CHAPTER 4

PROJECT IMPLEMENTATION AND CONTROLLING

INTRODUGTION TO MONITORING, EVALUATION & CONTROLLING

4.1.1 Project Monitoring

Project even with a good planning, adequate machinery and sufficient flow of resources cannot automatically achieve the desired result. There must be some Warning mechanism, which can alert the project about its possible success and failures off and on constant watching not only saves wastage of scare resources but also ensure speedy execution of the project. Thus, monitoring enables a continuing critique of the project implementation.

Definition

Monitoring is defined as a management function to guide in the intended direction and to check the performance against predetermined plans. Monitoring means keeping a track of implementation process. Monitoring involves collecting, recording and reporting information concerning all aspects of project performance to keep track of and to check systematically all project activities.

Purpose of monitoring

Project monitoring helps to provide constructive suggestions like:

- Rescheduling the project (If the project run behind the schedule)
- Re-budgeting the project (appropriating funds from one head to another avoiding expenses under unnecessary headings)
- Re-assigning staff (shifting staff form one area to another, recruiting temporary staff to meet the time schedules

4.1.2 Evaluation

Evaluation is judging, appraising, determining the worth, value or quality of a project to make necessary decision in terms of relevance, effectiveness, efficiencies, sustainability and impact. Project evaluations are performed either on routine basis or for special reason. The project team, for example, should routinely conduct assessments of their project to determine whether it is progressing within the scope as expressed in the project's goal and objectives

Purpose of evaluation

- To make the best possible use of funds
- Measuring accomplishment in order to avoid weakness and future mistakes
- Scope for modification and improvement
- Help to make future plan

4.1.3 Controlling

Controlling is the management function of comparing the actual achievements with planned ones at every stage and taking necessary action, if required, to ensure the attainment of planned goals. Controlling ensures that "Right things are done at right time in right manner." For effectively controlling a project, suitable control plans are to be formulated well in advance, suitable standards for project work packages are to be developed and suitable information system is to be

setup. So project can be controlled by gathering the required information from the project information system and comparing the actual performance and the planned performance are noticed and immediate corrective action are to be taken to realign the project back on the right track.

4.2 PROJECT CONTROL

The term 'control' refers to verifying if the project progresses as per the plan and to regulate deviations found if any. The project is controlled by project control system. The project control system is an arrangement that offers the project manager with details about deviations of the project from what was planned and also recommends corrective actions needed for rectifying the deviations. The control system help in identifying cost over-run situations time over-run situations and deviations from quality parameter.

Types of control

Control can be of the following types;

i) Pre-control :-It is initiated before the start of the activity. It detects the probable problem in advance and takes preventive, corrective actions.

ii) Go/No-go control :- Go/no-go control takes the form of testing to make sure that certain preconditions are met before task is undertaken. This type of control can be used for specific part of project

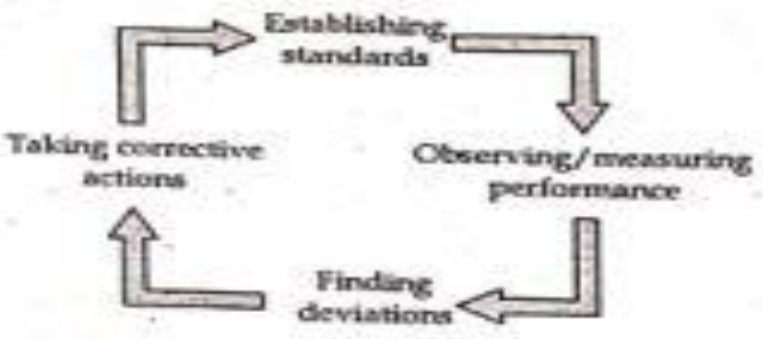
iii) Post control:- It is initiated after the completion of the activity. It is based on feedback of performance results.

Difficulties in project control in Nepal

- Government and political leader interference in project
- Due to shortage of fund cost is given prime importance which results in delay and poor quality.
- Lack of efficient manpower and technical knowledge.
- Inappropriate reporting system
- Delay in finding and taking control measures :
- Other factors such as topography, geography, social, cultural, etc.

4.3 PROJECT CONTROL CYCLE

A control cycle is necessary to conduct a series of management actions in loop at a regular frequency. There are four basic steps;



i) Establishing standard (What is to be done?)

Project performance standards are based on project planning. Through the standards project is controlled. They are starting point of control. They should be reasonable standards and can be in terms of time, quantity, quality cost etc.

ii) Observing/measuring performance (What actually was done?)

Actual perfornance is measured within a given period. It is a continuous ongoing process to get feedback. Suitable monitoring system is required to get required. information.

iii) Finding deviations (Extent and cause of deviation)

In third steps the actual performance is compared with the standards and deviation is identified if any. The sources and causes of deviation are analyzed.

iv) Taking correction actions (Future standards)

After the identification of deviation, then corrective actions are taken to bring back the project on track. If the performance deviation is within allowable limit, no action will be taken. If not, they can be corrected by improvement of design; changing raw material etc. or standards can be revised as requirements.

4.4 ELEMENT OF PROJECT CONTROL

It includes:

4.4.1 Time control

The time/schedule control process monitors and controls changes to the project schedule. Output includes:

i) Updates to the schedule model data and baseline

ii)Performance measurements

iii) Requested changes

iv)Recommended corrective actions

v)Updates to organizational process assets

vi)Activity list and activity attribute updates

vii) Updates to the Project Management Plan

4.4.2 Cost control

The Cost Control process monitors and controls costs and changes to the project budget. Output includes:

i)Cost estimate updates

ii)Cost baseline updates

iii)Performance measurements

iv)Forecasted completion

v)Requested changes

vi) Recommended corrective actions

vii) Updates to organizational process assets

vii) Updates to the Project Management Plan

4.4.3 Quality Control

The quality control performance process measures specific project results to determine whether the project is meeting quality standards, Output includes: -

i) Quality control measurements

ii) Validated defect repair

iii) Updates to the quality baseline

iv) Recommended corrective and preventive actions

v) Requested changes

vi) Recommended defect repair

vii) Updates to organizational process assets

viii) Validated deliverables

ix) Updates to the Project Management Plan

4.5 PROJECT SCHEDULE CONTROL

Controlling schedule is the project management activity in which progress on project activities is compared against schedule baseline to understand whether project is ahead of schedule or behind. Based on deviation you can plan on corrective or preventive actions and manage changes to baseline. Baseling schedule is prepared by contractor before commencement of work and approved by the client. There are several things that can cause a project's schedule to require control;

- Technical difficulties took longer than planned to resolved
- Initial time estimates were optimistic
- Task sequencing was incorrect
- Required inputs of material, personnel or equipment were unavailable when needed
- Necessary preceding tasks were incomplete
- Government regulations were altered

Schedule control

Controlling the schedule involves:

1. Determining the current status
2. Influencing factors that could cause schedule changes
3. Identifying if the schedule has changed
4. Managing changes as they occur

Performance reviews measure, compare, and analyze schedule performance such as actual start and finish dates, percent complete, and the remaining duration for work in progress. If earned value analysis (EVA) is utilized the schedule variance and schedule performance index are used to assess the magnitude of schedule variations. An important part of schedule control is to decide if the schedule variation requires corrective action. For example; a major delay on any activity not on the critical path may have little effect on the overall project schedule, while a much shorter delay on a critical or near-critical activity may require immediate action.'

Schedule performance measurements are used to assess the magnitude of variation to the original schedule baseline. The total float variance is also an essential planning component to evaluate project time performance.

Important aspects of project schedule control include determining the cause and degree of variance relative to the schedule baseline and deciding whether corrective or preventive action is required.

4.6 EARNED VALUE ANALYSIS

Earned value analysis is an approach for measuring how much work has been completed in a project at given point of time and performance.

This analysis can be done by calculating how much time, the work has taken and the resources it has utilized. These values are then compared with the planned values of time and resources. If the time taken to do the particular task is greater than what was planned, it means that the project is running behind schedule. Similarly, if the resources utilized are more than what were planned, it means the project has not been managed efficiently in terms of resources.

Formally, Earned value analysis may be defined as a tool to objectively measure project performance by integrating scope, time and cost data. Earned value management also provides a means to forecast future performance based on past performance. Earned value technique compares the cumulative value of the budgeted cost of work performed(earned) at the original allocated budgeted amount to both, the budgeted cost of work scheduled(planned) and the actual cost of work performed (actual).

Actual information must be entered periodically to use Earned Value Analysis:

- Was each item of the Work Breakdown Structure(WBS), completed or approximately how much of the work was completed,
- Actual start and end dates of the activities/tasks,
- Actual costs of individual activities and tasks.

Why Earned Value Analysis is done?

Meeting project deadlines within a reasonable budget is hard to achieve. Focusing on both the parameters is a difficult but a necessary task. Without monitoring and controlling the project, it is nearly impossible to complete it within the scope, time and cost. Compromising on one of these three factors leads to the over utilization of other(s), which is not desirable and may lead to contractual penalties. To complete a project in the given timeframe and within the given resources, it is necessary to plan for their judicious use, not only at the beginning of a project but also during its execution. This is essential to make the project adapt to external changes and absorb irregularities in the schedule.

This is where Earned Value Analysis comes into the picture. It is used as a tool for cost control as it is very helpful in determining how the project is going, in terms of cost, scope and time. That is, whether the cost is under control and if it will go over our planned budget or in how much time the project would be completed is we continue working at the same pace.

Thus, Earned Value Analysis is helpful to plan and make changes in our plan depending on the current scenario and other internal and external factors which may influence the project.

4.7 PROJECT QUALITY CONTROL

Quality is ensuring that required standards of performance are attained.

Quality control

Quality control is the process for monitoring specific project result to determine whether this comply with relevant quality standards and identifying ways to eliminate cause of unsatisfactory performance. According American Society for Quality (ASQ) "Quality control consists of the observation techniques and activities used to fulfill requirement for quality."

You can think of quality control as the activities that are used to evaluate whether your product or service meets the quality requirement specified for your project. It's important to note that project quality control is performed throughout the project. The quality requirements are defined during the quality planning process. They include both project process and product goals.

Quality Assurance

Quality assurance is board practice used for assuring the quality of products or service. According to ASQ quality assurance is "the planed and systematic activities implemented in a quality system so that quality requirements for a product or service will be fulfilled". In quality assurance, a constant effort is made to enhance the quality practices in project.

You can think of quality assurance as the activities and management processes that are done to ensure that the products and services, the project delivers, are at the required quality level. It is process driven and focused on the development of the product or delivery of the services.

Quality control Vs Quality assurance

- Quality control is a product oriented process whereas quality assurance is process-oriented practice.
- Quality control makes sure that the end product meets the quality requirement whereas quality assurance makes sure that the process of manufacturing the product does adhere to standards.
- Quality assurance can be identified as a productive process while quality control can be noted as a reactive process.

Techniques for Quality control/Assurance

Following techniques shall be applied for quality control/assurance;

i. Preparation of quality control/assurance plan.
ii. Regular inspection/supervision
iii. Testing
    - Destructive or non-destructive

- Field or lab

iv. Sampling

v. Identifying deviations or discrepancies.

vi. Adopting necessary corrective measures.

Factor influencing quality

Following factors influence the quality;

i. Design

ii. Drawings

iii. Specifications

iv. Bid preparation and selection of a contractor

v. Socio-economic factors vi) Environmental factors

Cost of quality

The sources of cost of quality are: failure, prevention, and appraisal. Failure costs may result from either internal or external failure.

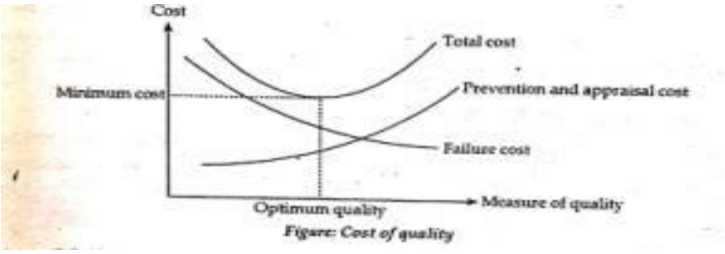


Figure: Cost of quality

Internal failures

It includes scarp and rework. The costs of scrap and rework are more than the sum of lost product and additional work. Costs associated with disposal, storage, transportation, and inventory control must be included to determine total costs.

External failures

It occur after a product has been delivered to a customer may generate costs for repairs in accordance with product warranty and product recalls. This can lead to the loss of customers which is huge cost.

Prevention costs

It begins with planning. It is costs which appear before product or service reach to the customer. Planning generates early costs to be sure, but good planning prevents later costs that arise from changes to an inadequate product or service.

Appraisal costs

It begins with inspection of incoming supplies. The quality of a product is significantly affected by the quality of materials that go into its production or project implementation.

Benefits of quality in projects

The benefits of quality in project performance are many. Some of them are:

Customer satisfaction:

Quality project and product will yield customer satisfaction. A satisfied customer may perceive greater value than originally anticipated.

Cost reduction:

Quality on project activities can reduce waste which directly leads to the cost reduction. As costs go down, profits may go up.

Productivity increasing:

should work does not have to be redone so there are no needs to spend additional fund to redo the work.

Better competitiveness:

better products, better project performance, and lower costs translate directly into increased competitiveness.

Relationship between time, cost and quality.

One of the biggest problems of project managers is to harmonize project cost, time and quality. It is difficult to achieve this because cost, time and quality are related in the way that changes of one influence on the other two. Project managers typically try to balance the three when meeting project objectives, but they may make trade-offs among the three during project implementation in order to meet objectives and satisfy customers. There are many examples in practice that projects were delivered on time and within budget but failed to meet the expectations of end users (Quality).

The relationship between time, cost and quality can be expressed in a triangle. The concept of the triangle is the mutual dependency between the three constraints: increasing quality will increase the amount of time needed, which also will lead to an increase in cost. A tight time schedule could lead to a decrease in quality and subsequent increase in cost.

4.8 INTRODUCTION TO PROJECT MANAGEMENT INFORMATION SYSTEM (PMIS)

Project management information systems (PMIS) are system tools and techniques used in project management to deliver information. Project managers use the techniques and tools to collect, combine and distribute the information through electronic and manual means. PMIS help plan, execute and close project management goals.

Requirements of PMIS

i) Project forms are filled periodically based on measurement of progress of each activity

ii) Forms are entered in PMIS and analyzed to prepare reports

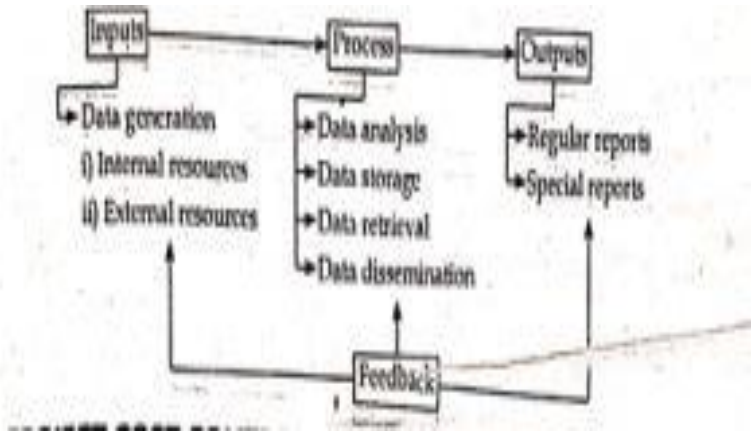
iii) Corrective actions are taken based on report

Objectives of PMIS

The objectives of PMIS are;

- To reduce project duration
- To increase resource productivity
- To make better use of resource
- To decrease cost/price
- To reduce uncertainty in decision making

Elements of PMIS



4.9 PROJECT COST CONTROL

Project cost control is one of the most important project management activities Filed to ensure the project is delivered within the cost expectation laid down by the project's definition. So, it is the process controlling the expenditure in a project at all stage from its inspection through its development. Cost control consists of measuring comparing to a baseline and then taking positive action where necessary. The project's cost position can be accessed through;

- The original budget cost
- The current approved budget cost (current allowed budget)
- The committed cost.
- The actual cost
- The forecast cost

Aspects of cost control

Cost control involves the following steps and covers various aspects of management. It has to be brought in following manner;

i)Planning

Initially a plan or set of target is established in the form of budgets standards or estimates.

ii) Communication

The next step is to communicate the plan to those whose responsibility is to implement the plan.

iii)Motivation

After the plan is put into action, evaluation of the performance starts. Cost are ascertained and information about achievements is collected and reputed. The fact that the cost being reported for evaluating performance acts as a prompting force.

iv)Appraisal

Comparison has to be made with, predetermined target and actual performance, Deficiencies are noted and discussion is started to overcome deficiencies.

v)Decision-making

Finally, reported variances are received. Corrective action and remedial measures are ken or set of target is revised, depending upon the administrations of the problem.

Advantage of cost control

Cost control has following advantages

i) It helps the project to improve its profitability and competitiveness

ii) In the absence of cost control, profit may be drastically reduced despite large and increasing sales volume.

iii) It is indispensable for achieving greater productivity.

iv) Cost control may also help a firm in reducing its cost and reduce its price

v) If the price of the product is stable and reasonable, it can maintain higher sales and thus employment of work force.

Methods of cost control

1. Short term planning and control
2. Accounting method of control
3. Earn value analysis method

1. Short term planning and control:-

In this method, the controlled can be done by breaking the whole project into smaller component or task and by preparing short terms plans for weeks and days which are easy to evaluate and monitor.

2. Accounting methods of control

There is various accounting method of cost control which is as follows;

i) Overall profit/ loss account

After the completion of the project overall profit and loss is determined and analyze from the account. This data are kept as historical record and used for next project. This system is suitable for small project.

ii) Profit-loss on valuation dates

Profit and loss for the certain or required period of time is determined from the account

iii) Unit cost

In this method unit cost of item from tender cost or quotation is compared with the actual cost.

3. Earned value analysis method

Actual cost of work performed (ACWP)

It is the actual cost of work done.

Budgeted cost of work schedule (BCWS)

It is value of work that should have been done at a given point of time. This takes the work planned to have been done and the budget for each task, and indicates the portion of the budget planned to have been used.

Budgeted cost of work performed (BCWP)

It is the value of work done at a given point in time. This takes the work that has been done and the budget for each task, and indicates what portion of budget ought to have been used to achieve it.

Schedule variance (SV)

SV = BCWP – BCWS

Negative number implies that the work is behind schedule.

Positive number implies that the work is ahead schedule.

Zero for work is right on schedule.

Cost Variance (CV)

CV = BCWP – ACWP

Negative number implies a current budget over-run.

Positive number implies a current budget under-run.

Zero is right on budget.

Schedule performance Index (SPI)

= BCWP/BCWS

Values under 1 indicate that the project is behind schedules.

Values over 1 indicate that the project is ahead schedules.

Cost performance index (CPI)

= BCWP/ACWP

Values under 1 indicate that the project is over budget.

Values over 1 indicate that the project is under budget.

Example 4.1

Suppose you are managing a construction project. The project is expected to be completed in 8 months at a cost of Rs. 100000 per month. After 2 months, you realize that the project is 30% completed at a cost of Rs. 400000. Determine whether project is on time, on-budget after 2 months.

Solution:

Given that;

Budget at completion = 8 x 100000 = Rs. 800000

ACWP = Rs. 400000

BCWP = 30% of Rs. 800000 = Rs. 240000

BCWS = 2/8 x 800000 = Rs. 200000

Cost variance = BCWP – ACWP

= 240000 – 400000

= -Rs. 160000

Project is over budget.

Schedule variance = BCWP – BCWS

= 240000 - 200000

= Rs. 40000

Project is behind schedule.

Cost performance index (CPI) = BCWP/ACWB = 240000/400000 = 0.6

Schedule performance index (SPI) = BCWP/BCWS = 240000/200000 = 1.2

Since, CPI is less than one; this means the project is over budget. Since, SPI is more than one the project is ahead schedule. However, this has come at a cost of going over budget. If work is continued at this rate, the project will delivered ahead of schedule and over budget. Therefore, corrective action should be taken.