UNIT-10 Quality Management

Learning Outcomes

By the end of this unit the learner will be able to:

- ✓ Determine the expected level of quality for a project
- ✓ Discuss the quality management plan for a project.

Unit 10

Quality Management

Project quality management ensures that the deliverables created by the project teams meet the expectations of the stakeholders. Quality is the "totality of characteristics of an entity that bear on its ability to satisfy stated or implied needs." There is an anticipated level of quality for the project deliverables of every project. The process of ensuring that the project fulfils its obligations to satisfy the project needs is known as Project Quality Management. The anticipated level of quality will vary as the project itself varies.

To ensure that the customer receives the product or service they think they have purchased, these processes measure overall performance, monitor the project results and compare them to the quality standards set out in the project-planning process.

Project Quality Management is composed of the following three processes: Quality Planning, Quality Assurance, and Quality Control.

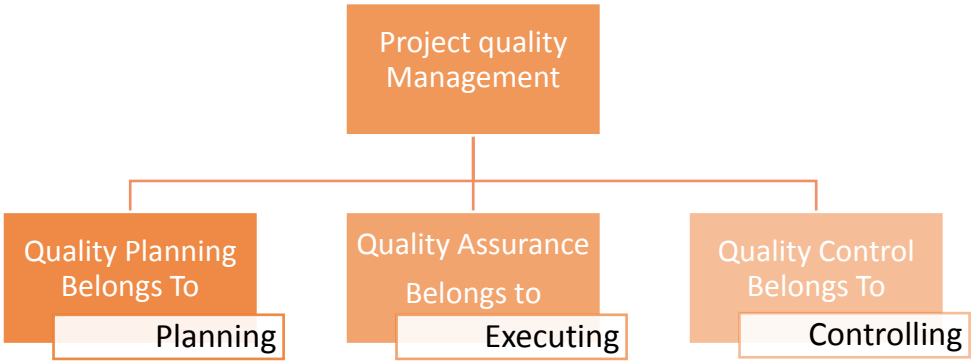


Fig 9.1: Project Quality Management

The expected level of quality is determined by the details and specifications set out by the customer. Project quality management, as far as your exam is concerned, is compatible with ISO 9000 and ISO 10000 quality standards and guidelines. Project quality management is also concerned with the management and product of the project. It is easy to focus on the product (the thing or service the project creates), but project managers must also provide quality for the project management activities. The disadvantages of focusing too much on the product include the following:

- Hurrying to complete the project work by rushing through quality inspections. This may result in unacceptable deliverables
- Overworking the project team in order to complete the project. This may result in unacceptable work, a decline in team morale, and the slow, steady destruction of the project team's willingness to work.

Implementing Quality Project Management

Quality management and project management have similar characteristics:

- **Customer satisfaction:** The project must satisfy the customer requirements by delivering what it promised in order to satisfy the needs of the customer.
- **Management responsibility:** The project team must work towards the quality goal. Management must also provide the necessary resources to deliver on the quality promises.
- **Prevention:** Quality is planned into a project, not inspected into it. It is always more cost-effective to prevent mistakes than to correct them.
- **Kaizen technology:** Kaizen is a quality management philosophy of applying continuous small improvements to reduce costs and ensure consistency or project performance.
- **Marginal analysis:** Marginal analysis studies the cost of the incremental improvements to a process or product and compares it against the increase in revenue made from the improvements. For example, the price of the added feature may cost the company £5 per unit, but the amount of extra sales per year gained from the improvement will meet or exceed the cost of the improvement.
- **Plan-do-check-act:** Deming set the bar with his "plan-do-check-act" approach to quality management. This approach is similar to the project management processes through which every project passes.

Planning for quality is more cost-effective than inspecting work results and doing the work again, or correcting problems to adhere to quality demands. This is one of the key principles of project quality management: quality is planned in, not inspected in. The project manager must consider the cost of achieving the expected level of quality in contrast to the cost of non-conformance. The cost of quality includes training, safety measures, and action to prevent poor quality.

Determining the Quality Policy

Top management should define the quality policy. The quality policy of the organization may follow a formal approach such as Six Sigma, ISO 9000, or Total Quality Management (TQM), or it may have its own direction and approach to satisfying the demand for quality. To guide the project implementation, the project team should adapt the quality policy of the organization. This ensures that the management and the deliverables of the project are in alignment with the performing organization's quality policy. Additionally, the project manager should document how the project will fulfil the quality policy in both project deliverables and in the management. What if two different entities are working together on a project and using differing quality policies? Or what if the performing organization does not have a quality policy? In these circumstances, the project management team should create the quality policy.

The project stakeholders must be aware of the quality policy, regardless of where the quality policy comes from. This is important because the quality policy and associated quality methodology may

require actions that may lengthen the project schedule, such as peer reviews, quality audits, and other quality-centric activities. In addition to the time required to fulfil the quality requirements, additional costs may be incurred.

Reviewing the Project Scope Statement

Just as project quality management is focused on fulfilling the needs of the project, the scope statement is a key input to the quality planning process. Recall that the scope statement defines what will and will not be delivered as part of the project, as well as objectives regarding cost, schedule and scope. The deliverables, and the expectations of the customers, will help guide the quality planning session to ensure that customer requirements in regard to quality are met.

Reviewing the Product Description

While the project scope will define the initial product description, the product description may have supporting details that the project manager and project team will need to review. Consider a project to create an apartment building. The requirements, specifications and details of the building will need to be evaluated and reviewed since this information will undoubtedly affect the quality planning.

Reviewing the Standards and Regulations

The standards and regulations of each industry will need to be reviewed to establish that both the project plan and the plan for quality are acceptable. For example, a project to wire a building for electricity will have to adhere to certain regulations. The relevance of the regulations must be planned into the project to conform to the requirements.

Planning for Quality

Once the project manager has assembled the required inputs and evaluated the product description and project scope, he/she might begin to create a plan on how to satisfy the quality demands. He/she will need to rely on the project team, the documentation created to date, and the project's key stakeholders for much of the input. The project manager will also use several different techniques to plan for meeting quality.

As planning is an iterative process, so too is quality planning. The project manager should evaluate the events as they occur and then apply corrective actions. This is a common PMI theme: plan, implement, measure, react and document! Throughout the project implementation, things will go awry, stakeholders will demand changes, team members may produce substandard work, and so on; all of these variables must be evaluated for their impact on project quality. What good is a project if it is "completed" on time, but the quality of the deliverables is unacceptable? Technically, if the product is unacceptable, it is not finished since it has failed to meet the project scope. Let us examine some tools and techniques that the project manager will use to plan for quality.

Using a Benefit/Cost Analysis

A benefit/cost analysis is a process of determining the pros and cons of any process, product, or activity. Benefits should outweigh costs. The straightforward approach to project management is concerned with the costs of the quality management activities versus the benefits of quality management activities. There are two major considerations in the benefit/cost analysis in quality management:

- **Costs:** Completing quality work may cost more money than the work is worth. To deliver a level of quality beyond what is demanded costs the project additional funds. The types of quality management activities that guarantee quality may not be needed for every project.
- **Benefit:** Completing quality work increases productivity as there is no shoddy work that needs to be redone. When work is completed correctly the first time, as expected, the project does not have to spend additional funds on redoing the work.
- **Gold plating:** The customer does not need or want more than what was requested. The project team should strive to deliver what was expected. Gold plating is the process of adding extra features that may drive up costs and alter schedules.

While quality is needed in every project, not every project has the same quality expenses based on the demands. For example, a project to create and secure an information technology department may require the expense of a security consulting firm to evaluate, test and certify the security of the software code, the network servers and the physical security of the department. The cost of the quality requirements is in alignment with the demands of the project.

Another project may aim to create a temporary drainage ditch for a field. There are specifications for the ditch, but the project may not require the expense of a landscape architect to evaluate the slant and descent of the temporary ditch.

Applying Benchmarking Practices

In quality project management, benchmarking is all about comparing the current project to another. Benchmarking is a technique of taking what the project manager has planned or experienced regarding quality and comparing it to another project to see how the various aspects measure up. The current project can be measured not just against projects within the performing organization or within the same industry but against any other project.

The goal of benchmarking is to evaluate the differences between the two projects and then to implement corrective actions to the current project. Benchmarking allows the project manager and the project team to see what is possible and then strive toward that goal. For example, Project A may have better quality performance than Project B. When the project manager compares the two projects, he/she will want to determine the differences between them. He/she will look for what is missing in Project B or what activities the personnel in Project A are doing that he is not. Benchmarking can also be

used as a measurement against industry standards, competitors' pricing, or competitors' level of performance.

Creating a Flow Chart

Technically, a flow chart is any diagram illustrating how components within a system are related. An organizational flow chart shows the bottom crew of operations up to the "little squirt" on top. Flow charts show the relationships between components and help the project team determine where quality issues may be present and then plan accordingly.

You will need to know about two types of flow charts for this exam:

- **System or process flow charts:** These flow charts illustrate the flow of a process through a system, such as a project change request through the change control system, or work authorization through a quality control process. A process flow chart does not have to be limited to the project management activities; a process flow chart might demonstrate how a manufacturer creates, packages and ships the product to the customer
- **Cause-and-effect diagrams:** These diagrams are also known as Ishikawa diagrams and fishbone diagrams. They show the relationships between the variables within a process and how those relationships may contribute to inadequate quality. This diagram can help organize both the process and team opinions, as well as generating discussion on finding a solution to ensure quality.

Considering the Cost of Quality

The cost of quality considers the expense of all the activities within a project to ensure quality. The cost of quality is broken down into two major categories:

1. **Cost of non-conformance:** This approach is the cost of completing the project work without quality. It is always more cost-effective to do the work properly the first time. Hence, the biggest issue here is the money lost by having to redo the project work. Other non-conformance costs include loss of customers, downtime, loss of sales, and corrective actions to fix problems caused by incorrect work.
2. **Cost of conformance to requirements:** This approach is the cost of completing the project work to satisfy the project scope and the expected level of quality. Examples of this cost include safety measures, training, and quality management activities to ensure that quality is met.

Implementing the Quality Policy

The objective of the quality planning is to find a method to implement the quality policy. Because planning is iterative, the quality planning sessions may and often do require several revisits to the quality

planning processes. On longer projects, there may be scheduled quality planning sessions to compare the performance of the project in relation to the quality that was planned.

Creating the Quality Management Plan

This document describes how the quality policy is fulfilled by the project manager and the project team. One of the major outputs of quality planning is the quality management plan. In an ISO 9000 environment, the quality management plan is referred to as the "project quality system."

The quality management plan addresses three things about the project and the project work:

- **Quality assurance:** The overall performance is evaluated to ensure that the project meets the relevant quality standards. Quality assurance is generally considered the work of applying the quality plan. Quality assurance maps onto an organization's quality policy and is typically a managerial process.
- **Quality control:** Work results are monitored to determine whether they meet relevant quality standards. If the results do not meet the quality standards, the project manager applies root-cause analysis to determine the cause of the poor performance and then eliminates the cause. Quality control is inspection-orientated.
- **Quality improvement:** The project performance is measured and evaluated, and corrective actions are applied to improve the product and the project. The improvements may be large or small depending on the condition and the quality philosophy of the performing organization.

Creating Quality Assurance

Quality assurance (QA) is the sum of the planning and the implementations of the plans by the project manager, the project team, and management to ensure that the project meets the demands of quality. QA occurs not only at the end of the project but also before and during the project.

The Quality Assurance department or another entity will complete the QA activities in some organizations. QA is concerned with finding the defects and then fixing the problems. Depending on the quality system adopted by the organization or project team, there are many different approaches to QA. There are two types of QA:

- **Internal QA:** Assurance provided to management and the project team
- **External QA:** Assurance provide to the external customers of the project

There are three inputs that the project manager and project team will need to prepare for QA:

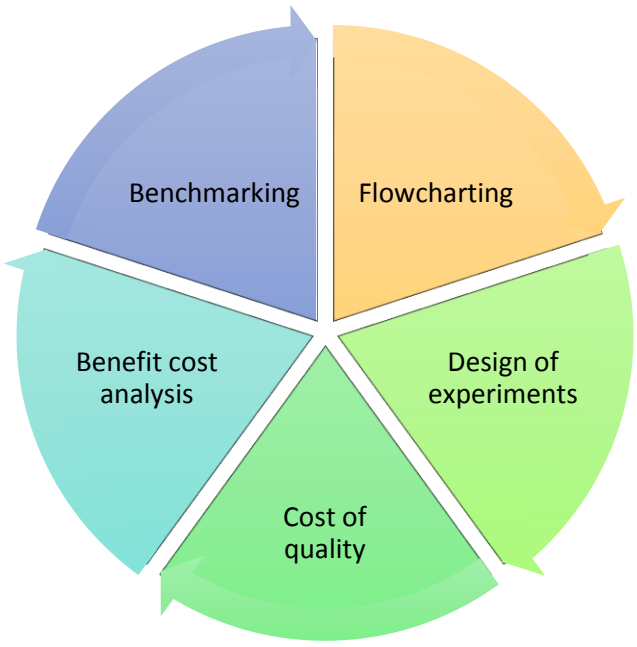
- **The quality management plan:** This plan defines how the project team will implement and fulfil the quality policy of the performing organization.

- **Results of quality control measurements:** Quality control tests will provide these measurements. The values must be quantifiable in order that results might be measured, compared and analyzed. In other words, "pretty close to on track" is inadequate; "95 per cent pass rate" is more acceptable.
- **Operational definitions:** The metrics that define the project processes, their attributes, and units of measure are necessary for QA.

Applying Quality Assurance

The QA department, management or, in some instances, even the project manager can complete the requirements for QA. QA can be accomplished using the same tools as those used for project planning:

- Flowcharting
- Design of Experiments
- Cost of Quality
- Benefit cost analysis
- Benchmarking



Completing a Quality Audit

Quality audits are about learning. Quality audits are formal reviews of what has been completed within a project, what has worked, and what has not worked. The idea of a quality audit is to identify the lessons learned during the current project to determine how to improve the project — and other projects within the organization. The end result of the audit is to improve performance for the current project, other

projects, or the entire organization. The idea is that Susan the project manager might learn from the implementations of Bob the project manager and vice versa.

Quality audits can be scheduled at key intervals within a project or they may occur without warning. The audit process can vary depending on who is completing the audit: internal auditors or hired, third-party experts.

Improving the Project

Quality improvement requires action to improve the project's effectiveness. The actions to improve the effectiveness may have to be routed through the change control system. This means change requests, analysis of the costs and risks, and involvement from the Change Control Board.

Implementing Quality Control

To determine whether the results satisfy the demands of the quality standards, Quality Control (QC) requires the project manager, or other qualified party, to monitor and measure project results. Root-cause analysis follows the quality control processes, should the results be unsatisfactory. Root-cause analysis is necessary to enable the project manager to determine the cause and apply corrective actions. On the whole, QC occurs throughout the life of a project, not just at its end. Moreover, QC is concerned not only with the product the project is creating but also with the project management processes. QC measures performance, cost variances, and scheduling. The experience of the project should be one of quality — not just the product the project creates. Consider a project manager who demands the project team work extreme hours to meet an unrealistic deadline; team morale suffers, as does the project work the team is completing.

The project team should have the following skill sets in order to be competent in quality control:

- Statistical quality control, such as sampling and probability
- Attribute sampling to measure conformance to quality on a per unit basis
- Variable sampling to measure conformance to quality as a whole
- Inspection to keep errors away from the customer
- Tolerance range to determine whether the results are within, or outside, an acceptable level of quality
- Special causes to determine anomalies in quality
- Control limits to determine whether the results are in, or out, of quality control
- Random causes to determine expected variances of quality

Preparing for Quality Control

Quality control relies on several inputs:

- **Quality management plan:** This plan defines how the project team will meet the quality policy.
- **Work results:** The results of both the project processes and the product are needed to measure and compare to the quality standards. The expected results of the product and the project can be measured from the project plan.
- **Operational definitions** The operational definitions that define the metrics for the project are needed to enable QC to measure and react to the results of project performance.

Checklists If the project is using checklists to ensure that the project work is completed, a copy of the checklists will be needed as part of quality control. The checklists can serve as an indicator of completed work—and expected results.

Inspecting Results

Although quality is planned into a project, not inspected into it, inspections are needed to prove the conformance to the requirements. An inspection can be carried out on the project as a whole, a portion of the project work, the project deliverable, or even an individual activity. Inspections are also known as:

Revisiting Flow Charting

Flowcharting uses charts to illustrate how the different parts of a system operate. Flowcharting is valuable in quality control because the process can be evaluated and tested to determine where in the process quality begins to break down. Corrective actions can then be applied to the system to ensure quality continues as planned—and as expected.

Completing a Statistical Sampling

Statistical sampling is a process of choosing a percentage of results at random. For example, in a project to create a medical device, 20 per cent of all units may be randomly selected to check their quality. This process must be completed on a consistent basis throughout the project, rather than according to a sporadic schedule. The science of statistical sampling, and its requirements in order to be effective, is a complex process. Statistical sampling can reduce the costs of quality control, but mixed results may ensue if an adequate testing plan and schedule are not followed.

Results of Quality Control

Quality control should, first and foremost, result in quality improvement. Based on the results of the tools and techniques used to implement quality control, the project manager and project team apply corrective actions to prevent unacceptable quality and improve the overall quality of the project management processes.

The corrective actions identified by the project manager and the project team may require change requests and management approval. The value and importance of the change should be evident in order that the improvement to quality might be approved and folded into the project. In addition to quality improvement, there are other outcomes of quality control:

- **Acceptance decisions:** Results of work are either accepted or rejected. Rejected items typically mean rework.
- **Rework:**Non-conformance with quality results in rework. Rework costs time and money and contributes to projects being late, over budget, or both. It is always more cost-effective to do the work properly the first time than to have to do it again.
- **Process adjustments:**When results of inspections indicate that quality is unacceptable, process adjustments may be needed in order to take immediate corrective actions or planned preventive actions to ensure that quality improves. Process adjustments may qualify for a change request and be funnelled through the Change Control System as part of integration management.
- **Completed checklists**The completed checklists should become part of the project records, if the project is using checklists to confirm the completion of work. Some project managers require the project team member completing the checklist to initial the checklists as whole and complete.

Further Reading:

- ✓ *Manning, G. A. (2005) Financial Investigation and Forensic Accounting, 2nd ed.*
- ✓ *Golden, T.W., Skalak, S., Clayton, M. (2006) A Guide to Forensic Accounting Investigation*
- ✓ *Singleton, T., et al. (2006) Fraud Auditing and Forensic Accounting*
- ✓ *Silverstone, H., Sheetz, M. (2006) Forensic Accounting and Fraud Investigation for Non-Experts, 2nd ed.*