

## Project Management Course

A project is “a temporary endeavor undertaken to create a unique product, service, or result. Temporary means that every project has a definite beginning and a definite end. Unique means that the product or service is different in some distinguishing way from all similar products or services.

### Advantages of Managing Projects –

- Better control of financial, physical, and human resources.
- Improved customer relations.
- Shorter development times.
- Lower costs.
- Higher quality and increased reliability.
- Higher profit margins.
- Improved productivity.
- Better internal coordination.
- Higher worker morale (less stress)

A project ends when its objectives have been reached, or the project has been terminated. Projects can be large or small and take a short or long time to complete.

### Examples of projects

- Developing a new product or service
- Acquiring/Implementing a software product
- Constructing a building or facility
- Running a campaign for political office
- Implementing a new business process

### Project Characteristics

Despite above diversities, projects share the following common characteristics.

- Unique in nature.
- Have definite objectives (goals) to achieve.
- Requires set of resources.
- Have a specific time frame for completion with a definite start and finish.
- Involves risk and uncertainty.
- Requires cross-functional teams and interdisciplinary approach.

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## Introduction to Project Management

Introduction Realization of these objectives requires systematic planning and careful implementation. To this effect, application of knowledge, skill, tools and techniques in the project environment, refers to project management. Project management in recent years has proliferated, reaching new heights of sophistication. It has emerged as a distinct area of management practices to meet the challenges of new economic environment, globalization process, rapid technological advancement, and quality concerns of the stakeholders.

### Project Definition

Project management is “the application of knowledge, skills, tools and techniques to project activities to meet project requirements.

Project in general refers to a new endeavor with specific objective and varies so widely that it is very difficult to precisely define it. Some of the commonly quoted definitions are as follows. Project is a temporary endeavor undertaken to create a unique product or service or result.

*(AMERICAN National Standard ANSI/PMI99-001-2004)*

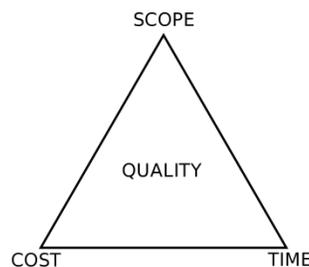
Project is a unique process, consist of a set of coordinated and controlled activities with start and finish dates, undertaken to achieve an objective conforming to specific requirements, including the constraints of time cost and resource.

*(ISO10006)*

### Project Performance Dimensions

Three major dimensions that define the project performance are scope, time, and resource. These parameters are interrelated and interactive. The relationship generally represented as an equilateral triangle.

It is evident that any change in any one of dimensions would affect the other. For example, if the scope is enlarged, project would require more time for completion and the cost would also go up. If time is reduced the scope and cost would also be required to be reduced. Similarly any change in cost would be reflected in scope and time. Successful completion of the project would require accomplishment of specified goals within scheduled time and budget.



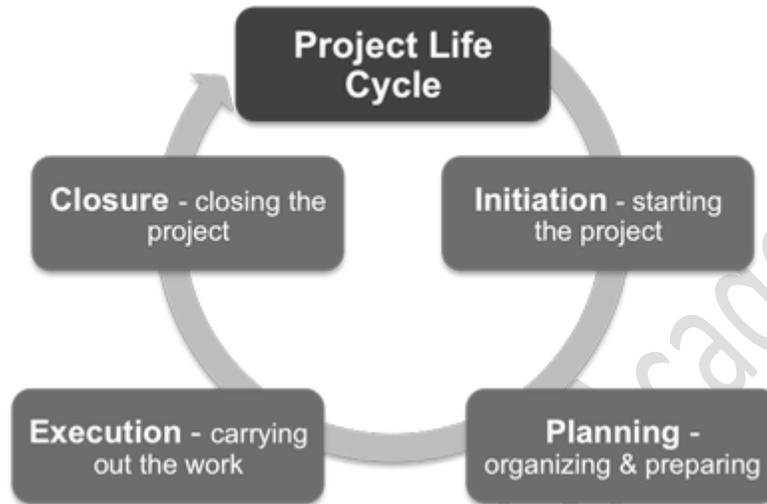
In recent years a fourth dimension, stakeholder satisfaction, is added to the project. However, the other school of management argues that this dimension is an inherent part of the scope of the project that defines the specifications to which the project is required to be implemented. Thus the performance of a project is measured by the degree to which these three parameters (scope, time and cost) are achieved.

Mathematically Performance = f (Scope, Cost, Time)

In management literature, this equilateral triangle is also referred as the “Quality triangle” of the project.

## Project Life Cycle

Every project, from conception to completion, passes through various phases of a life cycle synonym to life cycle of living beings. There is no universal consensus on the number of phases in a project cycle. An understanding of the life cycle is important to successful completion of the project as it facilitates to understand the logical sequence of events in the continuum of progress from start to finish.



Typical project consists of four phases- Conceptualization, Planning, Scope Time Cost Figure 1. Project performance dimensions 3 Execution and Termination. Each phase is marked by one or more deliverables such as Concept note, Feasibility report, Implementation Plan, HRD plan, Resource allocation plan, Evaluation report etc.

### Conceptualization Phase

Conception phase, starting with the seed of an idea, it covers identification of the product / service, Pre-feasibility, Feasibility studies and Appraisal and Approval. The project idea is conceptualized with initial considerations of all possible alternatives for achieving the project objectives. As the idea becomes established a proposal is developed setting out rationale, method, estimated costs, benefits and other details for appraisal of the stakeholders. After reaching a broad consensus on the proposal the feasibility dimensions are analyzed in detail.

### Planning Phase

In this phase the project structure is planned based on project appraisal and approvals. Detailed plans for activity, finance, and resources are developed and integrated to the quality parameters. In the process major tasks need to be performed in this phase are;

- Identification of activities and their sequencing
- Time frame for execution
- Estimation and budgeting
- Staffing

A Detailed Project Report (DPR) specifying various aspects of the project is finalized to facilitate execution in this phase.

## Execution Phase

This phase of the project witnesses the concentrated activity where the plans are put into operation. Each activity is monitored, controlled and coordinated to achieve project objectives. Important activities in this phase are;

- Communicating with stakeholders
- Reviewing progress
- Monitoring cost and time
- Controlling quality
- Managing changes

## Termination Phase

This phase marks the completion of the project wherein the agreed deliverables are installed and project is put in to operation with arrangements for follow-up and evaluation.

## Project Classification

There is no standard classification of the projects. However considering project goals, these can be classified into two broad groups, industrial and developmental. Each of these groups can be further classified considering nature of work (repetitive, non-repetitive), completion time (long term, short term etc), cost (large, small, etc.), level of risk (high, low, no-risk), mode of operation ( build, build-operate-transfer etc).

Industrial projects also referred as commercial projects, which are undertaken to provide goods or services for meeting the growing needs of the customers and providing attractive returns to the investors/stake holders. Following the background, these projects are further grouped into two categories i.e., demand based and resource / supply based. The demand based projects are designed to satisfy the customers' felt as well the latent needs such as complex fertilizers, agro-processing infrastructure etc. The resource/ supply based projects are those which take advantage of the available resources like land, water, agricultural produce, raw material, minerals and even human resource.

Projects triggered by successful R&D are also considered as supply based. Examples of resource based projects include food product units, metallurgical industries, oil refineries etc. Examples of projects based on human resource (skilled) availability include projects in IT sector, Clinical Research projects in bio services and others.

Development projects are undertaken to facilitate the promotion and acceleration of overall economic development. These projects act as catalysts for economic development providing a cascading effect. Development projects cover sectors like irrigation, agriculture, infrastructure health and education.

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## **Project management**

Project management is a distinct area of management that helps in handling projects. It has three key features to distinguish it from other forms of management and they include: a project manager, the project team and the project management system. The project management system comprises organization structure, information processing and decision making and the procedures that facilitate integration of horizontal and vertical elements of the 7 project organization. The project management system focuses on integrated planning and control.

### **Benefits of Project Management Approach**

The rationale for following project management approach is as follows.

Project management approach will help in handling complex, costly and risky assignments by providing interdisciplinary approach in handling the assignments.

*Example: Research and development organizations.*

Project management approaches help in handling assignments in a specified time frame with definite start and completion points.

*Example handling customer orders by Industries involved in production of capital goods.*

Project management approaches provide task orientation to personnel in an Organization in handling assignments.

*Example: Organizations in IT sector handling software development assignments for clients*

### **Project Management Knowledge Areas -**

- Integration Management
- Scope Management
- Time Management
- Cost Management
- Quality Management
- Human Resource Management
- Communications Management
- Risk Management
- Procurement Management

## **Project Identification and Formulation**

A project in the economic sense directly or indirectly adds to the economy of the Nation. However an introspection of the project performance clearly indicates that the situation is far from satisfactory. Most of the major and critical projects in public sector that too in crucial sectors like irrigation, agriculture, and infrastructure are plagued by tremendous time and cost overruns.

Even in the private sector the performance is not all that satisfactory as is evident from the growing sickness in industry and rapid increase in non-performing assets (NPAS) of Banks and Financial Institutions. The reasons for time and cost over runs are several and they can be broadly classified under-technical, financial, procedural and managerial. Most of these problems mainly stem from inadequate project formulation and haphazard implementation.

### **Project Identification**

Project identification is an important step in project formulation. These are conceived with the objective of meeting the market demand, exploiting natural resources or creating wealth. The project ideas for developmental projects come mainly from the national planning process, where as industrial projects usually stem from identification of commercial prospects and profit potential. As projects are a means to achieving certain objectives, there may be several alternative projects that will meet these objectives. It is important to indicate all the other alternatives considered with justification in favour of the specific project proposed for consideration. Sectoral studies, opportunity studies, support studies, project identification essentially focuses on screening the number of project ideas that come up based on information and data available and based on expert opinions and to come up with a limited number of project options which are promising.

### **Project Formulation**

Project Formulation is the processes of presenting a project idea in a form in which it can be subjected to comparative appraisals for the purpose of determining in definitive terms the priority that should be attached to a project 9 under severe resource constraints. Project Formulation involves the following steps.

1. **Opportunity Studies** - An opportunity study identifies investment opportunities and is normally undertaken at macro level by agencies involved in economic planning and development. In general opportunity studies there are three types of study – Area Study, sectoral and Sub-sectoral Studies and Resource Based Studies. Opportunity Studies and Support studies provide sound basis for project identification.
2. **Pre feasibility Studies / Opportunity Studies** - A pre-feasibility study should be viewed as an intermediate stage between a project opportunity study and a detailed feasibility study, the difference being primarily the extent of details of the information obtained. It is the process of gathering facts and opinions pertaining to the project. This information is then vetted for the purpose of tentatively determining whether the project idea is worth pursuing furthering.
3. **Feasibility Study** - Feasibility Study forms the backbone of Project Formulation and presents a balanced picture incorporating all aspects of possible concern. The study investigates practicalities, ways of achieving objectives, strategy options, methodology, and predict likely outcome, risk and the consequences of each course of action. It becomes the foundation on which project definition and rationale will be based so that the quality is reflected in subsequent project activity.

A well conducted study provides a sound base for decisions, clarifications of objectives, logical planning, minimal risk, and a successful cost effective project. Assessing feasibility of a proposal requires understanding of the STEEP factors. These are as under **S**ocial, **T**echnological, **E**cological, **E**conomic, and **P**olitical.

The project feasibility studies focus on - *Economic and Market Analysis, Technical Analysis, Market Analysis, Financial Analysis, Economic Benefits, Project Risk and Uncertainty, Management Aspects.*

4. Project Appraisal - The project appraisal is the process of critical examination and analysis of the proposal in totality. The appraisal goes beyond the analysis presented in the feasibility report. At this stage, if required compilation of additional information and further analysis of project dimensions are undertaken. At the end of the process an appraisal note is prepared for facilitating decision on the project implementation.

The appraisal process generally concentrates on the following aspects.

- ❖ Market Appraisal: Focusing on demand projections, adequacy of marketing infrastructure and competence of the key marketing personnel.
- ❖ Technical Appraisal: Covering product mix, Capacity, Process of manufacture engineering know-how and technical collaboration, Raw materials and consumables, Location and site, Building, Plant and equipments, Manpower requirements and Breakeven point.
- ❖ Environmental Appraisal: Impact on land use and micro-environment, commitment of natural resources, and Government policy.
- ❖ Financial Appraisal: Capital, rate of return, specifications, contingencies, cost projection, capacity utilization, and financing pattern.
- ❖ Economic Appraisal: Considered as a supportive appraisal it reviews economic rate of return, effective rate of protection and domestic resource cost.
- ❖ Managerial Appraisal: Focuses on promoters, organization structure, managerial personnel, and HR management.
- ❖ Social Cost Benefit Analysis (SCBA): Social Cost Benefit Analysis is a methodology for evaluating projects from the social point of view and focuses on social cost and benefits of a project.

5. Detailed Project Report (DPR) - Once the projects are appraised and the investment decisions are made a Detailed Project Report (DPR) is prepared. It provides all the relevant details including design drawings, specifications, detailed cost estimates etc. and this would act as a blue print for project implementation.

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## Project Management Techniques

Project management involves decision making for the planning, organizing, coordination, monitoring and control of a number of interrelated time bound activities. Project Manager therefore, often depends on tools and techniques that are effective enough not only for drawing up the best possible initial plan but also capable of projecting instantaneously the impact of deviations so as to initiate necessary corrective measures. The search for an effective tool has resulted in development of a variety of techniques.

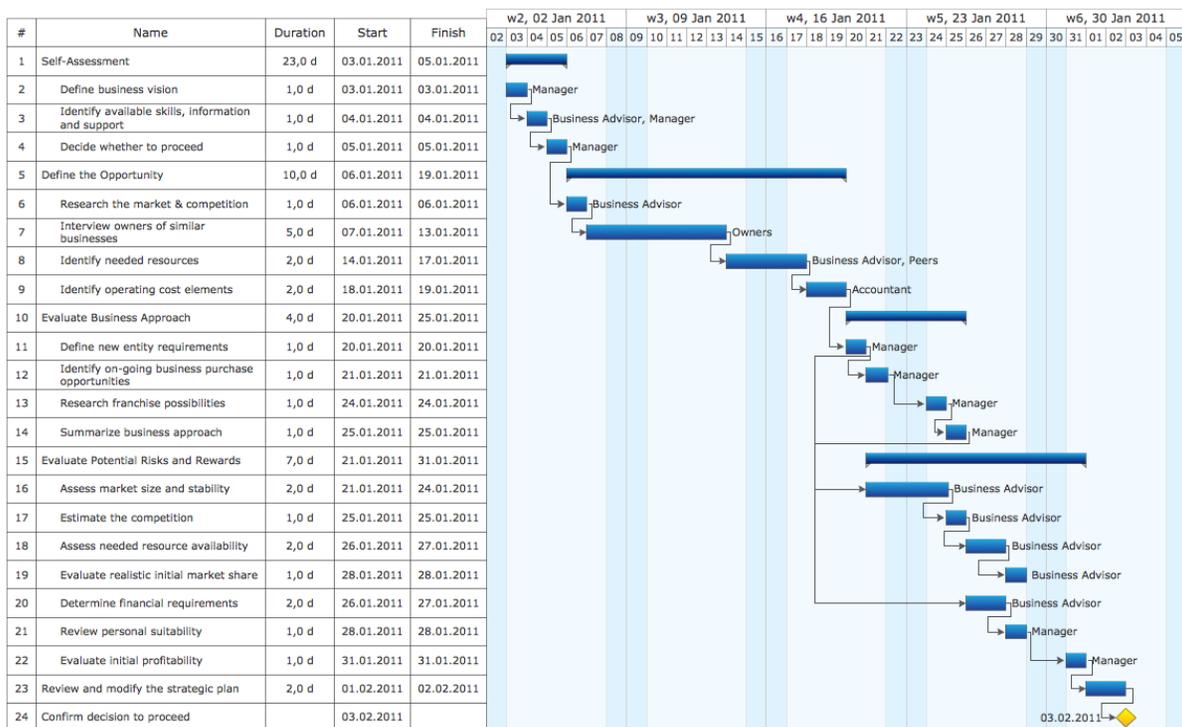
These project management techniques can be classified under two broad categories.

1. Bar Charts
2. Networks

**Bar Charts - Bar charts are the pictorial representation of various tasks required to be performed for accomplishment of the project objectives. These charts have formed the basis of development of many other project management techniques.**

1. **Gantt Chart** - Henry L Gantt (1861 – 1919) around 1917 developed a system of bar charts for scheduling and reporting progress of a project. These charts latter were known as Gantt Charts. It is a pictorial representation specifying the start and finish time for various tasks to be performed in a project on a horizontal time-scale. Each project is broken down to physically identifiable and controllable units, called the Tasks. These tasks are indicated by means of a bar, preferably at equi-distance in the vertical axis and time is plotted in the horizontal axis. Length of the bar indicates required time for the task whereas the width has no significance. Though the bar chart is comprehensive, convenient, and very effective.

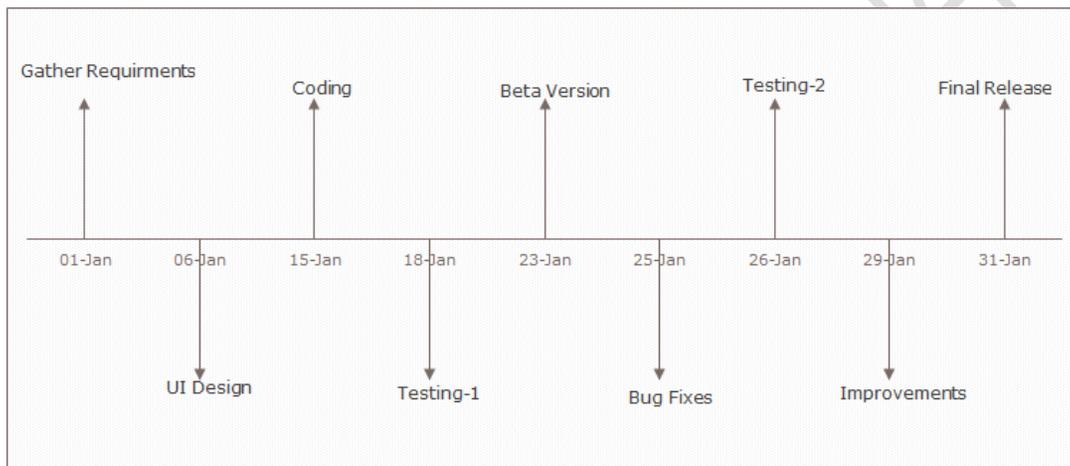
**Strategic Plan for New Business**



It has the following limitations;

- Like many other graphical techniques are often difficult to handle large number of tasks in other words a complex project.
- Does not indicate the inter relationship between the tasks i.e., if one activity overruns time what would be the impact on project completion.

2. **Milestone Chart** - Milestone chart is an improvement over the bar chart (Gantt chart) by introducing the concept of milestone. The milestone, represented by a circle over a task in the bar chart indicates completion of a specific phase of the task. In a milestone chart a task is broken down in to specific phases (activities) and after accomplishment of each of the specific activity a milestone is reached or in other words an event occurs. The chart also shows the sequential relationship among the milestones or events within the same task but not the relationship among milestones contained in different tasks.



Weaknesses of this chart are as follows;

- Does not show interdependence between tasks.
- Does not indicate critical activities.
- Does not consider the concept of uncertainty in accomplishing the task.
- Very cumbersome to draw the chart for large projects.

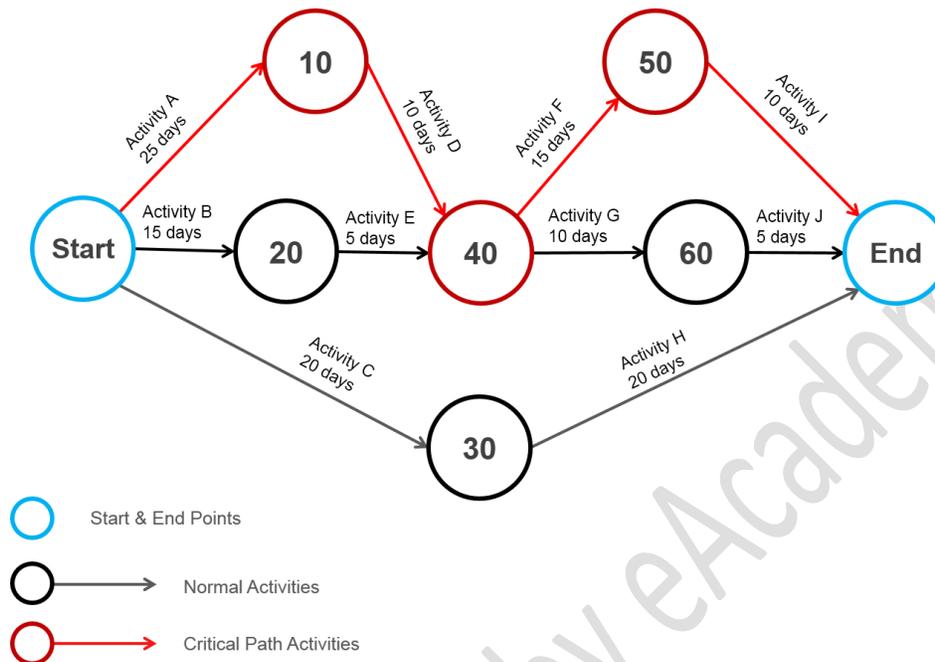
**Networks** - The network is a logical extension of Gantt's milestone chart incorporating the modifications so as to illustrate interrelationship between and among all the milestones in an entire project. The two best-known techniques for network analysis are Programme Evaluation and review Technique (PERT) and Critical Path Method (CPM).

These two techniques were developed almost simultaneously during 1956-1958. PERT was developed for US navy for scheduling the research and development activities for Polaris missiles programme.

CPM was developed by E.I. du Pont de Nemours & Company as an application to construction project. Though these two methods were developed simultaneously they have striking similarity and the significant difference is that the time estimates for activities is assumed deterministic in CPM and probabilistic in PERT. There is also little distinction in terms of application of these concepts.

PERT is used where emphasis is on scheduling and monitoring the project and CPM is used where emphasis is on optimizing resource allocation. However, now-a-days the two techniques are used synonymously in network analysis and the differences are considered to be historical.

Both CPM and PERT describe the work plan of project where arrows and circles respectively indicate the activities and events in the project. This arrow or network diagram includes all the activities and events that should be completed to reach the project objectives.



### Project Scope Management

Project Scope Management refers to the set of processes that ensure a project's scope is accurately defined and mapped. Scope Management techniques enable project managers and supervisors to allocate just the right amount of work necessary to successfully complete a project—concerned primarily with controlling what is and what is not part of the project's scope.

- ✓ **Scope planning:** Deciding how the scope will be defined, verified, and controlled.
- ✓ **Scope definition:** Reviewing the project charter and preliminary scope statement and adding more information as requirements are developed and change requests are approved.
- ✓ **Creating the WBS (Work Breakdown Structure):** Subdividing the major project deliverables into smaller, more manageable components.
- ✓ **Scope verification:** Formalizing acceptance of the project scope.
- ✓ **Scope control:** Controlling changes to project scope.

### Project Time Management

Project time management refers to a component of overall project management in which a timeline is analyzed and developed for the completion of a project or deliverable. Project time management consists of six different components or steps.

- ✓ **Activity Definition:** Identifying and scheduling different components of the project management sequence that is required for completion of project deliverables.
- ✓ **Activity Sequencing:** The process of project time management that defines the order in which deliverables must be completed.
- ✓ **Activity Resource Estimating:** Identifying and defining the types and quantities of resources and materials required to complete a deliverable.

- ✓ **Activity Duration Estimating:** Identifying and estimating the timeline for completion of durables.
- ✓ **Schedule Development:** The analysis of the order of activities, timelines, resources, and schedule barriers to develop a project schedule.
- ✓ **Schedule Control:** Project management intervention to mitigate changes to the product schedule.

### Project Cost Management

Project cost management is keeping your project within its defined budget. It is also an essential part of project management.

Cost estimating, cost budgeting, and cost control are three cost related processes that interact with each other and with other areas of project management. All of these processes require effort and a working knowledge of the cost of things. Depending on the complexity of the project they can require more than one person, and they may occur more than once during the life of a project.

Project cost management can be very simple, or extremely complex.

- ✓ **Cost estimating:** Developing an approximation or estimate of the costs of the resources needed to complete a project.
- ✓ **Cost budgeting:** Allocating the overall cost estimate to individual work items to establish a baseline for measuring performance.
- ✓ **Cost control:** Controlling changes to the project budget.

### Project Quality Management

Project Quality Management is a critical aspect of the performing organization, and integral to project management. It includes the processes and activities, that determine the quality policies, objectives, and responsibilities necessary to assure that project requirements are met. Project Quality Management implements the organization's Quality Management System via policies, procedures, and continuous improvement activities, as appropriate.

Processes critical to the Quality Management System include Quality Planning, Quality Assurance, and Quality Control.

- ✓ **Quality planning:** Identifying which quality standards are relevant to the project and how to satisfy them.
- ✓ **Quality assurance:** Periodically evaluating overall project performance to ensure the project will satisfy the relevant quality standards.
- ✓ **Quality control:** Monitoring specific project results to ensure that they comply with the relevant quality standards.

Quality Planning is an integral part of project management. It identifies relevant quality standards and determines how they can best be satisfied.

Quality Assurance ensures that project management utilizes the quality processes needed to meet project requirements in a planned and systematic manner.

Quality Control monitors specific project outputs and determines compliance with applicable standards. It also identifies project risk factors, their mitigation, and looks for ways to prevent and eliminate unsatisfactory performance.

## Five Cost Categories Related to Quality

- **Prevention cost:** Cost of planning and executing a project so it is error-free or within an acceptable error range.
- **Appraisal cost:** Cost of evaluating processes and their outputs to ensure quality.
- **Internal failure cost:** Cost incurred to correct an identified defect before the customer receives the product.
- **External failure cost:** Cost that relates to all errors not detected and corrected before delivery to the customer.
- **Measurement and test equipment costs:** Capital cost of equipment used to perform prevention and appraisal activities.

## Project Risk Management

Project risk management is the art and science of identifying, analyzing, and responding to risk throughout the life of a project and in the best interests of meeting project objectives.

*Negative risk* involves understanding potential problems that might occur in the project and how they might impede project success. *Positive risks* are risks that result in good things happening; sometimes called opportunities.

There are six steps to the project risk management process, and these steps are repeated over the course of the entire project.

- ✓ **Risk management planning:** Deciding how to approach and plan the risk management activities for the project.
- ✓ **Risk identification:** Determining which risks are likely to affect a project and documenting the characteristics of each.
- ✓ **Qualitative risk analysis:** Prioritizing risks based on their probability and impact of occurrence.
- ✓ **Quantitative risk analysis:** Numerically estimating the effects of risks on project objectives.
- ✓ **Risk response planning:** Taking steps to enhance opportunities and reduce threats to meeting project objectives.
- ✓ **Risk monitoring and control:** Monitoring identified and residual risks, identifying new risks, carrying out risk response plans, and evaluating the effectiveness of risk strategies throughout the life of the project.

## Project Communications Management

Project Communications Management plays a key role in keeping all members of the project management team on the same page. Without communication among all team members and project stakeholders there can be a breakdown in processes which could have a negative impact on the final product.

- ✓ **Communications planning:** Determining the information and communications needs of the stakeholders.
- ✓ **Information distribution:** Making needed information available to project stakeholders in a timely manner.
- ✓ **Performance reporting:** Collecting and disseminating performance information, including status reports, progress measurement, and forecasting.

- ✓ **Managing stakeholders:** Managing communications to satisfy the needs and expectations of project stakeholders and to resolve issues.

The project manager must know the communication processes involved in effective project management. First of all there should be planning to determine what information needs to be communicated to all stakeholders in the project. Next, that information must be made readily available to the stakeholders and generated in a timely fashion. Performance must also be accounted for by reporting the project status, measuring progress and forecasting. Finally, communication with project stakeholders must be managed so that all requirements are met and issues are promptly resolved. Interactions and overlap among the communication processes are inevitable and expected throughout all phases of project management.

Project Communications Management can be broken down into essential knowledge and skills as follows:  
Managing a meeting by having an agenda as well as resolving conflict

- ✓ Writing style to be used
- ✓ Method of communication; written or oral, informal memo or formal report, face-to-face or email, all of which are dependent on the situation at hand
- ✓ Techniques for presentation including whether to use visual aids and effective use of body language
- ✓ Possible barriers or feedback loops that influence communication.

#### *Suggestions for Improving Project Communications*

- Manage conflicts effectively.
- Develop better communication skills.
- Run effective meetings.
- Use e-mail effectively.
- Use templates for project communications.

#### Project Human Resource Management

Project human resource management involves organizing and managing a project team. The team is usually made up of people with specific skills and responsibilities. The project team, also known as project staff, should be involved in plans and decision making from the beginning of the project. Team members should feel invested in the outcome of the project. This will increase loyalty and commitment to project goals and objectives.

The number of team members and their responsibilities can change as the project develops. The project management team, also called the core, executive, or leadership team, is responsible for project planning, controlling, and closing and takes directives from the project team. Smaller project responsibilities can be shared by the team or designated by the project manager.

The project management team and the project sponsor work together to secure funding, simplify scope questions, and influencing team members.

Project human resource management processes include **human resource planning, acquiring the project team, developing the project team and managing the team**. Processes are used multiple times, usually occurring at least once in a project or several times in different phases if the project is made up of many phases.

In reality, processes intersect with each other and with other phases and are not as definite and concrete as illustrated here.

Project human resource management planning may be required if more experienced members are added to the team. The project management team should also prepare for risk management and changes to project duration.

- ✓ **Human resource planning:** Identifying and documenting project roles, responsibilities, and reporting relationships.
- ✓ **Acquiring the project team:** Getting the needed personnel assigned to and working on the project.
- ✓ **Developing the project team:** Building individual and group skills to enhance project performance.
- ✓ **Managing the project team:** Tracking team member performance, motivating team members, providing timely feedback, resolving issues and conflicts, and coordinating changes to help enhance project performance.

### Project Procurement Management

Project Procurement Management is part of the project management process in which products or services are acquired or purchased from outside the existing employee base (which would work on the project) in order to complete the task or project.

There are essentially two different types of procurements, one in which the company is responsible for the particular product or service under a legal contract, this PPM includes contract management responsibilities that issue specific tasks to various team members. Both of these project management processes are imperative to a company's success.

PPM includes a variety of tasks including the planning process where one decides what to acquire or purchase and how they will do so.

- ✓ **Planning purchases and acquisitions:** Determining what to procure, when, and how.
- ✓ **Planning contracting:** Describing requirements for the products or services desired from the procurement and identifying potential sources or sellers.
- ✓ **Requesting seller responses:** Obtaining information, quotes, bids, offers, or proposals from sellers, as appropriate.
- ✓ **Selecting sellers:** Choosing from among potential suppliers through a process of evaluating potential sellers and negotiating the contract.
- ✓ **Administering the contract:** Managing the relationship with the selected seller.
- ✓ **Closing the contract:** Completing and settling each contract, including resolving any open items.

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