schedule; negative slack would indicate behind schedule; and zero slack would indicate on schedule.
- *Fast tracking*: It means performing more critical activities in parallel.
- *Crashing critical path*: Shortening duration of critical activities.

- *Event chain methodology*: It is an uncertainty modeling and schedule-network analysis technique that is focused on identifying and managing events and event chains that affect project schedules.
- *Monte Carlo simulations*: It is used to determine uncertainties and quantify the cumulative impact of the events.
- *Critical chains of events*: These are the event chains that have the most potential to affect the projects.
- *Gantt chart*: It is a horizontal bar chart developed as a production control tool.

16.10 REFERENCES

Bamberger, Michael and Hewitt, Eleanor. 1986. *Monitoring and Evaluating Urban Development Programs: A Handbook for Program Managers and Researchers*. (Technical Paper no.53). Washington D. C.: World Bank.

Blank, R. 1993. Developing a System of Education Indicators: Selecting, Implementing, and Reporting Indicators, *Educational Evaluation and Policy Analysis*, 15 (1) (Spring): 65-80.

Flyvbjerg, B., Holm, M. K. S., and Buhl, S. L. 2002. Underestimating costs in public works projects: Error or Lie? *Journal of the American Planning Association*, 68, no.3: 279-295.

Flyvbjerg, B. 2006. From Nobel Prize to project management: getting risks right, *Project Management Journal*, pp.5-15.

Gantt, H. L. 1910. *Work, Wages and Profit*, New York: The Engineering Magazine, Republished in 1974. Easton, Pennsylvania: Hive Publishing Company.

Investopedia. See <http://www.investopedia.com/terms/p/pert-chart.asp#axzz1hqiQRQvK>.

Kelley, James. 1961. Critical Path Planning and Scheduling: Mathematical Basis, *Operations Research*, Vol.9, No.3, May-June.

Kelley, James and Walker, Morgan. 1959. *Critical-Path Planning and Scheduling*. Proceedings of the Eastern Joint Computer Conference. See http://en.wikipedia.org/wiki/Critical_path_method.

Kerzner Harold. 2003. *Project Management: A Systems Approach to Planning, Scheduling, and Controlling*. John Wiley & Sons.

Peter, W. G. Morris. 1994. *The Management of Projects*. Thomas Telford: Google Print.

Project Management Institute. 2003. *A Guide to the Project Management Body of Knowledge* (3rd ed.). *Project Management Institute*. ISBN 1-930699-45-X.

Robyn, M. Dawes and Bernard Corrigan. 1974. Linear Models in Decision Making, *Psychological Bulletin*, 81, No.2: 93-106.

Suchman, E. 1976. *Evaluative Research*. New York: Russell Sage Foundation.

Tversky, A., and Kahneman, D. 1972. Judgment under uncertainty: heuristics and biases, *Science*, 185: 1125-1130.

Virine, L., and Trumper M. 2007. *Project Decisions: The Art, Science and Management Concepts*. Vienna: VA, ISBN 978-1567262179.

Wallace Clark and Henry Gantt. 1922. *The Gantt chart, a working tool of management*. New York: Ronald Press.

War Child, *Planning, Monitoring and Evaluation*, 2006. See <http://www.toolkitsportdevelopment.org/casablanca2007/html/resources/86/86C76D76-2A25-4C32-BC8F-2B241F064176/Monitoring%20and%20evaluation.pdf>.

Williams, T. 2006. "Why Monte Carlo simulations of project networks can mislead". *Project Management Journal*, Vol.23. No.3: 53-61.

World Bank. 1986. "Project monitoring and evaluation", in World Bank technical paper: *Monitoring and Evaluating Urban Development Programs: A Handbook for Program Managers and Researchers*. Washington DC: World Bank.

World Bank. 1994. *Building Evaluation Capacity, Lessons and Practices*, No.4, Operations Evaluation Department, November.

World Bank. 1996. *Designing Project Monitoring and Evaluation. Lessons and Practices*, No.8. Operations Evaluation Department.

World Bank, 2004. *Monitoring & Evaluation: Some tools & approaches*. Washington DC: World Bank.

Suggested Readings

Baker, Sunny G., Michael Campbell, and Kim Baker. 2003. *The Complete Idiot's Guide to Project Management*. Blacktown, New South Wale: Alpha Books.

Casley, Dennis J., and Krishna Kumar. 1987. *Project Monitoring and Evaluation in Agriculture*. Washington D. C.: World Bank.

Klastorin, Ted. 2003. *Project Management: Tools and Trade-offs* (3rd ed.). New York: Wiley.

Malcolm, D. G., J. H. Roseboom, C. E. Clark, and W. Fazar. 1959. Application of a Technique for Research and Development Program Evaluation, *Operations Research*, Vol.7, No.5, September-October, pp.646-669.

Punmia, B. C., and K. Khandelwal. 2006. *Project Planning and Control P.E.R.T. and C.P.M.: For Degree Classes*. New Delhi: Laxmi Publications.

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