Course Portfolio

Project Management

MGIS 473

Level VII

Department of Management Information System

COLLEGE OF BUSINESS ADMINISTRATION

Jazan University, Jazan(KSA)

Course Syllabus

Course Name: Project Management				Course Code:	
Credit Hours	3	Contact Hours	Lecture	Lab	Total
			3		3
Track	◯ **Core** Elective		◯ **Major**		◯
Level	VII		Prerequisite		

Course Description: This course highlights on the issues involved in the process of Project Management.

Objectives: To familiarize the students with Project Management, techniques of a project planning and implementation and the use of computers in the same.

Learning Outcomes: After going through with this course, students are expected to develop the required skills needed for handling a project successfully.

Skills to be developed throughout the course: Students will develop their analytical and oral communication skills via case study work carried out in seminar session. Information technology and written communication will be developed when completing the written assignment which will also test students creative skills and their abilities to present theoretical information in practical situations.

Course Description

Unit I : UNDERSTANDING PROJECT MANAGEMENT

Introduction to Project Management: Project Management definition, evolution of project management, skills required for a project manager, McKinsey 7-S Frame work, Project Manager as a Planning Agent, Project Life Cycle.

Unit II : PROJECT PLANNING

Project planning: Project planning, Strategy in project planning, WBS, *planning cycle,* project schedule, management control,

Project Feasibility Study: Types of feasibility study, Scope of appraisal, steps in project appraisal.

Unit III: PROJECT EVALUATION AND REVIEW TECHNIQUES

Network planning models- (CPM and PERT), MIS

PROJECT MANAGEMENT FUNCTION: Planning, the essence of control, direction, project authority, leadership and team building, leadership and team building, leadership culture, co-ordination, co-ordination and communication, project review meetings, management policies and procedures.

UNIT IV: PRICING, ESTIMATING AND COST CONTROL

Types of classification of estimates, overhead rates, material support cost, pricing projects and review, budgeting for projects, status reporting.

Learning resources:

1. **Text Books:**

Author	Title	Publisher	Year
Vasant Desi H.R. Appannaiah P.N. Reddy	Project Management	Himalaya Publication	Sixth Edition, 2011
Prashant Chandra	Project –Planning, Analysis, Selection, Financing, Implementation and review	Pearson Education 2nd	2007
John M. Nicholas	Project Management For Business & Technology	Pearson Education 2nd Ed.	2005
Robert Buttrick	Project Workout	Financial Times, Prentice Hall	2008

2. **E- Library Reserves**

   www.emaraldinsight.com/insight

   www.en.wikipedia/wiki/listof_management_topics

3. **Internet**

- Ebsco Business Source Premier: A database containing several hundred key business and management journals with full text articles updated daily.

- www.decalibrary.org

- www.ipl.org

- www.lisa.lsbu.ac.in

4. **Journals**

- Journals of product innovation

- Harvard Business Review

- International Journal of Project Management

- Journal of Operation Management

Delivery and Teaching Strategy: (Lecture, online, Physical, blended self directed through CD, web based courses and DVD)

Methods of Instruction: It would be based on lecture, demonstration and assignment review. Questions are encouraged and participation is expected.

Assessment Strategy:

1. **First Mid Term Exam: 20 Marks to be held on………… Day, …….. Month, 20….**

2. **Second Mid Term Exam: 20 Marks to be held on………… Day, …….. Month, 20….**

3. **Attendance, Class Participation & Assignment: 10 Marks**

4. **Total: 100 Marks**

Unit – I

What is Project Management?

Project management is the discipline of planning, organizing, securing and managing resources to bring about the successful completion of specific project goals and objectives. It is sometimes conflicted with program management, however technically that is actually a higher level construction: a group of related and somehow interdependent engineering projects.

A project is a temporary endeavor, having a defined beginning and end (usually constrained by date, but can be by funding or deliverables), undertaken to meet unique goals and objectives usually to bring about beneficial change or added value. The temporary nature of projects stands in contrast to business as usual (or operations) which are repetitive, permanent or semi-permanent functional work to produce products or services. In practice, the management of these two systems is often found to be quite different, and as such requires the development of distinct technical skills and the adoption of separate management.

The primary challenge of project management is to achieve all of the engineering project goals and objectives while honoring the preconceived project constraints. Typical constraints are scope, time, and budget the secondary—and more ambitious—challenge is to optimize the allocation and integration of inputs necessary to meet pre-defined objectives.

Evolution of project management.

The importance of Project Management is an important topic because all organizations, because they small or large, at one time or other, are involved in implementing new undertakings. These undertakings may be diverse, such as, the development of a new product or service; the establishment of a new production line in a manufacturing enterprise; a public relations promotion campaign; or a major building program.

On a macro level organizations are motivated to implement project management techniques to ensure that their undertakings (small or major) are delivered on time, within the cost budget and to the stipulated quality. On a micro level, project

management combined with an appropriate information management system has the objectives of: (a) reducing project overhead costs; (b) customizing the project workplace to fit the operational style of the project teams and respective team members; (c) proactively informing the executive management strata of the strategic projects on a real-time basis; (d) ensuring that project team members share accurate, meaningful and timely project documents; and (e) ensuring that critical task deadlines are met. Whilst the motivation and objectives to apply project management in organizations is commendable, they do not assure project success.

1) **Prior to 1958**: Craft system to human relations. During this time, the evolution of technology, such as, automobiles and telecommunications shortened the project schedule. For instance, automobiles allowed effective resource allocation and mobility, whilst the telecommunication system increased the speed of communication

2) **1958-1979**: Application of Management Science. Significant technology advancement took place between 1958 and 1979, such as, the first automatic plain-paper copier by Xerox in 1959. Between 1956 and 1958 several core project management tools including CPM and PERT were introduced. However, this period was characterized by the rapid development of computer technology.

3) **1980-1994**: Production Centre Human Resources. The 1980s and 1990's are characterized by the revolutionary development in the information management sector with the introduction of the personal computer (PC) and associated computer communications networking facilities. This development resulted in having low cost multitasking PCs that had high efficiency in managing and controlling complex project schedules.

4) **1995-Present**: Creating a New Environment. This period is dominated by the developments related to the Internet that changed dramatically business practices in the mid 1990's.This allows automatic uploading of data so that anyone around the globe with a standard browser can: (a) input the most recent status of their assigned tasks; (b) find out how the overall project is doing; (c) be informed of any delays or advances in the schedule; and (d) stay "in the loop" for their project role, while working independently at a remote site.

Skills Required for Project Manager

What qualities are most important for a project leader to be effective?

Inspires a Shared Vision

An effective project leader is often described as having a vision of where to go and the ability to articulate it. Visionaries thrive on change and being able to draw new boundaries. It was once said that a leader is someone who "lifts us up, gives us a reason for being and gives the vision and spirit to change." Visionary leaders enable people to feel they have a real stake in the project. They empower people to experience the vision on their own. According to Bennis "They offer people opportunities to create their own vision, to explore what the vision will mean to their jobs and lives, and to envision their future as part of the vision for the organisation." (Bennis, 1997)

Good Communicator

The ability to communicate with people at all levels is almost always named as the second most important skill by project managers and team members. Project leadership calls for clear communication about goals, responsibility, performance, expectations and feedback.

There is a great deal of value placed on openness and directness. The project leader is also the team's link to the larger organisation. The leader must have the ability to effectively negotiate and use persuasion when necessary to ensure the success of the team and project. Through effective communication, project leaders support individual and team achievements by creating explicit guidelines for accomplishing results and for the career advancement of team members.

Integrity

One of the most important things a project leader must remember is that his or heractions, and not words, set the modus operandi for the team. Good leadership demands commitment to, and demonstration of, ethical practices. Creating standards for ethical behaviour for oneself and living by these standards, as well as rewarding those who exemplify these practices, are responsibilities of project leaders. Leadership motivated by self-interest does not serve the well being of the team. Leadership based

on integrity represents nothing less than a set of values others share, behaviour consistent with values and dedication to honesty with self and team members. In other words the leader "walks the talk" and in the process earns trust.

Enthusiasm

Plain and simple, we don't like leaders who are negative - they bring us down. We want leaders with enthusiasm, with a bounce in their step, with a can-do attitude. We want to believe that we are part of an invigorating journey - we want to feel alive. We tend to follow people with a can-do attitude, not those who give us 200 reasons why something can't be done. Enthusiastic leaders are committed to their goals and express this commitment through optimism. Leadership emerges as someone expresses such confident commitment to a project that others want to share his or her optimistic expectations. Enthusiasm is contagious and effective leaders know it.

Empathy

What is the difference between empathy and sympathy? Although the words are similar, they are, in fact, mutually exclusive. According to Norman Paul, in sympathy the subject is principally absorbed in his or her own feelings as they are projected into the object and has little concern for the reality and validity of the object's special experience. Empathy, on the other hand, presupposes the existence of the object as a separate individual, entitled to his or her own feelings, ideas and emotional history (Paul, 1970). As one student so eloquently put it, "It's nice when a project leader acknowledges that we all have a life outside of work."

Competence

Simply put, to enlist in another's cause, we must believe that that person knows what he or she is doing. Leadership competence does not however necessarily refer to the project leader's technical abilities in the core technology of the business. As project management continues to be recognised as a field in and of itself, project leaders will be chosen based on their ability to successfully lead others rather than on technical expertise, as in the past. Having a winning track record is the surest way to be considered competent. Expertise in leadership skills is another dimension in

competence. The ability to challenge, inspire, enable, model and encourage must be demonstrated if leaders are to be seen as capable and competent.

Ability to Delegate Tasks

Trust is an essential element in the relationship of a project leader and his or her team. You demonstrate your trust in others through your actions - how much you check and control their work, how much you delegate and how much you allow people to participate. Individuals who are unable to trust other people often fail as leaders and forever remain little more that micro-managers, or end up doing all of the work themselves. As one project management student put it, "A good leader is a little lazy." An interesting perspective!

Cool Under Pressure

In a perfect world, projects would be delivered on time, under budget and with no major problems or obstacles to overcome. But we don't live in a perfect world - projects have problems. A leader with a hardy attitude will take these problems in stride. When leaders encounter a stressful event, they consider it interesting, they feel they can influence the outcome and they see it as an opportunity. "Out of the uncertainty and chaos of change, leaders rise up and articulate a new image of the future that pulls the project together." (Bennis 1997) And remember - never let them see you sweat.

Team-Building Skills

A team builder can best be defined as a strong person who provides the substance that holds the team together in common purpose toward the right objective. In order for a team to progress from a group of strangers to a single cohesive unit, the leader must understand the process and dynamics required for this transformation. He or she must also know the appropriate leadership style to use during each stage of team development. The leader must also have an understanding of the different team players styles and how to capitalise on each at the proper time, for the problem at hand.

Problem Solving Skills

Although an effective leader is said to share problem-solving responsibilities with the team, we expect our project leaders to have excellent problem-solving skills themselves.

They have a "fresh, creative response to here-and-now opportunities," and not much concern with how others have performed them. (Kouzes 1987)

McKinsey 7 S Frame Work
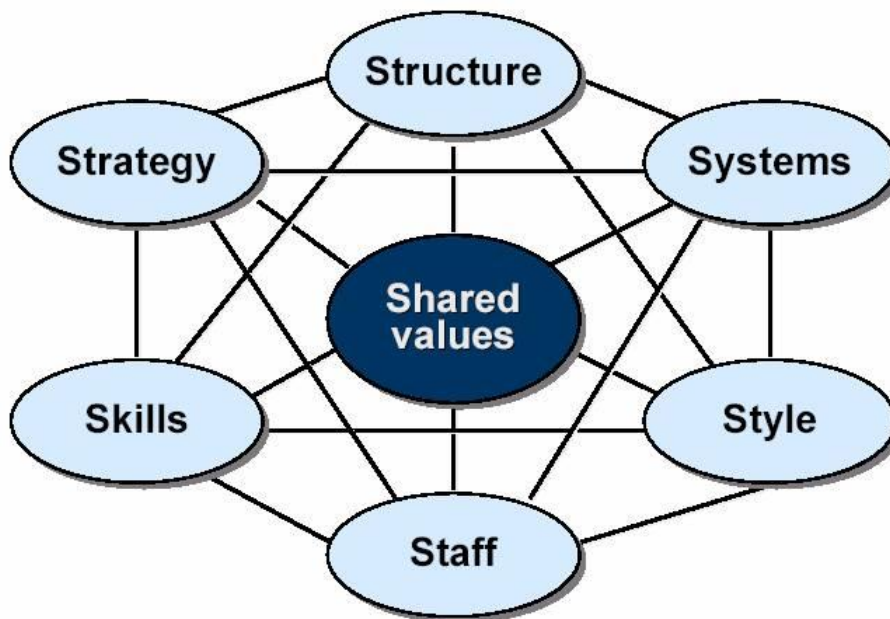
The 7S model can be used in a wide variety of situations where an alignment perspective is useful, for example to help you:

- Improve the performance of a company.
- Examine the likely effects of future changes within a company.
- Align departments and processes during a merger or acquisition.
- Determine how best to implement a proposed strategy.

Tip:

The McKinsey 7S model can be applied to elements of a team or a project as well. The alignment issues apply, regardless of how you decide to define the scope of the areas you study.

The Seven Elements

The McKinsey 7S model involves seven interdependent factors which are categorized as either "hard" or "soft" elements:
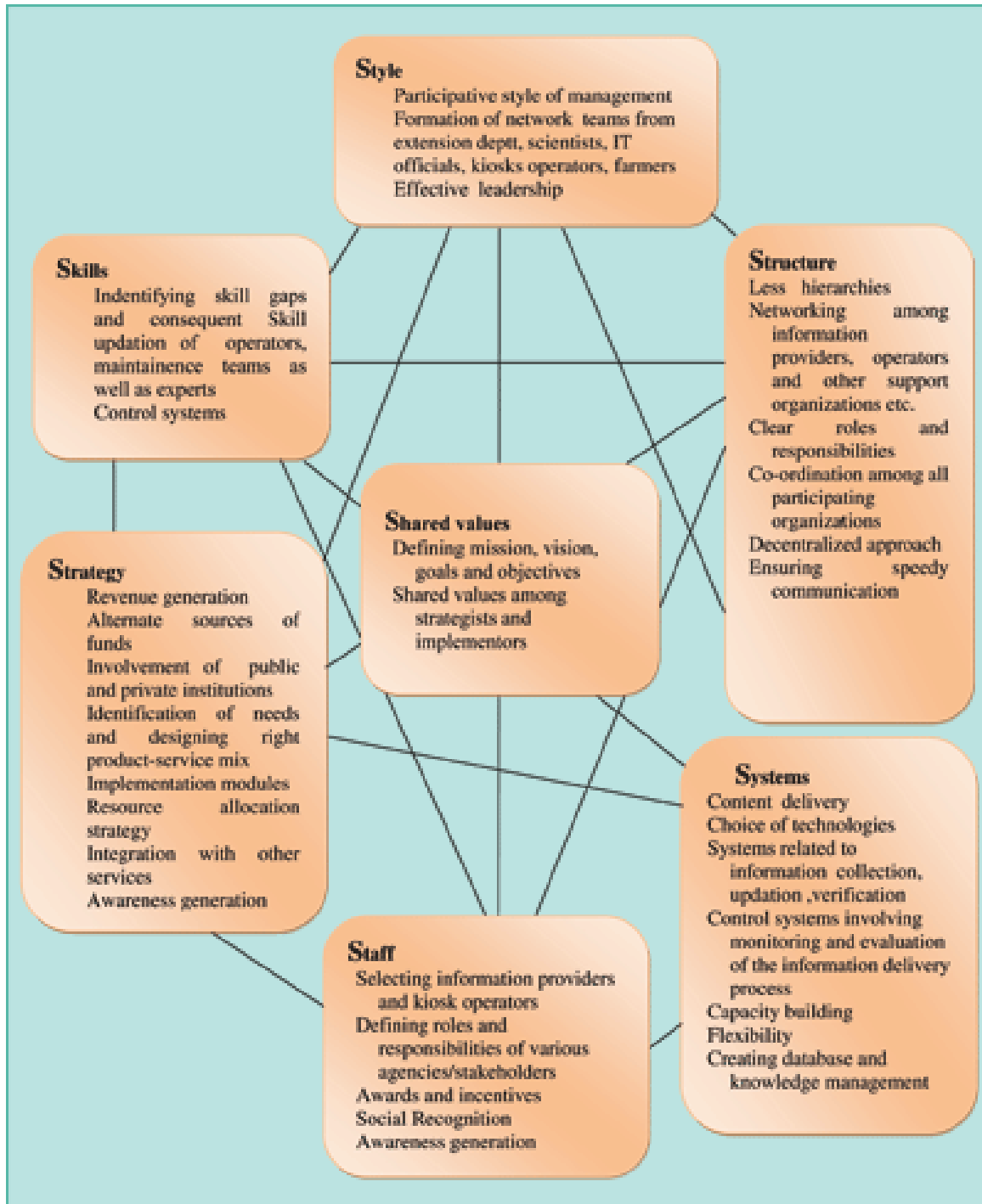
Hard Elements	Soft Elements
Strategy Structure Systems	Shared Values Skills Style Staff

"Hard" elements are easier to define or identify and management can directly influence them: These are strategy statements; organization charts and reporting lines; and formal processes and IT systems.

"Soft" elements, on the other hand, can be more difficult to describe, and are less tangible and more influenced by culture. However, these soft elements are as important as the hard elements if the organization is going to be successful.

The way the model is presented in Figure 1 below depicts the interdependency of the elements and indicates how a change in one affects all the others.

- **Strategy:** the plan devised to maintain and build competitive advantage over the competition.
- **Structure:** the way the organization is structured and who reports to whom.
- **Systems:** the daily activities and procedures that staff members engage in to get the job done.
- **Shared Values:** called "superordinate goals" when the model was first developed, these are the core values of the company that are evidenced in the corporate culture and the general work ethic.
- **Style:** the style of leadership adopted.
- **Staff:** the employees and their general capabilities.
- **Skills:** the actual skills and competencies of the employees working for the company.

Style
Participative style of management
Formation of network teams from extension deptt, scientists, IT officials, kiosks operators, farmers
Effective leadership

Skills
Indentifying skill gaps and consequent Skill updation of operators, maintainence teams as well as experts
Control systems

Structure
Less hierarchies
Networking among information providers, operators and other support organizations etc.
Clear roles and responsibilities
Co-ordination among all participating organizations
Decentralized approach
Ensuring speedy communication

Shared values
Defining mission, vision, goals and objectives
Shared values among strategists and implementors

Strategy
Revenue generation
Alternate sources of funds
Involvement of public and private institutions
Identification of needs and designing right product-service mix
Implementation modules
Resource allocation strategy
Integration with other services
Awareness generation

Systems
Content delivery
Choice of technologies
Systems related to information collection, updation ,verification
Control systems involving monitoring and evaluation of the information delivery process
Capacity building
Flexibility
Creating database and knowledge management

Staff
Selecting information providers and kiosk operators
Defining roles and responsibilities of various agencies/stakeholders
Awards and incentives
Social Recognition
Awareness generation

System approaches in project management

A project is a temporary, one-time endeavor undertaken to solve a problem or take advantage of an opportunity. It usually has a customer or customers (either internal or

external to the organization that is doing the project), a budget or a set of scarce resources that must be managed and some kind of timeframe/constraint for completion or operation. Before one can undertake a project to solve a problem one must first understand the problem. Not only understand the details of the problem but also understand who has the problem and the context and environment that must be taken into consideration in addressing the problem.

The system approach is a framework for conceptualizing problems as systems and for doing things such as solving problems and designing systems.

CONCEPT OF SYSTEM APPROACH:

    1) The objectives and performance system

    2) The environment and constraints of the system

    3) The resources of the system

    4) The element of the system and their function

    5) The management of the system

The objectives and performance system:

The system approach mandate a practical thinking about the real objective of the system and real ways to measure it project management uses this kind of thinking**.**

The environment and constraints of the system:

The environment of the system i.e. relevent subsystem, groups and the persons who affect or affected by t5he system, must also be identified.

The resources of the system:

In accomplishing system goals, internal system resources such as capital, labour, material must also be identified. Most of the system resources are exhaustible. The system is free to utilize them.

The element of the system and their function:

The system approach to a project considers the project in terms of many element .each having performance measure directly related to performance of the overall project.

The management of the system:

The system approaches plays explicit attention to the management of the system.

Project Manager As A Planning Agent

All managers at all levels of every organization perform these functions, but the amount of time a manager spends on each one depends on both the level of management and the specific organization. Some of these functions include:

· **Planning**: This step involves mapping out exactly how to achieve a particular goal. Say, for example, that the organization's goal is to improve company sales. The manager first needs to decide which steps are necessary to accomplish that goal. These steps may include increasing advertising, inventory, and sales staff. These necessary steps are developed into a plan. When the plan is in place, the manager can follow it to accomplish the goal of improving company sales.

· **Organizing**: After a plan is in place, a manager needs to organize her team and materials according to her plan. Assigning work and granting authority are two important elements of organizing.

· **Staffing**: After a manager discerns his area's needs, he may decide to beef up his staffing by recruiting, selecting, training, and developing employees. A manager in a large organization often works with the company's human resources department to accomplish this goal.

· **Leading**: A manager needs to do more than just plan, organize, and staff her team to achieve a goal. She must also lead. Leading involves motivating, communicating, guiding, and encouraging. It requires the manager to coach, assist, and problem solve with employees.

· **Controlling**: After the other elements are in place, a manager's job is not finished. He needs to continuously check results against goals and take any corrective actions necessary to make sure that his area's plans remain on track.

Project life cycle.

The Project Life Cycle refers to a logical sequence of activities to accomplish the project's goals or objectives. Regardless of scope or complexity, any project goes through a series of stages during its life. There is first an Initiation or Birth phase, in which the outputs and critical success factors are defined, followed by a Planning phase, characterized by breaking down the project into smaller parts/tasks, an Execution phase, in which the project plan is executed, and lastly a Closure or Exit phase, that marks the completion of the project. Project activities must be grouped into phases because by doing so, the project manager and the core team can efficiently plan and organize resources for each activity, and also objectively measure achievement of goals and justify their decisions to move ahead, correct, or terminate. It is of great importance to organize project phases into industry-specific project cycles. Why? Not only because each industry sector involves specific requirements, tasks, and procedures when it comes to projects, but also because different industry sectors have different needs for life cycle management methodology. And paying close attention to such details is the difference between doing things well and excelling as project managers.

1) Initiation

In this first stage, the scope of the project is defined along with the approach to be taken to deliver the desired outputs. The project manager is appointed and in turn, he

selects the team members based on their skills and experience. The most common tools or methodologies used in the initiation stage are Project Charter, Business Plan, Project Framework (or Overview), Business Case Justification, and Milestones Reviews.

2) Planning

The second phase should include a detailed identification and assignment of each task until the end of the project. It should also include a risk analysis and a definition of a criteria for the successful completion of each deliverable. The governance process is defined, stake holders identified and reporting frequency and channels agreed. The most common tools or methodologies used in the planning stage are Business Plan and Milestones Reviews.

2) Execution and controlling

The most important issue in this phase is to ensure project activities are properly executed and controlled. During the execution phase, the planned solution is implemented to solve the problem specified in the project's requirements. In product and system development, a design resulting in a specific set of product requirements is created. This convergence is measured by prototypes, testing, and reviews. As the execution phase progresses, groups across the organization become more deeply involved in planning for the final testing, production, and support. The most common tools or methodologies used in the execution phase are an update of Risk Analysis and Score Cards, in addition to Business Plan and Milestones Reviews.

4) Closure

In this last stage, the project manager must ensure that the project is brought to its proper completion. The closure phase is characterized by a written formal project review report containing the following components: a formal acceptance of the final product by the client, Weighted Critical Measurements (matching the initial requirements specified

by the client with the final delivered product), rewarding the team, a list of lessons learned, releasing project resources, and a formal project closure notification to higher management. No special tool or methodology is needed during the closure phase.

Unit – II

Project Planning

Project planning is part of project management, which relates to the use of schedules such as Gantt charts to plan and subsequently report progress within the project environment.

Initially, the project scope is defined and the appropriate methods for completing the project are determined. Following this step, the durations for the various tasks necessary to complete the work are listed and grouped into a work breakdown structure. The logical dependencies between tasks are defined using an activity network diagram that enables identification of the critical path. Float or slack time in the schedule can be calculated using project management softwareThen the necessary resources can be estimated and costs for each activity can be allocated to each resource, giving the total project cost. At this stage, the project plan may be optimized to achieve the appropriate balance between resource usage and project duration to comply with the project objectives. Once established and agreed, the plan becomes what is known as the baseline. Progress will be measured against the baseline throughout the life of the project. Analyzing progress compared to the baseline is known as earned value management.

Stages of project planning.

1) Identification of the Problem

   The first step in project planning is identifying the problem.

2) Planning

   In the planning stage, the project team will come up with ideas on how to solve the problem, along with cost estimates, deadlines and target goals for the end result.

3) Implementation

   During the implementation phase, the plans to solve the problem that you came up with in Step 2 will be enacted.

4) **Evaluation and Live Operations**

During this stage, the response to the problem that the project team came up with is monitored, with support provided to customers. You will also do an analysis of the entire process to this point, evaluating how the project team responded to the problem, including whether or not they were able to complete the project on-time and on- or under-budget.

5) Future Planning:

The final step is future planning. In this step, you'll determine if the project needs to be continued or if it can be ended, if a project needs to be developed to succeed this project, and if this project needs to be re-evaluated at a point in time in the future or at regular intervals.

Different tools of project planning

There are various tools of project planning

1) Work break down structure

2) Work packages

3) Project scheduling

4) Responsibility matrix

5) Budgeting

6) Forcasting

Work breakdown structure in project planning

A **work breakdown structure (WBS)** in project management and systems engineering, is a tool used to define and group a project's discrete work elements in a way that helps organize and define the total work scope of the project.

A work breakdown structure element may be a product, data, a service, or any combination. A WBS also provides the necessary framework for detailed cost estimating and control along with providing guidance for schedule development and control. Additionally the WBS is a dynamic tool and can be revised and updated as needed by the project manager.

Utility of WBS.

WBS in an important document and can be tailored to use in a number of different way.

1) It serves as an effective means of communication to integrate the objectives and activities of all the internal and external organizations involves in the project

2) It represent separate sequential and parallel activities assigned to different groups who will schedule, measure and control their own performance

3) It reflects the procurement strategy during the various stages of the project life cycle.

4) It may illustrate how each piece of the project contribute to the whole in

   terms of performance.

Concept of project schedule

Scheduling is an inexact process in that it tries to predict the future. While it is not possible to know with certainty how long a project will take, there are techniques that can increase your likelihood of being close. If you are close in your planning and estimating, you can manage the project to achieve the schedule by accelerating some efforts or modifying approaches to meet required deadlines.

One key ingredient in the scheduling process is experience in the project area; another is experience with scheduling in general. In every industry area there will be a body of knowledge that associates the accomplishment of known work efforts with a time duration. In some industries, there are books recording industry standards for use by cost and schedule estimators. Interviewing those who have had experience with similar projects is the best way to determine how long things will really take.

When preparing a schedule estimate, consider that transition between activities often takes time. Organizations or resources outside your direct control may not share your sense of schedule urgency, and their work may take longer to complete. Beware of all external dependency relationships. Uncertain resources of talent, equipment, or data will likely result in extending the project schedule.

Experience teaches that things usually take longer than we think they will, and that giving away schedule margin in the planning phase is a sure way to ensure a highly stressed project effort. People tend to be optimistic in estimating schedules and, on average, estimate only 80% of the time actually required.

Failure to meet schedule goals is most often due to unrealistic deadlines, passive project execution, unforeseen problems, or things overlooked in the plan.

Methods used in project Scheduling.

1. **Gantt Chart** : Taking its name from early project management innovator Henry L. Gantt, the basic Gantt chart is an easy way to document schedules. It is a horizontal-bar schedule showing activity start, duration, and completion. It shows the connection between events and the calendar, and provides a graphical analog of the activity duration.

The Gantt schedule can illustrate the relationship between work activities having duration, events without duration that indicate a significant completion, and milestones that represent major achievements or decision points. Various annotations can be used to communicate the progress of the project effort compared to the baseline plan, as well

to depict in a graphical way areas where there are modified expectations from the baseline plan.

2. **Resource Leveling**:

Projects will often be confronted by time and organizational constraints that limit their ability to obtain human resources. Sometimes staff can be supplemented through temporary help from technical service agencies. When staffing requirements are identified and constraints are understood, work plans can sometimes be adjusted to fit requirements to available resources.

Resource scheduling is one of the greatest challenges for projects without access to large organizational or job-market resource pools. Project planning should address such issues as redundancy of critical resources, resource capacity, bench strength in vital areas, and contingency plans to handle departures of key personnel.

3. **Crashing:**

Efforts to accelerate a project schedule are commonly grouped under the term "crashing" the schedule. Maybe this term was coined to suggest that there is always some price for driving a project to completion sooner than normal. There are a number of ways to improve the schedule when your boss says, I need it sooner!

1. Add people to the schedule. Additional staff must be added early in a project or they will slow it down while learning the ropes. If you add people, you may also need to add staff for supervision and coordination, so staff are fully applied.

- 2. Improve productivity and work longer hours. A good team atmosphere with management support can help make this happen. Without positive nourishment of this process, you could lose your team to attrition.

- 3. Review schedule dependencies and look for opportunities to overlap tasks or make serial tasks concurrent or parallel activities. This requires greater coordination and sometimes involves increased risks which need to be managed carefully.

- 4. Review the project scope and remove or delay features or functionality from the project critical path.

- 5. Consider innovative approaches such as a different development methodology, alternative technologies, or out-sourcing options.

- **Benefits of project scheduling.**

  ### 1. Forces detailed thinking and planning

  This is the biggest benefit! Brainstorming with the team on what needs to be done when and by whom can be a very enlightening exercise. A few months ago I was assisting a project manager and his team as they were developing their plan. As we were loading the tasks into the project schedule (again, could have easily been a napkin), I kept asking about predecessors and successors. This would be followed by a long pause as the team members pondered the concept, then discussion and sometimes, additional tasks would surface. About 3/4 of the way through the exercise the project manager stated "So now I see why we should do it this way!"

- **2) Improves communication**

  A completed / current version of the schedule keeps all team members "singing from the same page of the hymn book". When the team knows what is supposed to occur when and by whom, this makes managing the rest of the project a little easier. Communicating with management, the customer, and other stakeholders is also much easier with a schedule.

- **3) Provides a goal**

  Whether it is the short term goals of tasks for the week, the mid range goals of a deliverable or milestone, or the overall project finish date, this information is all contained within the schedule. And providing you are following the tip of communicating, all team members should be aware of these goals.

- **4) Lets you know when you are off track**

  Just like when you take a trip; the schedule is the roadmap that tells you how to get from point A to point Z. There even may be times when you experience potholes or detours, but if you did not have a roadmap, how would you get back on track? Monitoring the baseline or original schedule allows you to know when

you get off track. It will tell you just how far off track your project is, and allow you to experiment with what-if scenario's for getting back on track.

- **5) Reduces delivery time**

- There are a couple of ways a schedule helps here.

- Once your original schedule is complete, you now have the abilitiy to step back and determine what tasks could be started early or completed in parallel with other tasks (Fast Tracking).

- Secondly, by tying dates and durations to tasks creates a sense of urgency that might not otherwise be there. Without these dates, a team member may postpone working on an activity that could cause a delay in downstream milestones.

- **6) Reduces costs**

- You may think that developing and managing a schedule would increase costs. It is more work right? Here are a few examples of how a schedule reduces cost.

- Reduces rework - Imagine someone starting to develop the code for a new application without all the requirements.

- Eliminates duplicate work - Imagine person A and person B heading off to perform the same task when only person A was assigned.

- Return resources sooner - Whether renting a bulldozer, or contracting a team of people, the longer those resources are on the project, the more costly it becomes. A schedule will enable the project manager to return those resources as soon as possible.

- **7)Increases productivity**

  By examining the sequence of tasks and the resources assigned, perhaps periods can be found where resources are under-utilized. Assigning them to additional tasks or changing the logic of when the tasks should be performed will make the team more productive.

- **8) See problems early**

  Whether it is an issue with a milestone date slipping or resources being over-allocated a month from now, having an up-to-date schedule can help you see these problems before they become true issues impacting your project. You can

leverage the schedule for what-if scenarios to find a solution or raise the issue to the proper stakeholders well in advance.

- 9) Enables project manager to control the project instead of the project having control of them

- This one is probably debatable by many project managers who currently have a detailed schedule but still find themselves struggling each day just to stay afloat. But imagine where you would be without that plan.

Management Control

4 main steps in control process in management are:

Control as a management function involves the following steps:

1. Establishing standards:

Standards are criteria against which results are measured. They are norms to achieve the goals. Standards are usually measured in terms of output. They can also be measured in non-monetary terms like loyalty, customer attraction, goodwill etc. Some of the standards are as.

a. Time standards:

The goal will be set on the basis of time lapse in performing a task.

b. Cost standards:

These indicate the financial expenditures involved per unit, e.g. material cost per unit, cost per person, etc.

c. Income standards:
These relate to financial rewards received due to a particular activity like sales volume per month, year etc.
d. Market share:

This relates to the share of the company's product in the market.

e. Productivity:

Productivity can be measured on the basis of units produced per man hour etc.

f. Profitability:

These goals will be set with the consideration of cost per unit, market share, etc.

2. Measuring performance

Measurement involves comparison between what is accomplished and what was intended to be accomplished. The measurement of actual performance must be in the units similar to those of predetermined criterion. The unit or the yardstick thus chosen be clear, well-defined and easily identified, and should be uniform and homogenous throughout the measurement process.

The performance can be measured by the following steps:
(a) Strategic control points:
It is not possible to <u>check</u> everything that is being done. So it is necessary to pick strategic control points for measurement. Some of these points are:
(i) Income:

It is a significant control point and must be as much per unit of time as was expected. If the income is significantly off form the expectation then the reasons should be investigated and a corrective action taken.

(ii) Expenses:

Total and operational cost per unit must be computed and must be adhered to. Key expense data must be reviewed periodically.

(iii) Inventory:

Some minimum inventory of both the finished product as well as raw materials must be kept in stock as a buffer. Any change in inventory level would determine whether the production is to be increased or decreased.

(iv) Quality of the product:

Standards of established quality must be maintained especially in food processing, drug manufacturing, automobiles, etc. The process should be continuously observed for any deviations.

(v) Absenteeism:

Excessive absenteeism of personnel is a serious reflection on the environment and working conditions. Absenteeism in excess of chance expectations must be seriously investigated.

(b) Meclzanised measuring devices:

This involves a wide variant of technical instruments used for measurement of machine operations, product "quality for size and ingredients and production processes. These instruments may be mechanical, electronic or chemical in nature.

(c) Ratio analysis:

Ratio analysis is one of the most important management tools. It describes the relationship of one business variable to another.

The following are some of the important ratios:
i) Net sales to working capital:

The working capital must be utilised adequately. If the inventory turnover is rapid then the same working capital can be used again and again. Hence for perishable goods, this ratio is high. Any change in ratio will signal a deviation from the norm.

ii) Net sales to inventory:

The greater the turnover of inventory, generally, the higher the profit on investment.

iii) Current ratio:

This is the ratio of current asset (cash, receivables etc.) to current liabilities, and is used to determine a firm's ability to pay the short term debts.

iv) Net profits to net sale:

This ratio measures the short-run profitability of a business.

v) Net profits to tangible net worth:

Net worth is the difference between tangible assets (not good will, etc) and total liabilities. This ratio of net worth is used to measure profitability over a long period.

vi) Net profits to net working capital:

The net-working capital is the operating capital at hand. This would determine the ability of the business to finance day-to-day operations.

vii) Collection period on credit sales:

The collection period should be as short as possible. Any deviation from established collection period should be promptly investigated.

viii) Inventory to net working capital:

This ratio is to determine the extent of working capital tied up in inventory. Generally, this ratio should be less than 80 per cent, ix) Total debt to tangible net worth: This ratio would determine the financial soundness of the business. This ratio should remain as low as possible.

(d) Comparative statistical analysis:

The operations of one company can be usefully compared with similar operations of another company or with industry averages. It is a very useful performance measuring device.

(e) Personal observation:

Personal observation both formal and informal can be used in certain situation as a measuring device for performances, specially, the performance of the personnel. The informal observation is generally a day-to-day routine type. A manager may walk through a store to have a general idea about how people are working.

3. Comparing the actual performance with expected performance

This is the active principle of the process. The previous two, setting the goals and the measurement format are the preparatory parts of the process. It is the responsibility of the management to compare the actual performance against the standards established.

This comparison is less complicate if the measurement units for the standards set and the performance measured are the same and quantified. The comparison becomes more difficult when these require subjective evaluations

Ralph C. Davis identifies four phases in the comparison.

1. Receiving the raw data.

2. Accumulation, classification and recording of this information.

3. Periodic evaluation of completed action to date.

4. Reporting the status of accomplishment to higher line authority.

At the third phase, deviations if any are noted between standards and performance. If clear cut deviations are there, then management must study the:-

(i) Causes for deviation

(ii) Effect of deviation

(iii) Size of deviation

(iv) Positive or negative deviation.

4. Correcting Deviations:

The final element in the process is the taking corrective action. Measuring and comparing performance, detecting shortcomings, failures or deviations, from plans will be of no avail if it does point to the needed corrective action.

Thus controlling to be effective, should involve not only the detection of lapses but also probe into the failure spots, fixation of responsibility for the failures at the right quarters, recommendation of the best possible steps to correct them. These corrective actions must be applied when the work is in progress. The primary objective should be avoidance of such failures in future.

The required corrective action can be determined from the qualified data as per the standards laid out and the performance evaluation already done. This step should be taken promptly, otherwise losses may be cumulative and remedial action will be all the more difficult to take.

Corrective action must be well balanced, avoiding over controlling and at the same time letting not things to drift.

What is a Feasibility Study?

As the name implies, a feasibility study is an analysis of the viability of an idea. The feasibility study focuses on helping answer the essential question of "should we proceed with the proposed project idea?" All activities of the study are directed toward helping answer this question.

Feasibility studies can be used in many ways but primarily focus on proposed project. Entrepreneurs   with a business idea should conduct a feasibility study to determine the viability of their idea before proceeding with the development of a business. Determining early that a business idea will not work saves time, money later.

A feasible business venture is one where the business will generate adequate cash-flow and profits, withstand the risks it will encounter, remain viable in the long-term and meet the goals of the founders. The venture can be either a start-up business, the purchase of an existing business, an expansion of current business operations or a new enterprise for an existing business. A feasibility study is only one step in the business idea

assessment and business development process. Reviewing this process and reading the information below will help put the role of the feasibility study in perspective.

Evaluate Alternatives

A feasibility study is usually conducted after producers have discussed a series of business ideas or scenarios. The feasibility study helps to "frame" and "flesh-out" specific business scenarios so they can be studied in-depth. During this process the number of business alternatives under consideration is usually quickly reduced.

During the feasibility process you may investigate a variety of ways of organizing the business and positioning your product in the marketplace. It is like an exploratory journey and you may take several paths before you reach your destination. Just because the initial analysis is negative does not mean that the proposal does not have merit. Sometimes limitations or flaws in the proposal can be corrected.

Pre-Feasibility Study

A pre-feasibility study may be conducted first to help sort out relevant scenarios. Before proceeding with a full-blown feasibility study, you may want to do some pre-feasibility analysis of your own. If you find out early-on that the proposed business idea is not feasible, it will save you time and money. If the findings lead you to proceed with the feasibility study, your work may have resolved some basic issues. A consultant may help you with the pre-feasibility study, but you should be involved. This is an opportunity for you to understand the issues of business development.

Market Assessment

Also, a market assessment may be conducted that will help determine the viability of a proposed product in the marketplace. The market assessment will help to identify opportunities in a market or market segment. If no opportunities are found, there may be no reason to proceed with a feasibility study. If opportunities are found, the market assessment can give focus and direction to the construction of business scenarios to investigate in the feasibility study. A market assessment will provide much of the information for the marketing feasibility section of the feasibility study.

Results and Conclusions

The conclusions of the feasibility study should outline in depth the various scenarios examined and the implications, strengths and weaknesses of each. The project leaders need to study the feasibility study and challenge its underlying assumptions.

Don't expect one alternative to "jump off the page" as being the best scenario. Feasibility studies do not suddenly become positive or negative. As you accumulate information and investigate alternatives, neither a positive nor negative outcome may emerge. The decision of whether to proceed is often not clear cut. Major stumbling blocks may emerge that negate the project. Sometimes these weaknesses can be overcome. Rarely does the analysis come out overwhelmingly positive. The study will help you assess the tradeoff between the risks and rewards of moving forward with the business project.

Remember, it is not the purpose of the feasibility study or the role of the consultant to decide whether or not to proceed with a business idea. It is the role of the project leaders to make this decision, using information from the feasibility study and input from consultants.

Go/No-Go Decision

The go/no-go decision is one of the most critical in business development. It is the point of no return. Once you have definitely decided to pursue a business scenario, there is usually no turning back. The feasibility study will be a major information source in making this decision. This indicates the importance of a properly developed feasibility study.

Feasibility studies aim to objectively and rationally uncover the strengths and weaknesses of the existing business or proposed venture, opportunities and threats as presented by the environment, the resources required to carry through, and ultimately the prospects for success.

Five common factors (TELOS)

Technology and system feasibility

The assessment is based on an outline design of system requirements in terms of Input, Processes, Output, Fields, Programs, and Procedures. This can be quantified in terms of volumes of data, trends, frequency of updating, etc. in order to estimate whether the new system will perform adequately or not. Technological feasibility is carried out to determine whether the company has the capability, in terms of software, hardware, personnel and expertise, to handle the completion of the project

Economic feasibility

Economic analysis is the most frequently used method for evaluating the effectiveness of a new system. More commonly known as cost/benefit analysis, the procedure is to determine the benefits and savings that are expected from a candidate system and compare them with costs. If benefits outweigh costs, then the decision is made to design and implement the system. An entrepreneur must accurately weigh the cost versus benefits before taking an action.

Cost-based study: It is important to identify cost and benefit factors, which can be categorized as follows: 1. Development costs; and 2. Operating costs. This is an analysis of the costs to be incurred in the system and the benefits derivable out of the system.

Time-based study: This is an analysis of the time required to achieve a return on investments. The future value of a project is also a factor.

Legal feasibility

Determines whether the proposed system conflicts with legal requirements, e.g. a data processing system must comply with the local Data Protection Acts.

Operational feasibility

Operational feasibility is a measure of how well a proposed system solves the problems, and takes advantage of the opportunities identified during scope definition and how it

satisfies the requirements identified in the requirements analysis phase of system development.

Schedule feasibility

A project will fail if it takes too long to be completed before it is useful. Typically this means estimating how long the system will take to develop, and if it can be completed in a given time period using some methods like payback period. Schedule feasibility is a measure of how reasonable the project timetable is. Given our technical expertise, are the project deadlines reasonable? Some projects are initiated with specific deadlines. You need to determine whether the deadlines are mandatory or desirable.

Unit – III

PROJECT EVALUATION AND REVIEW TECHNIQUES / CPM

Explain the concept of network technique.

Network Techniques helps managers to plan when to start various tasks to allocate resources so that the task can be carried out within schedule.

The network diagram may be defined as a graphical representation of the projects activities showing the planned sequence of work. There are various terminology which is used in nework Technique

1)   Event or Node: An event is a specific instant of time which marks the start and end of the activity.

2)   Dummy Activity: it is hat activity which is accomplished in zero time and no consuming resources.

Explain CPM Technique in network technique.

CPM - Critical Path Method

DuPont developed a **Critical Path Method** (CPM) designed to address the challenge of shutting down chemical plants for maintenance and then restarting the plants once the maintenance had been completed.

Complex project, like the above example, require a series of activities, some of which must be performed sequentially and others that can be performed in parallel with other activities. This collection of series and parallel tasks can be modeled as a network.

CPM models the activities and events of a project as a network. Activities are shown as nodes on the network and events that signify the beginning or ending of activities are shown as arcs or lines between the nodes

Fig:

 The following table gives data on normal time, and cost and crash time and cost for a project.

The following table gives data on normal time, and cost and crash time and cost for a project.

Activity	Normal		Crash	
	Time (Weeks)	Cost (Rs.)	Time (Weeks)	Cost (Rs.)
1 – 2	3	300	2	400
2 – 3	3	30	3	30
3 – 4	7	420	5	580
2 – 5	9	720	7	810
3 – 5	5	250	4	300
4 – 5	0	0	0	0
5 – 6	6	320	4	410

6 – 7	4	400	3	470
6 – 8	13	780	10	900
7 – 8	10	1,000	9	1,200

Indirect cost is Rs. 50 per week.

(a) Draw the network diagram for the project and identify the critical path.

(b) What are the normal project duration and associated cost?

(c) Find out the total float associated with each activity.

(d) Crash the relevant activities systematically and determine the optimal project completion time and cost.

Solution :

The network for normal activity times indicates a project completion time of 32 weeks with the critical path: 1 – 2 – 5 – 6 – 7 – 8, as shown below:

Network Diagram (1)

(a)   Normal project duration is 32 weeks and the associated cost is as follows:

Total Cost = Direct normal cost + Indirect cost for 32 weeks

$$= 4{,}220 \; + \; 50 \; \times \; 32 \; = \text{Rs. } 5{,}820$$

(b)   Calculations for total float associated with each activity are shown in following table:

Activity	Total Float $(L_i - E_i) - t_i$
1 – 2	(3 – 0) - 10 = 0
2 – 3	(7 – 3) - 7 = 1
2 – 4	(12 – 3) - 7 = 2
2 – 5	(12 – 3) - 9 = 0
3 – 5	(12 – 6) - 5 = 1
4 – 5	(12 -10) – 0 = 2
5 – 6	(18 – 12) – 6 = 0
6 – 7	(22 – 18) - 4 = 0
6 – 8	(32 – 18) - 13 = 1
7 – 8	(32– 22) – 10 = 0

(c) For Critical activities, crash cost-slope is given in the following table:

Critical Activity	Crash Cost per Week (Rs.)
1 – 2	400 – 300 / 3 – 2 = 100
2 – 5	810 – 720 / 9 – 7 = 45
5 – 6	410 x 320 / 6 – 4 = 45
6 - 7	470 – 400 / 4 – 3 = 70
7 - 8	1200 – 1000 / 10 – 9 = 200

The minimum value of crash cost per week is for activity (2 – 5) and (5 – 6). Hence, crashing activity (2 – 5) by 2 from 6 weeks to 7 weeks, But the time should be reduced by I week only otherwise another path 1 - 2 - 3 - 5   6 - 7 - 8 become a parallel path. Network Digram (2) shown on next page is developed when it is observed that new project time is 31 weeks and the critical paths are 1 - 2 - 5 - 6 - 7 - 8 and 1   2   3   5   6   7   8.

With crashing of activity (2 – 5), the new total cost involved can be calculated as follows:

New total cost = Total direct normal cost + Increased direct cost due to crashing of activity (2 – 5) + indirect cost for 31 weeks

$$= (4,220 + 1 \times 45) + (31 \times 50) = 4,265 + 1,550 = \text{Rs. } 5,815$$

Now with respect to Network Diagram (2) given on next page, the new possibilities for crashing in the critical paths are listed in the table given below:

Critical Activity	Crashed Cost Per Week (Rs.)
1 – 2	100
2 – 5	X (Crashed)
2 – 3	0 (No crashing is needed)
3 – 5	50
5 – 6	45
6 – 7	70
7 – 8	200

Network 2

The minimum value of crashed cost slope is for activity (5 – 6). Hence, crashing it by 2 weeks from 6 weeks to 4 weeks. The New network Diagram (2) will now look like Network Diagram (3) as shown below:

Network 3

It may be noted in Network Diagram (3) that both the critical paths shown in Network Diagram (2) remain unchanged because activity (5 – 6) is common between critical paths shown in Network Diagram (2) But with this crashing of activity 5 – 6 by 2 weeks, the new cost involved is:

New total cost = Total direct normal cost + Increased direct cost due to crashing of (5 – 6) + Indirect cost for 29 weeks

$$= (4{,}220 + 1 \times 45 + 2 \times 45) + 29 \times 50 = \text{Rs. } 5{,}805$$

With respect to Network Diagram (3) given in above, the new possibilities for crashing in the critical paths are listed in the table given below:

Critical Activity	Crashed Cost per Week (Rs.)
1– 2	100
2 - 3	0 (No Crashing is needed)
2 - 5	X (Crashed)
5 - 6	X (Crashed)
6 - 7	70

7 - 8	200

The further crashing of (6 – 7) activity time from 4 weeks to 3 weeks will result in increased direct cost than the gain due to reduction in project time. Hence, here we must stop further crashing. The optimal project duration is 29 weeks with associated cost of Rs. 5,805 as show in the table given below:

Crashing Schedule of the project

Project Duration (Weeks)	Crashing Activity And Weeks	Direct Cost (Rs.)			Indirect Cost (Rs.)	Total Cost (Rs.)
		Normal	Crashing	Total		
32	-	4,220	-	4,220	32 x 50 = 1,600	5,820
31	2 – 5 (1)	4,220	1 x 45 = 45	4,265		5,815
29	5 – 6 (2)	4,220	45 x 2 x 45 = 135	4,355	31 x 50 = 1,550	5,805
28	6 – 7 (1)	4,220	135 + 1 x 70 = 205	4,425	29 x 50 = 1,450	5,825
					28 x 50 = 1,400	

What are the various steps in CPM Method to allocate minimum time to complete the project?

Steps in CPM Project Planning

1. Specify the individual activities.

2. Determine the sequence of those activities.

3. Draw a network diagram.

4. Estimate the completion time for each activity.

5. Identify the critical path (longest path through the network)

6. Update the CPM diagram as the project progresses

What are the Benefits and limitations of CPM Method?

CPM 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 and which are not.

CPM Limitations

While CPM is easy to understand and use, it does not consider the time variations that can have a great impact on the completion time of a complex project. CPM was developed for complex but fairly routine projects with minimum uncertainty in the project completion times. For less routine projects there is more uncertainty in the completion times, and this uncertainty limits its usefulness.

Explain about PERT Technique in network analysis.

The Program Evaluation and Review Technique (PERT) is a network model that allows for randomness in activity completion times. PERT was developed in the late 1950's for the U.S. Navy's Polaris project having thousands of contractors. It has the potential to reduce both the

time and cost required to complete a project.

The Network Diagram

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 is typically represented as an activity on arc network, in which the activities are represented on the lines and milestones on the nodes.

Fig:

There are three times have to be calculated:

1) Most likely times
2) Optimistic times
3) Pessimistic time

Explain various steps in PERT Technique.

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.

Explain about Estimated times in PERT Technique.

Estimate activity times

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 (OT***)* - generally the shortest time in which the activity can be completed.

• Most likely time (MT*)* - the completion time having the highest probability. This is different from expected time. Seasoned managers have an amazing way of estimating very close to actual data from prior estimation errors.

• **Pessimistic time (PT)** - the longest time that an activity might require.

The expected time for each activity can be approximated using the following weighted average:

Expected time = (OT + 4 x MT+ PT) / 6

This expected time might be displayed on the network diagram.

Variance for each activity is given by:

$[(PT - OT) / 6]^2$

What are the benefits and limitations of PERT Technique?

. Benefits of PERT

PERT is useful because it provides the following information:

- Expected project completion time.
- Probability of completion before a specified date.
- The critical path activities that directly impact the completion time.
- The activities that have slack time and that can lend resources to critical path activities.
- Activities start and end dates.

Limitations of PERT

The following are some of PERT's limitations:

- The activity time estimates are somewhat subjective and depend on judgment. In cases where there is little experience in performing an activity, the numbers may be only a guess. In other cases, if the person or group performing the activity estimates the time there may be bias in the estimate.

Project Controls : What is it and why is it important ?/ Essence of Control in Project Management

Definition of Project Controls :

Project Controls can be defined as - Management action, either preplanned to achieve the desired result or taken as a corrective measure prompted by the monitoring process. Project controls is mainly concerned with the metrics of the project, such as quantities, time, cost, and other resources; however, also project revenues and cash flow can be part of the project metrics under control. Thus, we believe an effective Project Controls process can be applied in a collaboration of its various sub-disciplines, such as:

1) Planning, Scheduling & Project Reporting
- Scope management;
- Project deliverables:
- Work breakdown / Cost breakdown structures;
- Schedule management;
- Schedule forecasting;
- Corrective action;
- Progress measurement / reporting;
- Productivity Analysis & Calculation;

2) Earned Value Analysis & Management

3) Cost Engineering & Estimating
- Estimating;
- Cost management;
- Cost control;
- Cost forecasting

4) Change Management & Controls

- Change order control;
- Trend Analysis;

5) Risk and Delay Claims
- Risk Assessment & management;
- Delay Claims Quantification
- Forensic Schedule Analysis

Put simply, Project Controls encompass the people, processes and tools used to plan, manage and mitigate cost and schedule issues and any risk events that may impact a project.

Importance of Project Controls :

The successful performance of a project depends on appropriate planning. The PMBOK Guide defines the use of 21 processes that relate to planning out of the 39 processes for project management, (Globerson & Zwikeal 2002). The execution of a project is based on a robust project plan and can only be achieved through an effective schedule control methodology. The development of a suitable Project Control system is an important part of the project management effort (Shtub, Bard & Globerson 2005). Furthermore, it is widely recognised that planning and monitoring plays a major role as the cause of project failures. Despite the continuous evolution in the project management field, it appears evident that the traditional approach still shows a lack of utilisation of Project Controls and there have been a number of articles published to support the importance of control in the achievement of project objectives. It has been proved time and again that Project performance can be improved if dedicated Project Controls systems are in place. An IBC 2000 Project Control Best Practice Study carried out by IPA identified that good Project Control practices reduce execution schedule slip by 15%. Project Controls cost range from 0.5% to 3% of total project, (including cost accounting), therefore, to break even, Project Control needs to improve cost

effectiveness by around 2%. A sample study carried out by the IBC Cost Engineering Committee (CEC) in 1999, showed cost improvements for the projects in the study, was more than 10%. It is noted also that NPV (Net Project Value) also benefits from schedule improvements. Success factors are based on good Project Control practices, which result in good cost and schedule outcomes.

Direction

In the Business direction the relationship between processes, technology directions and business strategy is determined. Processes which are likely candidates for renewal are identified and prioritized by mean of a disciplined approach:

- Develop understanding of business context
- Identify critical business processes
- Match processes to CSFs & priorities
- Formulate organization strategy
- Assess human capabilities

The Program for Change is the output of this phase. This is a list of key processes identified for improvement and prioritized for development and implementation over a certain time horizon. Process owners have been identified and a Program Organization has been agreed to initiate this effort. Budget assumptions have been outlined in order to be reflected in the company's planning process.

Different Aspects of Direction

1. **Motivation:** Internal and external factors that stimulate desire and energy in people to be continually interested and committed to a job, role or subject, or to make an effort to attain a goal.

    Motivation results from the interaction of both conscious and unconscious factors such as the (1) intensity of desire or need, (2) incentive or reward value of the goal, and (3) expectations of the individual and of his or her peers. These factors are the reasons one has for behaving a certain way. An example is a student that spends extra

time studying for a test because he or she wants a better grade in the class.

2. **Leadership:** Leadership is a process of social influence, which maximizes the efforts of others, towards the achievement of a goal.

3. **Supervision:** To oversee and secure effective performance of work as per plan to achieve goal.

4. **Communication:** To tell the people what to do and how to do a certain job. Communication is core of directing.

5. **Coordination:**
The synchronization and integration of activities, responsibilities, and command and control structures to ensure that the resources of an organization are used most efficiently in pursuit of the specified objectives. Along with organizing, monitoring, and controlling, coordinating is one of the key functions of management.

Project Authority

Authority is the power granted to individuals (possibly by their position) so that they can make final decisions. Authority can be delegated from one's superior. In a smoothly running company the top management sets the objectives, overall plans and basic policies and establishes the tone of the organization. The middle management directs the several functions like managing cost, engineering, finance, marketing and personnel. It solves various problem in the organization.

Leadership and Team Building

Successful leaders are able to influence others. They use their innate qualities to inspire a workforce, a team, or a nation to achieve goals. Leaders can see beyond themselves and beyond the task at hand to look at achieving long-term goals by utilizing their strengths combined with the strengths of others. Effective leaders are able to manage relationships with others and create positive outcomes.

Leadership, such as that demonstrated by Churchill, is about inspiring others and doing the right thing. Leaders make change happen, but their values remain steady and unchanging. Most leaders not only have a long-term perspective on goals, but they also have innovative ways of achieving their goals.

Leaders are flexible in their execution and will make midcourse corrections and iterative improvements—leaders "bend but don't break." They inspire those around them to stretch and do their best to fulfill the organizational mission. Leaders are able to energize those around them in order to create desired results without compromising their ethical standards.

Qualities of Leaders

1. Inspire action- Try to paint a vision of the future that inspires your people to do whatever it takes to get there. The best leaders also clear away the organizational roadblocks that constrain employees' natural creativity and initiative, unleashing a tremendous amount of energy in the process.

2. Optimistic- We all want to work with and for people who lift us up into the clouds instead of dragging us down into the mud. Make sure to seek out the positives in your people, helping them overcome their own feelings of self-doubt and spreading optimism throughout your organization.

3. Integrity- Research shows that the top thing that employees want from their leaders is integrity. Be honest, fair, candid and forthright, and treat everyone in the same way that you yourself would want to be treated.

4. Support and facilitate team- For people to do their very best work, they need an organizational environment that supports them by making it safe to take risks, to tell the

truth, and to speak up ... without being punished for doing so. Support your employees by creating this kind of environment, and it will facilitate their progress toward attaining your organization's goals.

5. Confidence- Highly effective leaders know deep down inside that they and their team can accomplish anything they set their minds to. Failure is not an option. Tentative leaders make for tentative employees. If you're confident, your people will be too.

6. Communicate - In any organization, knowledge is power, and great leaders ensure that every employee, from the very top to the very bottom of the org chart, is provided with complete and up-to-date information about the organization's goals, performance, successes and failures. To achieve this level of connection, you should also provide ample channels for two-way communication between employees and managers, actively soliciting their ideas for improvement and rewarding employees for submitting them.

7. be decisive - One of the most basic duties of any leader is to make decisions. Highly effective leaders aren't afraid to be decisive and to make tough calls quickly when circumstances require it. Once you have all the information you need to make an informed decision, then don't hesitate--make it. And once you make a decision, then stick with it unless there is a particularly compelling reason for you to change it.

Leadership Culture

Leadership style is extremely important in an organization, as it often affects the organization's culture. Which style of management is right? It depends greatly on the type of organization and on the top management within the organization. If managers are strong leaders, their style of leadership often predominates throughout the different levels of management within the organization. The leadership style is then responsible for creating the culture of the organization. There are good and bad hallmarks for leadership within an organization. If the corporate leadership style is deceptive, then often the management culture within the organization will be deceptive. The same would hold true if the leadership was ethical. It takes a strong leader to create a lasting culture within an organization. For ordinary leaders it can take years to shape the attitudes and environment; only an extraordinary leader is capable of making revolutionary change.

Project Review Meetings

Project Review Meetings provide an opportunity to analyse and document project successes and difficulties, thereby providing a better foundation for future project work.

Project Review Meeting Agenda

> ***The principals of the review are:***

• What was supposed to happen?

• What actually happened?

• Why were there differences?

• What did we learn?

> ***Why did we carry out the project?***

Revisit Objectives and Deliverables - what did we set out to do?

• Changes made to scope

Were objectives met?

• Schedule

• Costs

• Quality of deliverables

• Customer satisfaction What did we actually achieve?

• Objectives degree of completion

• Deliverables degree of completion

• Outstanding issues

What Went Well?

• Heroes

• Culture

• Process

• Content

• Technical

• Why?

• Any good recommendations to take forwards?

What could have gone better?

• People / Resource issues

• Communication / Process issues

• User Experience Issues

• Technical Build / Systems Integration issues

• Policy / Cultural Issues

• Why?

• How can we improve that?

What would we do differently next time?

• Aim for concise, specific, mutually agreed statements Roundup / Score

• Rate your experience of the project out of ten?

• What would have made it a ten?

Management Policies & Procedures

Just as planning is an essential aspect of a project, periodical audit and review are also a part of normal activity of an institution.

The audit process involves

- Establishing procedures and benchmarks.

- Checking the actual performance to verify how much of these have been properly followed.

- Comment on deviations from the established procedure and reasons for deviations and remedial actions.

The scope of audit covers the areas of Finance, Time, Quality, Human resource, Environmental issues, Planning & control. The procedural aspects relate to measuring the conformance or deviations from the standard procedure.

The project manager is expected to go through the report and initiate corrective action whereever required. He should also satisfactorily deal with all the objections raised in the audit report and remove such objections.

Unit – IV

Cost Planning is one of the essential features of project planning and management. The project manager is required to estimate the costs involved in several processes during the course of a project. Depending on the nature of the project and the customer requirement, the cost may refer to the basic bottomline cost or a break-up of total costs under various components. The project cost usually contains the elements like :

(1) **The labour cost:** Estimated costs for various types of people time element. Involved in the Project. The cost refers to the wages paid on hourly basis for each person and the estimated hours of work.

(II) **Materials cost:** Cost of materials required for successful completion of the project like consumables and the like.

(III) **Subcontractors:** Those are the people who do a part of the contract/ project for which the project manager may not have the expertise. The project manager incurs expenditure on them.

(IV) **Equipments:** Lease rentals in respect of some expensive equipment which are essential for the project but their contribution is restricted to a short duration of the project. Hence it is not worth investing, but have to be taken on rent or lease for which rentals are payable.

(V) **Indirect Cost (Travel/Training):** Conveyance charges incurred by the executives/ people in the project during the project for completing the project cost of training imparted to staff and transportation charges.

(VI) **Over heads:** Expenses incurred for office support system, legal, financial and other indirect expenses.

Types of Classifications of Estimates

From the above classification of cost, **the cost estimates can be divided into two broad classifications—**

(1) Project Capital cost– meaning the project cost for capital assets of the project and

(2) Project operating cost– which refers to the cost incurred for operation of the project assets which lead to income generation.

Project Cost System

The Project Cost System (PCS) as applicable for a project is different from the financial accounting based on historical cost. PCS covers the following important items.

- PCS aims at controlling the project cost, by keeping a check on actual cost as compared to the estimated cost.

- Since PCS cover the costs incurred at various stages in an integrated form, the total cost incurred at any given point of time can be easily computed.

- Cost records including duration are maintained activity wise in the form of cost cards with particulars of estimated time to start, completion time.

- The memorandum cards require upgradation at frequent intervals.

- The project manager or the authorised person is required to authorise the use of resources at every stage of consumption. This should be updated from time to time.

- The project manager should constantly check the actual expenses against the budget for each stage.

PCS is associated with the project organisation and scheduling. Using PCS, the actual cost can be related closely to the individual activity as per project schedule. This helps in proper project cost control.

In order to determine time input to a project, the following techniques can be used.

1. **Direct work measurement of the time input:** Here workers indicate the activities performed by them along with time period required to do the work. These details help one to arrive at the labour cost of the project. The aggregate of these labour cost is compared with the budgeted cost under this head.

2. **To understand as to how the workers are spending their time on various activities:** Random samples are taken and then an individual worker's contribution to the total output (of the project) is estimated. This forms the basis for direct work measurements and represents a portion of cost of production.

3. Sometimes an analysis of certain activities lead to generic set of actions and corresponding timings. Any new activity can be understood with respect to these generic activities and total time is arrived at by adding such times. Since the method is based on cause and effect relationship, no further time measurement is required.

4. **Learning curve:** In case of projects involving repetitive tasks, it is observed that the time to perform a task improves with repetition. This is generally the case with labour intensive projects. In such cases the pattern of improvement can be used to predict the reduction in time to complete the task. Based on empirical studies, this improvement can be quantified in the learning curve, by the following relationship.

"Each time the output quantity doubles, the unit labour hours are reduced at a constant rate". Learning curve is also referred to by different names like improvement curve, experience curve or progress curve. The improvement ration may vary from 60% (large improvement) to 100% (no improvement). As the difficulty of the work decreases, the expected improvement also decreases (improvement ratio is greater). In gereral, operations with high labour content yield a lower percentage of improvement.

The following example will illustrate the use of improvement phenomenon to estimate time & cost for repetitive task.

Eg.: Consider the case of unit that has received orders for 16 units. The first unit required 500 labour hours. The fig. shows the improvement in labour hours (0.80) with doubling of output each time.

Unit		Labour Hours
1		500
2	500 .80	400
4	400 .80	320
8	320 .80	256
16	256 .80	204.80
		(205 say)

The labour hour per unit can also be determined by reference to unit value tables (see Appendix A). For example for a production level of 16 units at an improvement ratio of 0.80, the per unit value is (0.4096 500=204.80) (Say 205).

We can also use cumulative values for all the units by using the factors for cumulative value (Appendix B).

For the 16 units in the above example, the total labour hours required would be =(8.920 500) = 4460 Hours

The Average labour hour per unit $= \dfrac{\text{Total labours hour}}{\text{No. of units}} = \dfrac{4460}{16} = 279(\text{say})$

The total labour hours for the 16th unit (205) differs from the average labour hour/unit (279). By knowing the average labour hour and processing cost, one can estimate the total cost under the learning curve method.

Advantage to the company by the learning curve procedure

Let us suppose that in the above example the company receives a repeat orders for supplying additional 34 units. From the cumulative table for 50 units and a ratio of 0.80, we find the ratio of 20.12.

|		
Hence labour hours for 50 units $= 20.12 \times 500$	$=$	10060
Less: labour hours for 16 units	$=$	4460
(Computed as above earlier)		
Total labour hours for the repeat order (34 unit)	$=$	5,600
Hence average labour hour/unit $= \dfrac{5{,}600}{34}$	$=$	165
Labour hour for the 50th unit $= 0.2838 \times 500$	$=$	142

Elements of cost and cost build up

The basic equation for price of a product is **P** = Cost + Profit.

The cost referred to in the above equation is the prime cost (direct material cost + Direct labor cost) + Project overheads + General overheads.
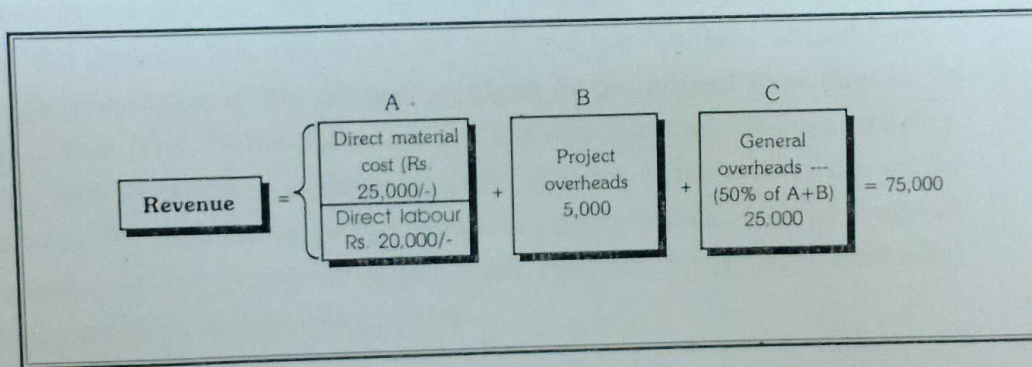
The material cost included above may consist of cost to the company or with margin. In case of capital goods purchased, usually part of the cost will be offeset against the project cost. The indirect expenses are those not directly relating to value - addition, but usually necessary for the projects. Overheads refer to the expenses incurred for providing the service.

		Direct material / Direct labour		Project overheads		General overheads		
Price	=	Direct material / Direct labour	+	Project overheads	+	General overheads	+	Profits

Prime cost
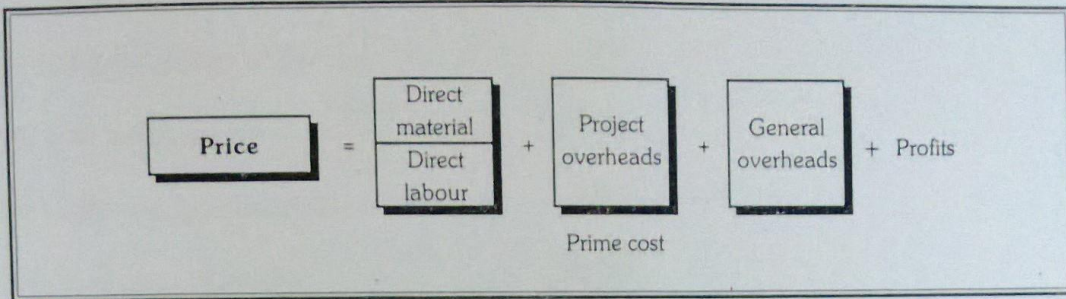
We can illustrate this element of cost and cost build up through an example. Let us say a college conducts executive development programme for junior level executives. What is the cost to the institution and how much it should charge for the participants? To answer this question we have to take into consideration the direct study materials supplied, salary to be paid to the supporting staff, project overheades (like printing of study material, complementary items to be given to participants etc., and general overheads (the usual expenses for establishment to keep the college going)

Here profit is not added to be cost. Since there is possibility that the college may not get the desired number of participants, then in that case the cost per participant may go up. The college usually adds its profit margin plus additional price to take care of such exigencies.

		A		B		C	
Revenue	=	Direct material cost (Rs. 25,000/-) / Direct labour Rs. 20,000/-	+	Project overheads 5,000	+	General overheads --- (50% of A+B) 25.000	= 75,000

The cost structure will appear as under.

No. of participants expected $\quad = \quad \underline{\quad 25 \quad}$

Cost per participants $= \dfrac{75000}{25} \quad = \quad 3000$

Add profit margin/candidate $\qquad\qquad 500$

Total cost/per candiate $\qquad\qquad \underline{\textbf{3500}}$

If instead of 25 participants only 20 people particpate in the programme, then cost per participant will go up. But in a real situation, the college cannot pass on this increase in cost to the participants because of the possible adverse reaction.

Different Approaches to Cost Estimating

Before taking up the topic of cost and budget, we may briefly consider two more classification of estimates Macro and Micro. Macro estimates are also known as top-down estimates and micro estimates are known as bottom up estimates. Since detailed discussion of these types is beyond the scope of this discussion, we shall briefly consider these two types of estimates.

Top-down estimates are done by an experienced senior level manager. Based on his experience, the manager can generally predict the duration and cost of the project. It is not necessary that the top manager should have a thorough knowledge of the process involved in the project execution or an expert in that field. Macro estimates are useful in strategic decision making, working with uncertainty, internal projects, varying scope among the macro approaches for estimating project times & cost, mention may be made of consensus method (Delphi method) Ratio methods (Parametric methods) Apportion method, and learning curves.

In the bottom-up estimates, the project has to be defined well in advance. The people at the operating level or even work package level can estimate the time and cost for a particular type of work. This turns out to be more efficient as it comes from the people with hands on experience at work package level. With work breakdown structure in place and work packages and associated costs, one can estimate the time, resources and cost estimates for the work packages. It is needless to add that both the above methods must be sensitive to the factors that affects the project estimates. Micro estimates are useful where cost and time are important, there is a fixed price contract and the details are to be furnished in minute form to the client. Some of the micro approaches are template method, parametric method, estimates for WBS work packages, a hybrid method using both macro & micro approaches in phases.

Overhead Rates, Material and Support costs

As we move to the individual items of work, there is a discernible improvement in the cost estimates. It is easy to make detailed cost estimates if the work packages are well defined. We generally come across the following types of costs.

1. Direct Cost:

    (a) Labor

    (b) Materials

    (c) Equipment

2. Project overhead costs

3. General overhead costs

Direct Costs: As the name implies, these costs are chargeable to a specific work package. These are cash outflows and should be paid quite frequently as per the progress of the project. These are therefore regregahed from overhead costs.

Di·ect Overhead Costs: These cost can be attributed to project deliverables or work packages. These represent the prorata share of the project cost in other si need to Cover. the entire plan. Eg. Manager's salary as attributable to project only shuch expenses in the long run.

General overhead costs: These costs are not directly linked to a specific project. This covers all such expenses incurred by the company to sell the product eg. Advertising accounts and management level people above certain level. There are usually alloted as a percentage of total direct cost, or as a pertage of specific costs such as labour material and equipment. These elements of cost and cost build up already have been discussed earlier in this chapter.

Pricing Projects and Review

The basic equation expressing the relationship between the cost and price is

$$\text{Cost} + \text{Profit} = \text{Price} \qquad (1)$$

This equation can also be written as

$$\text{Price} - \text{Profit} = \text{Cost} \qquad (2)$$

$$\text{Price} - \text{Cost} = \text{Profit} \qquad (3)$$

Although the equations (1), (2), (3) are just the same, their meaning is different. Depending on the equation selected we can understand which of the items viz price, cost or profit is fixed first.

In the first case i.e., cost + Profit = Price, the government may fix the price as in the case of petroleum prices. It is also possible that the industry may come out with a target costing system. Here the target price is fixed based on the market analysis eg. conusmer goods, electronic items, cars and other automobiles, with an intention to remain competitive in the market. From this price level, the profit margin is fixed and other figures of cost are then worked out.

If we adopt the equation (2) viz., price-profit = cost, the cost is fixed through a prior agreement with the supplier to supply the items at an agreed price. One can vary selling price and profit inline with the corporate philosophy.

The third equation viz., price - cost = Profit is referred to as cost plus pricing. This method is generally followed by large government undertakings through a tender process. The vendor is required to give a detalied estimate of time and material cost analysis for a project. The general drawback of this system is its over emphasis on lower cost which may get reflected in the performance. Since the vendor knows the amount of money he would receive for each wone, he would try to minimise the cost to gain advantage by resorting to substandard works.

Budgeting for Projects

Budgets is time-phased cost estimate. Generally, the budget analysis is carried out annually. But it is not unusual to find the companies working on quarterly or half yearly budgets. Budget is an ongoing cycle of seeking approval and then allocating funds as in the case of union and state budgets. Budget also serves as an important tool of cost control.

The time phasing of project work starts with the time estimate for work package. These time phased budgets for work packages are allotted to different

time periods to arrive at the financial requirements for each period for the entire duration of the project. Close monitoring of these budgets helps in controlling project0 cost. The budgetary allocation helps the finance manager to plan his requirement of funds in advance.

Control of Project cost

Once the project is launched, the management is concerned with the overall control including the control of project cost. To understand the details of the control of cost, it may be useful to recall the various terms assoicated with a project like concept of project itself, project owner or entrepreneur, project control and traditional project managment and reasons for failure of projects.

In the past, project management was characterised by lack of proper planning, no time bound activities, and was not much concerned about quality and adhocism. The natural corollary was unnecessary division of activities, longer lead time and unscheduled higher cost. These deficincies also lead to project failures. Lack of clarity of objectives of project, treating project as a part of overall managment without any dedicated personnel, lack of time tested procedures and lack of proper monitoring etc. contributed to the failure of the project. The following steps, if implemented, properly, will help in controlling the project cost to a great extent.

1. Set a target for cost of the project. This should be allotted as per work package and closely monitored.

2. The major heads of accounts, adopted as per norms of accounting, may be subdivided as per requirement.

3. Each cost point of the project should be run as a profit centre i.e., for evenly spending on activily, there should be a corresponding collection of dues so that company should not face cash-out position.

4. The management must call for periodic statements and reports about the progress of work and they should keep an eye on variance.

5. Incase of variance beyondm a limit, the reasons must be analysed.

Status Reporting

The project manager is required to report the progress of the project to the stakeholder intervals. This can be done at the completion of milestone even at frequent intervals as desired by the management. The main points to be covered in such monitoring and reporting (also referred to as Status Reporting) are

(a) System for project implementation

(b) Monitoring and reporting of progress.

(a) **System for Project implementation :** As stated in Chapter 1 of the book, this include defining project organization with lines and responsibilities. It should cover the entire project with the project manager as team leader and the different groups entrusted with specific work responsibilities.

The organization should also bring out a project manual with clear cut guidelines on Systems and policies to be followed in execution of the project, Exercise of authorities, Documentation for quality output as per design, Records maintenance

- Review meeting to assess the progress of the project
- Specification of computer software
- W B S and O B S.
- Houses of work for team members

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The work packages should be defined with their dates of start and finish and with defined budgets. The total of all the work packages should add up to value of the projected asset. There should be a network diagram with codes work packages as activities with sequential procedure compatible with CPM / PERT

(b) **Monitoring with respect to budget cost in respect of work package should cover:**

- Actual progress against the budgeted progress and equivalent percentage of budget performance and time overrun, if any
- Actual cost incurred as against budgeted cost and consequent cost over run if any
- Record of change in design under the authority of the authorised person.
- Possible effect of time and cost over run, if any

Those can be monitored using the standard software package available in the market. The top management should be kept informed of project period.