



Chapter 5 - Quality Management System

WHAT ARE WE GOING TO DISCUSS?

- Introduction
- Quality Standards
- Standards Organizations
- International Organization for Standardization (ISO)
- ISO 9000 Quality Management System
- ISO9000 Quality System Requirements
 - Quality System Elements
 - Functions Requirement
- ISO 9000 Quality System Documentation
- ISO 14000 Environment Management System & Benefits
- OHSAS 18000 & Benefits of OHSAS Management System



Introduction

- A quality system is a framework for quality management.
- It embraces the organizational structure, procedure, and processes needed to implement quality management.
- Standards have important economic and social repercussions.
- They are useful to industrial and business organizations of all types, to government, and to other regulatory bodies, to conformity assessment professionals, to suppliers and customers of products and services in both the public and private sectors, and to people in general in their role as customers and users.
- Standards provide governments with a technical base for health, safety, and environmental legislation.

Quality Standards

- A standard is simply “A *definition of how something should be*”.
- As per Pyzdek, “*Standards are documents used to define acceptable conditions or behaviors and to provide a base line for assuring that conditions or behaviors meet the acceptable criteria.*”
- As per Chung, “*Standard is reference base that is required to judge the adequacy of a quality system.*” He further states that a “*quality system has to cover all the activities leading to the finished product. Depending on the scope of operation of the organization, these activities include planning, design, development, purchasing, production, inspection, storage, delivery, and after-sales service.*”

Quality Standards

- Pyzdek further states that quality standards serve the following purpose:
 - ✓ Standards Educate
 - set forth ideals or goals for the guidance of manufacturers and users alike
 - Invaluable to the manufacturer who wishes to enter a new field
 - ✓ Standards Simplify
 - reduce the number of sizes, the variety of process, the amount of stock, and the paperwork that largely accounts for overhead costs
 - ✓ Standards Conserve
 - By making possible large-scale production of standard designs, they encourage better tooling, more careful design, and more precise controls
 - Reduce the production of defective and surplus pieces
 - Also benefit the user through lower costs

Quality Standards

- Pyzdek further states that quality standards serve the following purpose:
 - ✓ Standards provide a base upon which to certify
 - serve as hallmarks of quality
 - Are of inestimable value to the advertiser and to the buyer
- Standards are used to ensure that a product, system, or service measures up to its specifications and is safe for use.
- Standards are the key to any conformity assessment activity.

Quality Standards

- The International Organization for Standardization (ISO) has given the importance of standards as follows:
 - ✓ Standards make an enormous contribution to most aspects of our lives.
 - ✓ Standards ensure desirable characteristics of products and services such as quality, environmental fitness, safety, reliability, efficiency, and interchangeability and at an economical cost.
 - ✓ When products and services meet our expectations, we tend to take this for granted.
 - ✓ We soon care when products turn out to be poor quality, do not fit, are incompatible with equipment that we already have, are unreliable or dangerous.
 - ✓ When products, systems, machinery and devices work well and safely, it is often because they meet standards.

Quality Standards

- Standard setting is one of the first issues in developing a quality assurance system, and increasingly organizations are relying on readily available standards rather than developing their own.
- Each standard should be
 - ✓ Clearly written in simple language that is unambiguous
 - ✓ Convenient in understanding
 - ✓ Specific in setting out precisely what is expected
 - ✓ Measurable so that the organization can know whether it is being met
 - ✓ Achievable, that is, the organization must have the resources available to meet the standard
 - ✓ Constructible

Construction Division and Sections - Standards Available

Sr. No.	Construction Division	Related Section
1	Concrete	Reinforcement, Cement, Concrete
2	Masonry	Concrete Masonry, Brick Masonry
3	Metals	Material fabrication
4	Wood and Plastic	Material, Treatment, Paneling
5	Thermal and moisture protection	Liquid waterproofing, Bituminous waterproofing, Membrane waterproofing, Building insulation
6	Doors and windows	Steel doors, Aluminum doors, Wooden doors, Curtain wall, Glazing
7	Finishes	Gypsum plaster, Cement plaster, Tiling, Acoustic ceiling, Metallic ceiling

Construction Division and Sections - Standards Available

Sr. No.	Construction Division	Related Section
8	Specialties	Partitions, Landscape
9	Conveying systems	Elevators, escalators
10	Fire suppression	Firefighting system, Firefighting pumps
11	Plumbing	Plumbing piping, Plumbing Equipment, Water distribution pumps
12	HVAC	Chillers, Chiller piping, Chilled water Pumps, Cooling towers, Air handling unit, Fan coil units, Fans and ventilators
13	Automation	Building Automation systems
14	Electrical	Cable tray, Wiring accessories, Wires and cables, Lighting fixtures, lightning protection, switch boards, fire alarm system
15	Communication	Communication system

Standards Organizations

- There are many organizations that produce standards; some of the best known organizations in the quality field are

Sr. No.	Standards Organizations
1	International Organization for Standardization (ISO)
2	International Electro technical Commission (IEC)
3	American Society for Quality (ASQ)
4	American National Standards Institute (ANSI)
5	American Society for Testing and Materials (ASTM)
6	European Committee for Standardization (CEN)
7	British Standards Institution (BSI)
8	Bureau of Indian Standards (BIS)

Standards Organizations

- Standards produced by these organizations/institutes are recognized worldwide.
- These standards are referred in the contract documents by the designers to specify products or systems or services to be used in a project.
- They are also used to specify the installation method to be followed or the fabrication works to be performed during the construction process.
- Apart from these there have been many other national and international quality system standards.
- However, in order to facilitate international trade, delegates from 25 countries met in London in 1946 to create a new international organization.
- The objective of this organization was to facilitate international coordination and unification of industrial standards.
- The new organization, International Organization for Standardization, ISO, officially began operation on February 23, 1947.

International Organization for Standardization (ISO)

- ISO is a network of national standards institutes of 157 countries formed on the basis of one member per country, with a Central Secretariat in Geneva, Switzerland, that coordinates the system.
- ISO is the world's largest developer and publisher of international standards.
- It is a non-governmental organization that forms a bridge between the public and private sectors.
- It has more than 16,500 international standards. Of all the standards produced by ISO, the ones that are most widely known are the ISO 9000 and ISO 14000 series.
- ISO 9000 has become an international reference for quality requirements in business-to-business dealings. It is concerned with “Quality Management”.
- ISO 14000 is primarily concerned with “Environmental Management System”.

International Organization for Standardization (ISO)

- ISO standards are updated periodically since they were originally published in 1987. ISO 9000 actually comprises several standards.
- The 1994 version of the ISO 9000 series was made up of following standards:

ISO 9000	Quality management and quality assurance standards
ISO 9001	Quality systems—Model for quality assurance in design, development, production, installation, and servicing.
ISO 9002	Quality systems—Model for quality assurance in production installation and servicing.
ISO 9003	Quality systems—Model for quality assurance in final inspection and test
ISO 9004	Quality management and quality systems element guidelines

- These standards were simplified in December 2000 and are known as ISO 9000:2000. ISO 9000:2000 consists of the following standards:

International Organization for Standardization (ISO)

- ISO 9000:2000 consists of the following standards:

ISO 9000	Quality fundamentals and vocabulary
ISO 9001	Quality management systems
ISO 9004	Quality management system guidelines for performance improvement

- The ISO 9000:1994 had 20 elements listed under the ISO 9001 model for quality assurance in design, development, production, installation, and servicing.
- ISO 9000:2000 specifies requirements for a quality management system for any organization that needs to demonstrate its ability to consistently provide product that meets customer and applicable regulatory requirements and to enhance customer satisfaction.

International Organization for Standardization (ISO)

- Food Safety Management Systems ISO 22000
- Information Security Management Systems ISO 27001
- Supply Chain Security Management Systems ISO 28000

- ISO 22000:2005, published on September 1, 2005, is related to the safe food supply management system to ensure that food is safe at the time of human consumption.

- ISO 27001:2005 is related to information security system.

- ISO 28000:2005 is related to supply management system to help combat threats to safe and smooth flow of international trade.

ISO 9000 Quality Management System

- ISO 9000 quality system standards are a tested framework for taking a systematic approach to managing the business process so that organizations turn out products or services conforming to customer's satisfaction.
- The typical ISO quality management system is structured on four levels, usually portrayed as a pyramid.



Figure: Quality Management System Pyramid

ISO 9000 Quality Management System

- On top of the pyramid is the quality policy, which sets out what management requires its staff to do in order to ensure quality management system.
- Underneath the policy is the quality manual, which details the work to be done.
- Beneath the quality manual are work instructions or procedures.
- The number of manuals containing work instructions or procedures is determined by the size and complexity of the organization.
- The procedures mainly discuss the following:
 - What is to be done?
 - How is it done?
 - How does one know that it has been done properly (for example, by inspecting, testing, or measuring)?
 - What is to be done if there are problems (for example, failure)?
- The bottom level of hierarchy contains forms and records that are used to capture the history of routine events and activities.

ISO 9000 Quality Management System

- ISO 9001:2000 identifies certain minimum requirements that all quality management systems must meet to ensure customer satisfaction.
- A quality system has to cover all the activities leading to the final product or service.
- The quality system depends entirely on the scope of operation of the organization and particular circumstances such as number of employees, type of organization, and physical size of the premises of the organization.
- The quality manual is the document that identifies and describes the quality management system.
- ISO 9000:2000 outlines the necessary steps to implement the quality management system.

Steps to implement QMS

Identify the process (activities and necessary elements) needed for quality management system.

Determine the sequence and interaction of these processes and how they fit together to accomplish quality goals.

Determine how these processes are effectively operated and controlled.

Measure, monitor, and analyze these processes and implement action necessary to correct the process and achieve continual requirements.

Ensure that all information is available to support the operation and monitoring of the process.

Display the most options, thus helping make the right management system.

ISO 9001:2000 requirements fall into following sections



Quality System Documentation

- In the construction industry, a contractor may be working at any time on a number of projects of varied natures.
- These projects have their own contract documents to implement project quality, which require a contractor to submit a contractor's quality control plan to ensure that specific requirements of the project are considered to meet client's requirements.
- Therefore, while preparing a quality management system at a corporate level, the organization has to take into account tailor-made requirements for the projects and accordingly the manual should be prepared.
- *Refer Table 2.3 & Table 2.4 from textbook only for reference.*

ISO 14000 - Environmental Management System

- ISO 14000 is a series of international standards that have been developed to incorporate environmental aspects into business operations and product standards.
- ISO 14001 is a specific standard in the series for a management system that incorporates a set of interrelated elements designed to minimize harmful effects on the environment due to the activities performed by an organization, and to achieve continual improvement of its environmental performance.
- ISO 14001 incorporates quality management system philosophy, terminology, and requirement structure similar to that of ISO 9001 and provides system compatibility.

Benefits of ISO 14000

- Pollution prevention and waste reduction opportunities
- Cost reduction
- Customer satisfaction
- Compliance with regulatory requirements on environmental considerations
- Reduction in consumption of energy
- Reduction in use of natural resources
- Minimization of environmental liability and risk
- Commitment to social responsibility

OHSAS 18000

- The Occupational Health and Safety Assessment Series (OHSAS) 18000 has been developed to help organizations control and minimize occupational health and safety risks.
- OHSAS 18001 is a specific standard for occupational health and safety management systems designed to eliminate or minimize the risk to employees and other related parties who may be exposed to occupational health and safety risks associated with business activities.
- OHSAS 18000 is compatible with ISO 9001 and ISO 14001 management systems.
- OHSAS 18001 represents a progression of a management philosophy from quality management to environmental management to occupational health and safety management.

Benefits of OHSAS Management System

- Reduced accidents and injuries to the employees
- Reduced insurance liability and risk
- Decreased costs due to personal injury and production downtime
- Reduced worker compensation insurance costs
- Ease of managing safety risks
- Enhanced employee safety awareness

THANK YOU



Chapter 6 -

Quality Management System Certification & Quality Cost

WHAT ARE WE GOING TO DISCUSS?

- ISO Certification - Process Methodology & Schedule
- Integrated Quality Management System
- Quality Cost - Introduction
- Categories of Costs
- Reasons for Poor Quality
- Quality Cost in Construction
- Quality Performance Management System



ISO Certification

- In the context of ISO 9000 or ISO 14000, “certification” refers to the issuing of written assurance (the certificate) by an independent, external body that has audited an organization’s management system and verified that it conforms to the requirements specified in the standard.
- “Registration” means that the auditing body then records the certification in its client register so the organization’s management system has therefore been both certified and registered.
- “Certification” seems to be the term most widely used worldwide, although “registration” is often preferred in North America, and the two are also used interchangeably.

ISO Certification

- Accreditation is something different.
- It is certification of the certification body.
- Thus, it should be understood that the certification body is a third-party company registered with an established national accreditation board and is authorized to issue a certificate of conformance after evaluating the conformance of an organization's management system to the requirements of appropriate standard.

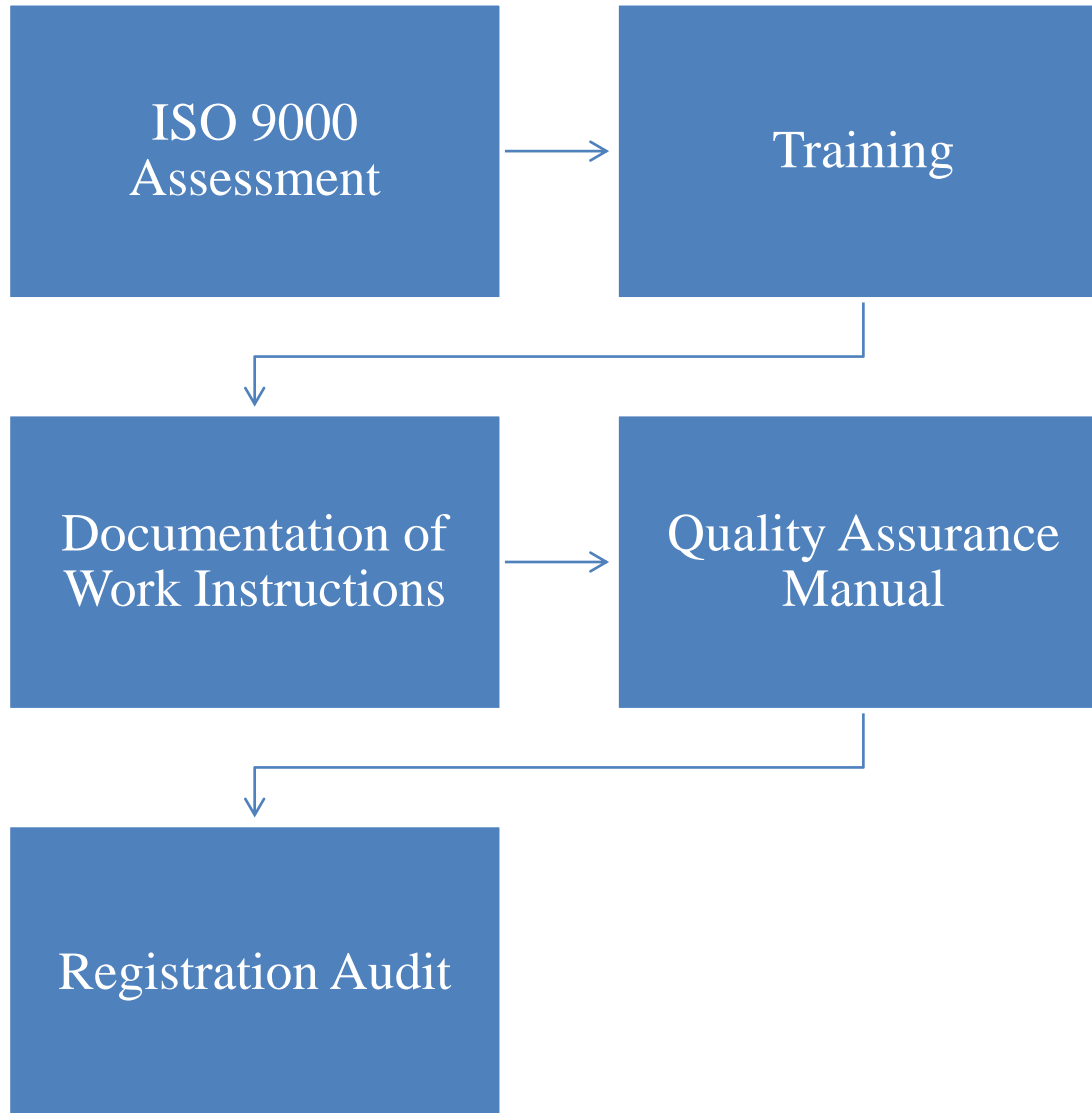
ISO Certification

- The ISO 9000 quality management system is accepted worldwide, and international customers prefer to do business with organizations having ISO certification.
- ISO certification is not compulsory; however, it is required for competitive advantage.
- ISO is valuable to firms because it provides a framework to assess
 - ✓ where they are
 - ✓ where they would like to be
 - ✓ What is their standing in the international market
- Implementation of an ISO management system in the organization brings
 - ✓ increased effectiveness
 - ✓ efficiency of operations
 - ✓ ensures that the product satisfies customer requirements

ISO Certification

- ISO 9000 and ISO 14000 concern the way an organization goes about its work and processes.
- ISO 9000 and ISO 14000 are not product standards.
- There are three types of audits that can be done on ISO quality management systems:
 1. First-Party Audit—Audit your own organization (internal audit).
 2. Second-Party Audit—Audit of supplier by the customer.
 3. Third-Party Audit—Totally independent of the customer–supplier relationship. The best certification of a firm is through third party.
- ISO 9000 certification audit is done by a certification body that has been accredited or has been officially approved as competent to carry out certification in a specified business sector by a national accreditation body.

ISO Certification - Process



ISO Certification - Process

1. ISO 9000 Assessment

- The initial assessment is a detailed review of the company's quality systems and procedures compared to ISO 9000 requirements.
- This process defines the scope of the ISO 9000 project.

2. Training

- All employees must be trained in two areas.
- First, they must have an overall understanding of ISO 9000 vocabulary requirements, the role of the quality manual, and the benefits that will be derived from the system.
- Second, they must understand the actual day-to-day process of upgrading and improving procedures.

3. Documentation of Work Instructions

- All procedures must be described and documented so that they can be understood prior to approval.
- Once completed, this documentation should outline every process a company undertakes that affects the quality of its finished products.

ISO Certification - Process

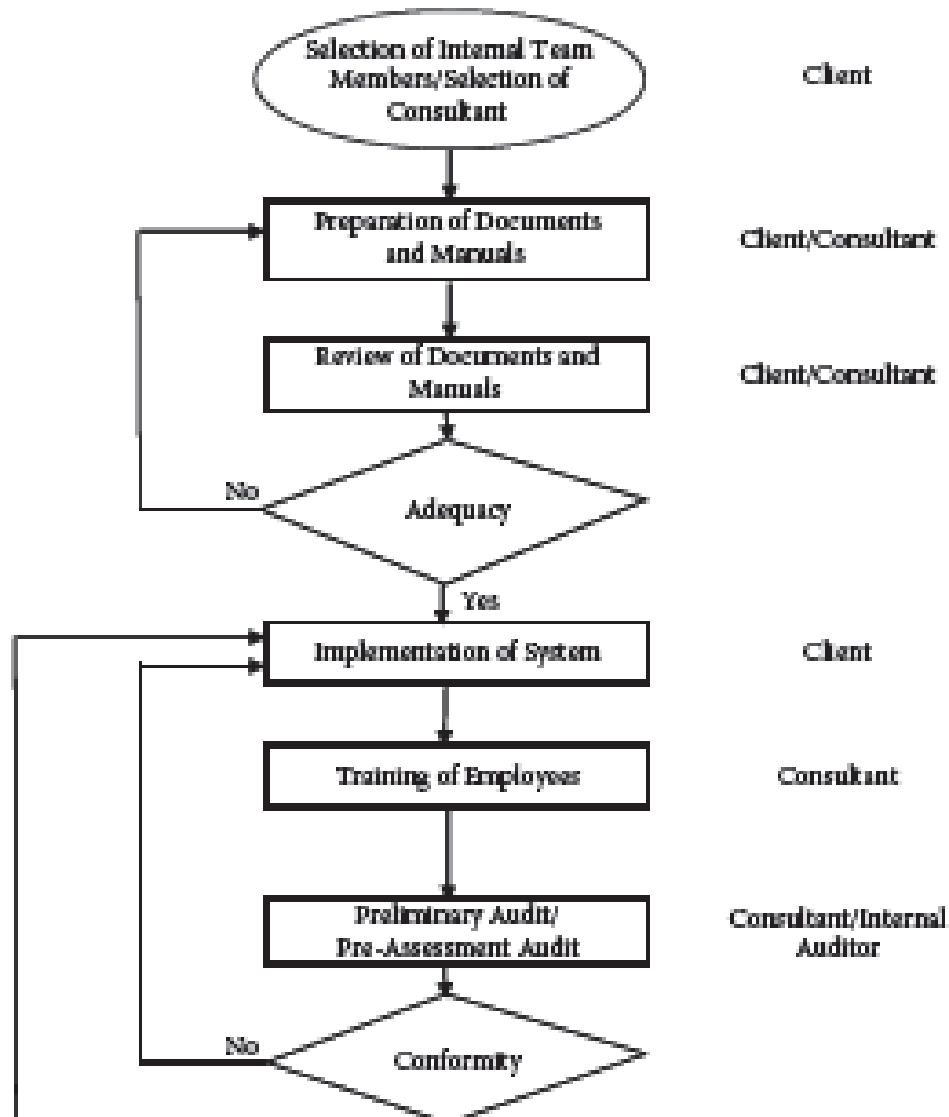
4. Quality Assurance Manual

- While ISO 9000 standards do not require a quality assurance and policy manual, they do require that a company document everything it does and every system that affects the quality of the finished product.
- The manuals are often used to assemble all documentation in one place.

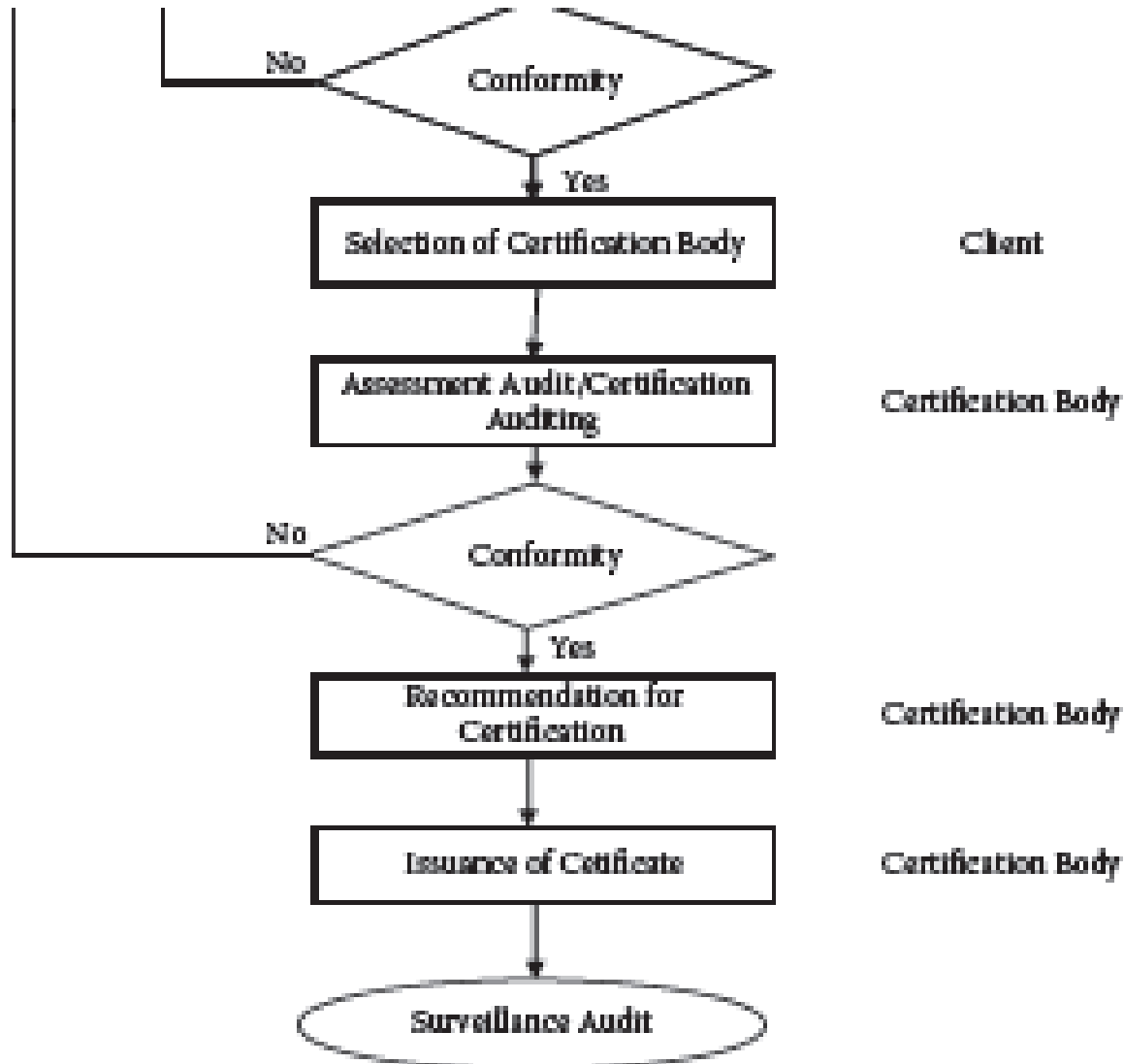
5. Registration Audit

- The final step in certification is an audit by an organization chosen as the external registrar to see that system is working as described in the quality manual and that it meets ISO 9000 requirements.

ISO Certification - Process Diagram



ISO Certification - Process Diagram



ISO Certification

- The duration of each activity and the overall period to obtain certification may vary from company to company depending on the size and nature of the business.
- With the certification of ISO 9000:2000, organizations obtain the following advantages:
 - ✓ Increased market share
 - ✓ Increase in revenues
 - ✓ Continuous improvement in organizational process
 - ✓ Consistency in products/services quality
 - ✓ Improvement in staff performance
 - ✓ Effectiveness in the utilization of staff
 - ✓ Efficient utilization of time, money, and other resources
 - ✓ Customer satisfaction and confidence in the organization's products/services

Integrated Quality Management

- *Refer Nil's PPT (Page – 117 to 119 of the textbook.)*

Quality Cost

- Quality Cost - Introduction
- Categories of Costs
- Reasons for Poor Quality
- Quality Cost in Construction
- Quality Performance Management System

- *Refer Diti & Darpan's PPT (Page No. 129 – 138 of the textbook.)*

THANK YOU