MODULE -6

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Construction procedures: different methods of construction – types of contract – Tenders – prequalification procedure - earnest money deposit – contract document – General and important conditions of contract - measurement and measurement book - Inspection and quality control - need, principles and stages. Basics of Total Quality Management.

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CONTRACT

Contract may be defined as an agreement which is enforceable by law. It is a written undertaking for execution of work or supply of materials or performance of any service.

An Agreement enforceable by law is a contract". Therefore in a contract there must be an agreement and (2) the agreement must be enforceable by law. A contract is also an "agreement creating and defining obligations between the parties" or an agreement enforceable at law made between two or more persons, by which rights are acquired by one or more to acts or forbearances on the part of the other or others.

An agreement comes into existence whenever one or more persons promise to one or others, to do or not to do something, "Every promise and every set of promises, forming the consideration for each other, is an agreement. Some agreements cannot be enforced through the courts of law, e.g., an agreement to play cards or go to a cinema. An agreement, which can be enforced through the courts of law, is called contract.

The Contract Act is the law of those agreements which create obligations, and in case of a breach of a promise by one party to the agreement, the other has a legal remedy.

Parts of a contract

- Offer/Proposal

- Acceptance
- Agreed terms

Offer / proposal

When one person signifies to another his willingness to do a work, he is said to make a proposal. Communication of an Offer: By words or by actions

Acceptance: When the person to whom the proposal is made signifies his assent thereto, the proposal is said to be accepted

1. Acceptance must be absolute

2. It must be communicated.

3. It must be according to the mode prescribed.

4. It must be given within the time specified or within reasonable time.

Essentials of a contract

1. Agreement.
2. Intention to create legal relationship.
3. Free and genuine consent.
4. Parties competent to contract.
5. Lawful consideration.
6. Lawful object.
7. Agreements not declared void or illegal.
8. Certainty of meaning.
9. Possibility of performance.
10. Necessary Legal Formalities.

1. Parties Competent to Contract:-

A person is competent to contract provided

a) He is of the age of majority according to the law to which he is subject. A person who is not a major according an agreement No contact shall be made by a subordinate authority who has not been directed or authorised to do so.
b) He is of sound mind. A person is said to be of sound mind for the purpose of making contract provided he is capable of understanding it and of forming a rational judgement as to is effect upon his interest at the time when he performs the contract.
c) He is not disqualified from contracting by any law to which he is subject.

2. Free Consent of the parties:

   Two or more persons are said to consent when they agreed that upon same thing in the same sense. Consent is said free when:

   a) It is not caused under influence. The relations between the two parties performing a contract are not such that one of the parties is in the position to dominate the will of the others and uses that position to obtain an unfair advantage over the other.
   b) It is not caused by committing or threatening to commit any act forbidden by the Indian penal code, or the unlawful detaining or threatening to detain any person to enter into an agreement
   c) It is no caused by fraud.
   d) It is not caused by misrepresentation.
   e) It is not caused by mistake. Where both the parties do an agreement under a mistake the agreement is avoidable.

3. Definite proposal and its acceptance:

   Terms of contact must be precise and definite and there must be no room for ambiguity or misconstruction therein. When one person signifies to another his willingness to anything, he is said to make a proposal the communication of a proposal is complete when it comes to the Knowledge of the person to whom it is made. The acceptance must be absolute, unqualified and expressed

in some usual and reasonable manner. Acceptance is made by performing conditions or receiving conditions.

4. The considerations or objects are lawful:

   The consideration or object of an agreement is said to be unlawful if forbidden by law or fraudulent or of such nature that, if permitted it would defeat the provisions of any law or involves or implies injury to the person or property of another or opposed to public policy or regarded as immoral by the court.

5. That the meaning shall be certain:

   Agreement, the meaning of which shall be certain or capable of being made certain.

ESSENTIAL ELEMENTS OF A CONTRACT

An agreement becomes enforceable by law when it fulfils certain conditions. These conditions, which may be called the Essential Elements of a Contract, are explained below.

1. ***Offer and Acceptance:*** There must be a lawful offer by one part and a lawful acceptance of the offer by the other and acceptance must conform to the rules laid down in the Indian Contract Act regarding offer and acceptance.
2. ***Intentions to create Legal Relationship:*** There must be an intention (among parties) that the agreement shall result in or create legal relations. An agreement to dine at a friend's house is not an agreement intended to create legal relations and is not a contract. But an agreement to buy and sell goods or an agreement to marry, are agreements intended to create some legal relationship and are therefore contracts, provided the other essential elements are present.
3. ***Lawful Consideration:*** Subject to certain exceptions, an agreement is legally enforceable only when each of the parties to it gives something and gets something. An agreement to do something for nothing is usually not enforceable by law. The something given or obtained is called consideration. The consideration may be an act (doing something) or forbearance (not doing something) or a promise to do or not to do something. Consideration may be past (something already done or not done). It

may also be present or future. But only those considerations are valid which are "lawful".

4. ***Capacity of Parties:*** The parties to an agreement must be legally capable of entering into an agreement; otherwise it cannot be enforced by a court of law. Want of capacity arises from minority, lunacy, idiocy, drunkenness, and similar other factors. If any of the parties to the agreement suffers from any such disability, the agreement is not enforceable by law, except in some special cases.
5. ***Free Consent:*** In order to be enforceable, an agreement must be based on the free consent of all the parties. There is absence of genuine consent if the agreement is induced by coercion, undue influence, mistake, misrepresentation, and fraud. A person guilty of coercion, undue influence etc. cannot enforce the agreement. The other party (the aggrieved party) can enforce it, subject to rules laid down in the Act.
6. ***Legality of the Object:*** The object for which the agreement has been entered into must not be illegal or immortal or opposed to public policy.
7. ***Certainty:*** The agreement must not be vague. It must be possible to ascertain the meaning of the agreement, for otherwise it cannot be enforced.
8. ***Possibility of Performance***: The agreement must be capable of being performed. A promise to do an impossible thing cannot be enforced.
9. ***Void Agreements***: An agreement so made must not have been expressly declared to be void. Under Indian Contract Act there are five categories of agreements which are expressly declared to be void. They are:
    1. Agreement in restraint to marriage.
    2. Agreement in restraint of trade.
    3. Agreement in restraint of proceedings.
    4. Agreements having uncertain meaning.
    5. Wagering agreement.
10. ***Writing Registration and Legal Formalities***: An oral contract is a perfectly good contract, except in those cases where writing and/or registration is required by some statute. In India writing and/or registration is required by some statute.

In India writing is required in cases of lease, gift, sale and mortgage of immovable property: negotiable instruments; memorandum and articles of association of a company etc. Registration is compulsory in cases of documents coming within the purview of Section 17 of the Registration Act, e.g., mortgage deeds covering immovable property. The terms of an oral contract are sometimes difficult to prove. Therefore important agreements are usually entered into writing even in cases where wiring is not compulsory.

TYPES OF CONTRACT

Contracts for the execution of civil engineering works are of following types:

(a) Lump sum contract
(b) Item ratc contract
(c) Lump sum and schedule contract
(d) Cost plus fixed fee contract
(e) Cost plus percentage of cost contract
(f) Special contracts

a) Lumpsum Contract

In this type of contract, the contractor offers to do the whole work as shown in drawings and described by specifications, for a total stipulated sum of money. There are no individual rates quoted, thus it becomes difficult to make adjustments in the contract value if any changes are to be made in the work later on. The schedule of different items of work is not provided and the contractor has to complete the work as per drawings and specifications for the agreed lump sum amount.

Deposit of 10% security money and other conditions of the contract are included in the contract agreement. Upon the completion of work, a fixed lump sum amount is paid to the contractor. Detailed measurements of different items are required but the whole work is compared and checked with drawings and specifications before releasing the payment. In large projects, part payments are made to the contractor at

different stages of work on mutually agreed terms. In case the contractor stops the work in between he is not entitled for any further payment.

Suitability

A lump sum contract is more suitable for works for which contractors have prior construction experience. This experience enables the contractors to submit a more realistic bid. This type of contract is not suitable for difficult foundations, excavations of uncertain character, and projects susceptible to unpredictable hazards and variations.

Merits

- The owner can decide whether to start or shelve the project knowing the total lump sum price quoted by different contractors.
- The contractor can earn more profit by in-depth planning and effective management at site.

Demerits

- Before the contract is awarded, the project has to be studied thoroughly and the complete contract document has lo be prepared in advance.
- In this type of contract, unforeseen details of work are not specified in the contract document. Many additional items may have to be undertaken as the work progresses, giving opportunity to the contractor for claiming higher rates for the extra items not included in the contract agreement.

b) Item Rate Contract

Also called a schedule contract, in this contract, the contractor undertakes the execution of work on an item rate basis. The amount to be received by the contractor, depends upon the quantities of various items of work actually executed. The payment to the contractor is made on the basis of detailed measurements of different items of work actually donc by him.

Suitability

The item rate contract is most commonly used for all types of engineering works financed by public or government bodies. This type of contract is suitable for works

which can be split into various items and quantities under each item can be estimated with accuracy.

Merits

- In this type of contract, there is no need for detailed drawings at the time of allotting contract as ¡n the case of lump sum contract. The detailed drawings can be prepared after the contract is awarded.
- Changes in drawings and quantities of individual items can be made as per requirement within agreed limits.
- The payment to the contractor is made on the actual work done by him at the agreed rates.

Demerits

- The total cost of work can only be known upon completion. As such, the owner may incur financial difficulty if the final cost increases substantially.
- Additional staff is required w take detailed measurements of work done for releasing payments to the contractor.
- The scope for additional saving with the use of inferior quality materials may prompt the contractor to use such materials in the work.

c) Lump Sum and Scheduled Contract

This is similar to the lump sum contract except the schedule of rates is also included in the contract agreement. In this type of contract the contractor offers to do a particular work at a fixed sum within a specified lime as per plans and detailed specifications. The schedule of rates for various items is provided which regulates the extra amount to bc paid or deducted for any additions or deletions made during the progress of work. Measurements of different items of original work are not required but extra items are required to be measured for payment. The original work shall however be checked and compared with the drawings and specifications.

Suitability

This type of contract is more suitable for construction works for which contractors have prior work experience and can consequently estimate the project cost more realistically.

Merits

- In this type of contract, additional staff for recording detailed measurement of original item of work is not required for making payment to the contractor.
- The owner can know from tenders as to what the project will cost him. Knowing the financial implications, the owner can decide to start or defer the project.

Demerits

- Before the contract is awarded the project has to be studied thoroughly and all the contract documents are required to be completed in every respect.
- The non-scheduled extra items arising out of changes made in the drawings and specifications are often a source of dispute because the contractor presses for rates higher than the prevailing market rates.

d) Cost Plus Fixed Fee Contract

Cost plus fixed fee contract is desirable when the scope and nature of the work can atleast be broadly defined. The amount of fee is determined as a lump sum from a consideration of the scope of work, its approximate cost, nature of work, estimated time of construction, manpower and equipment requirements etc. In order to negotiate such a type of contract, it is essential that the scope and some general details of the work are defined. The contractor in this type of contract is selected on the basis of merit rather than the fee alone. In case of cost plus percentage contract, the contractor has a tendency to increase his profit by increasing the cost of work. But this drawback is overcome in cost plus fixed fee contract because here the contractor's fee is fixed and does not fluctuate with actual cost of work. Once this fee is fixed, the contractor cannot increase the cost of work.

Suitability

- This type of contract is suitable for works required to be completed expeditiously and where it is difficult to foretell what difficulties are likely to be encountered.
- This contract is also suitable for important structures where the cost of construction is immaterial.

Merits

- In this type of contract, actual cost is to be borne by the owner. Therefore, the contractor performs the work in the best interest of the owner resulting in good quality work.
- The work can be taken in band even before the detailed drawings and specifications are finalized.
- Changes in design and method of construction if needed can be easily carried out without disputes.
- The work can be executed speedily.

Demerits

- This form of contract cannot bc adopted normally in case of public bodies and Government departments.
- The final cost of the work is no known in advance and this may subject the owner to financial difficulties.

e) Cost Plus Percentage of Cost Contract

In this type of contract, instead of awarding the work on lumsum or item rate basis, it is given on certain percentage over the actual cost of construction. The actual cost of construction is reported by the contractor and paid to him by the owner together with a certain percentage as agreed earlier.

The contractor agrees to do the work in accordance with the drawings, specifications, other conditions of contract. In this type of contract proper control has been exercised by the owner in purchase of materials and in arranging labour.

The suitability, merits and demerits of these type of contract are similar to cost plus fixed fee contarct. An addition to demerit, the tendency of the contractor to increase the cost of work to earn more profit by way of percentage of enhanced actual cost.

Special contract

There are certain special contract used at different occasions. Some of these contracts are:

1. Turnkey contract
2. Package contract
3. Negotiated contract
4. Continuing contract
5. Running contract
6. Joint venture contract
7. BOT contract
8. BOOT contract

1. Turnkey contract

A turnkey contract is an integrated contract in which all works pertaining to various disciplines such as civil, electrical, mechanical etc. are in a single contract called the main contract. The main contractor can sublet the contract to sub-contractors who are specialist in their respective fields.

In this contract, the main advantage of the owner is that he need not to coordinate the work of different contractors. The main contractor is responsible for all kinds of jobs, starting from planning to commissioning stage. The owner takes over the entire work which is fully operational and of proven performance from the main contractor.

2. Package contract

In a package contract, two or more related jobs, each of which could form a separate contract are combined in a single contract. In the field of civil engineering generally design and development are combined with construction and supplying or maintenance.

In this type of contract, plan of work and standards are established and the work is carried out accordingly by the contractor. The main contractor is responsible for safe guarding the owner's interest , clear approval of design and technical aspect have to be taken from the owner. The responsibility for the correctness of design lays with the main contractor.

3. Negotiated contract

In this type of contract negotiation across the table takes place between the representatives of the owner and the main contractor for the project cost and other conditions of contract. In this type of contract, detailed project specifications, are arrived at by discussions between the owner and the main contractor.

A negotiated contract involves extended discussions for finalization as a competitive contract. Most of the consultancy works of *World Bank* are negotiated contract

4. Continuing contract

In this type of contract new or additional work is awarded to the contractor on the basis of the agreed terms and conditions of an existing contract. Such contract do not require retendering and hence can save time and money.

5. Running contract

Such contracts provide goods and services at specified intervals or as on when required by the owner. The contract price is not fixed and the payment is based on actual goods supplied and services rendered as specified in the contract document.

6. Joint venture contract

An extra ordinary large construction project to be accomplished under a general contract may require a greater concentration of financial, and administrative and technical that can be mobilized by another company. This has led to the development of joint venture(J.V) type of contract in which several firms combined their assets , plan and personnel to undertake such a project. The J.V is similar to an ordinary partnership and corporation in that each party in the combination shares in the work, risk and profit or losses of the contract in accordance with the terms of the J.V agreement. There should be an independent written document or agreement between the J.V which gives a clear

arrangement for the financing and management of the work under the contract and the manner in which the risk and profits or losses are to be shared. The J.V agreement should be subject to the approval of the owner and may be made a part of the construction contract if desired.

7. BOT contract

Build - Operate – Transfer , a third party contract to to build, then operate an assest(for e.g dam , bridge, road) for a specific amount of time for a fee and then transfer the asset back to contracting company or entity (usually a government entity). This is commonly used by public sector for large capital projects. The system of contracting is useful when client does not want to invest directly in the project and wants to encourage development projects through external funding and investment. It is also a method of attracting and involving the private sector which typically involve very heavy capital investment

For e.g: a power corporation may ask bidders to setup power plant on BOT basis, where in the bidder agrees to design and construct the plant for in return for the right to operate. The plant, say for 10 years, during which the contractor can generate and sell the power. Design and construction of certain highways or airways can also be similar done on BOT basis.

8. BOOT contract

BOOT- Build – Own –Operate –Transfer is similar to BOT except that rather than receiving a fee for operating it. It receives the net income from the asset as if it owned it. This asset is a revenue generating asset (e.g: toll bridges, powerstations)

IMPORTANT CONDITIONS OF CONTRACT

The members of the construction team should be fully aware of their rights and obligations under the contract. Following are the important conditions of contract.

1. Time of completion
2. Delay and extension of time
3. Penalty

4. Compensation of delay in completion of work
5. Liquidated damages
6. Debitable agency
7. Valuation of variations
8. Settlement of disputes
9. Force majeure and natural disaster
10. Price excalation
11. Termination of contract

1. Time of completion

   The contract is required to complete the work within the agreed time of completion which is specified in a suitable unit of time (year, month, week, days) depending on the nature and scope of work. The contractor is also required to maintain the proportionate progress of work.

2. Delay and extension of time

   The delay in completion of work not attributed to the contractor, should be brought to the notice of the owner by the contractor in writing, within the time specified in the contract for seeking extension of time. The owner will satisfy himself that the delay is not on account of a lapse on the part of a contractor before granting suitable extension of time.

3. Penalty

   It is a fine imposed on the contractor for non-fulfillment of contractual obligations such as failure to maintain required progress of work, delay in completion, poor quality of work, bad workmanship etc.

4. Compensation for delay in completion of work

   The contractor is liable to pay compensation to the owner for delay attributed to him in completion of work. The amount of compensation may be stated as a percentage of the estimated cost of work for each unit of time delay. The maximum limit of compensation may be 10% of the contract price.

5. Liquidated damages

It is a fixed stipulated sum payable by the contractor on account of penalty for delays and does not bear any relationship to the real damage to the owner. It is generally high and fixed per day for the excess period over that specified in the contract for completing the work.

6. Debitable agency

   Whenever the contractor fails to fulfill his contractual obligation in respect of progress or quality of work even after giving due notice by the owner, it becomes necessary to appoint a debitable agency which works at the cost and risk of the contractor. This agency is in the form of labour or other contractor to fulfill the contractual obligations of the main contractor. The expenses incurred are charged from the bill or security of the original contractor.

7. Valuation of variations

   The valuation of variations is based on change in orders issued in writing by the owner. Generally, the variation in individual items of work should not be more than 25% and variation in total cost should not exceed 10%.

8. Settlement of disputes

   Efforts should be made to resolve disputes amicably between the owner and the contractor through mutual discussions and negotiations. Arbitration clause may be incorporated in the contract to settle disputes not resolved through mutual discussions and negotiations.

9. Force majeure and natural disasters

   Natural disasters are acts of nature, such as unprecedented floods or rainfall, earthquake, hurricanes, typhoons, fire etc. These disasters along with occurrence of riots, revolt etc. are beyond the control of the contractor and may lead to financial and time loss. The contractor should obtain an insurance policy for such risks as can be covered by insurance. In the event of financial or time loss, the contractor can claim financial compensation from the owner for risks which are not insurable and an extension of time for all such risks.

10. Price escalation

During execution of the work, labour wages and material prices may increase as a result of inflation. The contract conditions should, therefore, include on appropriate clause for payment of escalation to the contractor. Generally, escalation payment is made for increase in the cost of labour, materials and petrol, oil and lubricants (POL) and the percentages of three components are taken as under:

Labour	30% of contract price
Materials	65% of contract price
POL	5% of contract price

11. Termination of Contract

The owner can terminate the contract in the event of default or bankruptcy of the contractor and may impose penalty as per the contract agreement. Default on the part of the contractor includes abandoning the work, failure to maintain required progress, non-observance of rules/instructions etc. for which the owner may resend the contract and impose penalty upto 10% of the estimated cost of the work. Due notice must be served on the contractor before termination of the contract.

CONTRACT DOCUMENT

Construction works intended to be awarded to be awarded to contractors are given by publicity so that a sufficient number of interested parties may bid for the work. Usually the lowest bid is accepted unless there are valid reasons for not following these practices. Every written contract which clearly describes the work should also define the right and obligations of the parties. If the right and obligations of the owner and the contractor are defined in a document , then it is called the contract document. This document generally follows a standard format for construction contracts entered into by govt. and public bodies. The contract document consist of contract agreement on non-judicial stamp paper of prescribed value and the following sets of document each page of it is signed both by the owner and the contractor.

1. *Cover or Title Page*

It contains the name of the work, name of the owner, name of the contractor, contract agreement number, contents etc.

2. *Contents page*

   It contains the contents of the agreement with page references

3. *Notice Inviting Tender(NIT)*

   It contains a brief description of work estimated cost of work date and time for receiving the tender, amount of earnest money (EMD), security deposit(SD), time of completion etc.

4. *Tender form*

   It comprises of bill of quantities, contractor's rate, total cost of work, time for completion, security money to be deposited and penalty process etc.

5. *Schedule of issue of materials*

   It contains the list of materials to be issued by the department or owner to the contractor with rates or place of issue.

6. *Drawings*

   These comprise a complete set of fully dimensioned drawings including plans, elevations, sections, detailed drawings and site plan.

7. *Specifications*

   It is not practicable to include the detailed information of each item of work in the limited space of description in the bill of quantities. As such detailed agreement forms a part of the contract agreement.

   Specification should be clear and precise covering all items of bill of quantities (BOQ). Following specifications are normally included in the contract document

   a. General specification- These specify the class and type of work, quality of materials etc, in general for the work as a whole.
   b. In detailed specification – These views detailed description of each item of work including material and method to be used along with quality of workmanship required

8. *Conditions Of Contract*

   The terms and conditions of the contract specify the following.

a. Rates of each item of work inclusive of materials, labour , transport, plant and equipment and other arrangements required for the completion of work.
b. Amount and form of earnest and security money to be deposited
c. Manner of payment to contractor including running payments, final payments, refund of security money
d. Time of completion of work
e. Proportionate progress to be achieved
f. Penalty for poor quality and unsatisfactory work, back to proportionate progress and for delay in completion
g. Extension of time for completion of work
h. Engaging other agency at contractors cost and risk
i. Termination of contract
j. Changes in design and drawings etc and valuation of variations
k. Measurement of the work
l. Arbitration for settlement of disputes

In addition to the above performance and payments bonds are also sometimes considered as part of the contract document.

All the above stated documents collectively constitute a contract document. The documents are considered together for the purpose of contract interpretations, giving rise to meaning and effect to each part of the contract. In general, the intention of contracting parties is determined from the contract executed by them. The contractor should generally read and understand the contract before executing the work.

TENDER

Tender is an offer in writing for executing certain specified work or for supplying specified materials subject to certain terms and conditions like rates, time limit etc.

TYPES OF TENDERS:

1. Open Tenders
2. Limited tenders
3. Single tender
4. Rate contract

1. Open Tenders

   Open tender is a tender in which bids are invited from all contractors. An open advertisement in the important news papers and Indian trade journal will be published.

2. Limited Tenders

   In this kind of tender, only selected contractors are invited to bid or quote the rates for the supply of articles or to execute the work

3. Single Tender

   Only a single firm or contractor is invited for the tender. If the quoted rates are high, negotiations prior to agreement are done with the contractor.

4. Rate Contract

   This type of contract is used mainly for the supply of stores of items. The quantities are not mentioned. According to this contract, items are supplied at fixed rate during the period of contract.

TENDER DOCUMENTS

a) Notice Inviting Tenders.
b) Tender form with standard conditions of contract.
c) Schedule of quantities.
d) Special terms and conditions.

e) Complete specification of work.
f) Special specification and additional condition of contract.
g) Approved drawings where necessary.

PRE-QUALIFICATION PROCESS

Construction procurement is a risky proposition. An owner has a lot at stake. He tries to make every move cautiously. He realizes that a wrong move in the very beginning itself such as choosing the wrong contractor for his proposed project may not augur well for his project. The terms 'right' and 'wrong' contractor are subjective and have to be dealt with on a project- to-project basis. How to choose a set of right contractors for the project, is the essence of the pre-qualification process.

The term 'right contractor' signifies 'fitness of purpose' for the proposed project. The term bright contractor' has nothing to do with a large or a small contractor, since it may so happen sometimes that the large contractor may not be the right contractor tòr a proposed project if it is of low value. Similarly, a contractor, even it' he is a leader in the heavy civil construction sector, may not be the 'right contractor' for a project that involves buildings with complex architectural features. The process of selecting a poor or set of right contractors is the purpose of the pre-qualification process. A typical pre-qualification would take anything between 8 weeks and 10 weeks, and may involve considerable efforts on the part of the owner organization. Selection of the 'wrong contractor' has been identified as one of the causes of project failures. Hence, the gains in long terms that result from pre-qualification process are worth the time and effort spent on it.

There are other terminologies and processes that closely serve the function of the pre-qualification process. These are,

- licensing,
- registration of contractors,
- enlistment of contractors, and
- rating or grading of contractors.

Some organizations, instead of resorting to the pre-qualification process again and again, enlist or register sonic contractors for doing a particular type of work, and they also specify the limit of contract value (say, up to 5 crore, 5 crore -25 crore, more than 25 crore, and so on) for which the contractors are eligible. As and when any project of certain value is undertaken by these organizations, the tender document is issued to the Contractors enlisted for the said contract value. Indeed, this process saves time and effort for the owner as well as the contracting organization. The enlistment or registration is done for a particular period. Upon the expiry of the registration period, fresh application may have to be submitted in order to be registered.

In some countries, there is a system of providing license to the contractors. Under this system, a project beyond a certain value can he executed by a licensed contractor only. Under the licensing system, the contractors are awarded license in different categories, such as common contractors, and special contractors for different types of works such as civil works, plumbing and sanitary works, and electrical works. These classifications arc done based on the amount of work executed by the applicant and a number of other factors including experience of the contractor in relevant construction work; available stall strength; sales volume of completed projects; financial parameters such as ratio of current assets to current liabilities, ratio of fixed assets to capital, ratio of net profit to total liabilities and net worth; construction machinery owned by the contractor; and safety and labour relations record.

As explained earlier, the enlistment or registration system helps in saving time as every time the pre-qualilication process need not he repeated. However, for any unusual or specialized kind of work, pre-qualification process is carried out afresh. Pre-qualification of contractors is done by government as well as private organizations.

The announcement of pre-qualilication process is advertised in leading dailies, trade journals, etc., and sometimes also intimated individually to reputed contractors.

Typical document required for prequalifier

- Letter of transmittal
- Power of attorney
- Financial information

- Details of similar work
- Concurrent commitment
- Certificates for completed job
- Structure and organization
- Details of technical and administrative personnel
- Details of plant and equipment

INVITATION OF TENDER

Tender is published to get sufficient number of bids for an attractive offer. Approved contractors can participate in the tender. A notice inviting tender is published in newspapers and journals. Tender is also informed by post and posting on notice board in the office.

Tender notice

Whenever an agency or a firm wants to float tenders, they are to follow certain procedures The tenders are to be given publicity in leading dailies by way of advertisement. A time duration of about a month may be given for the submission of tenders. However, the tender notice should carry the following information:

a) Name of the department calling for tenders.
b) Name of work and location.
c) Designation of the officer inviting tenders
d) Last date and time of receipt of tenders
e) Period of availability of tender forms
f) Cost of tender documents
g) Time of completion and type of contract
h) Earnest money deposit to be paid
i) Date, time and place of opening tenders
j) Designation of the officer opening the tenders

The tenders are opened by the concerned officer at the place and time mentioned in the tender. The contractors or their representatives are to be present during the opening of the tender

Opening of Tenders

On the date of opening of tender, the sealed tenders are opened in the presence of contractors or their representatives. Officers have to read out the rates/amounts offered. The comparative statement showing the quoted rates all participated contractors must be published. Tenders that are not received in proper form duly filled can be rejected.

Acceptance of tender

After investigating the comparative statement, the lowest tender shall be accepted. If the lowest tender is not accepted- reasons are recorded confidentially. Letter of Acceptance Letter of acceptance is the letter communicating the acceptance, after the decision to accept a tender. It is issued on behalf of President of India or Governor of State. It's a notification of the opportunity to complete the formalities of contract. Further directions are also provided.

Work Order

A work order is issued after the intimation of the acceptance. Formal agreement has to be made within the specified days. Letter issued after formal agreement. Date of completion is treated from the date of issue of work order. Execution of civil engineering works. The execution of any proposed civil engineering work can be divided into two stages.

a) Preliminaries

b) Execution of works Execution of works:

Before a work is taken in hand for execution, the following condition should be followed systematically.

1) Administrative Approval on Rough Cost Estimate
2) Technical Sanction on Detailed Estimate by the Competent Authority
3) Transfer of funds to PWD
4) Handing over of land to PWD
5) Decision by Competent Authority on Mode of Construction

Execution of works comprises of the following activities.

i) Supervision
ii) Site Order Book
iii) Issue of Materials
iv) Scope of Sanction
v) Progress Report
vi) Materials at Site Account
vii) Payment
viii) Excess over Quantity
ix) Excess over Estimate

EARNEST MONEY DEPOSIT

It is the assurance or guarantee in the form of cash on the part of the contractor to keep open the offer for consideration and to confirm his intention to take up the work accepted in his favor for execution. In case if tender fails, this money is forfeited to government.

- Upto 5 lakhs 2- 0.5%, max 10,000
- Above 5 lakhs 2%, max 20,000 Return period
- All deposits except lowest three are returned within a week.
- Second and third lowest are returned within 15 days

The amount which is to be accompany the tender form as guarantee of the tender is known as the earnest money. It is usually about 1% to 2% of the total estimated cost of the work. This amount is kept with the department till the contract is allocated to some contractor. The earnest money is returned to unsuccessful contractors, forfeited in case of non-bonafide contractors, and is retained for the successful contractor for further adjustment with security deposit. Earnest money serves as a check so that the contractor may not refuse to accept the work or run away when his tender is accepted. The amount of earnest money depends on the estimated cost of works as follows.

- Rs. 50/- for works up to 2000/- Rs.100/- for works of 2000/- to 5000/- Rs 200/- for works from 5000/- to 10000/- and Rs 100/- for every additional 5000/- or part there of above Rs. 10000/-
- The earnest money may be cash or encashable at any time. It may be in form of deposit in treasury or State Bank or other approved Bank or government security or saving certificate or post office savings pass book or cash certificate pledges to the Executive Engineer.

SECURITY DEPOSIT

Amount deposited by the contractor whose tender has been accepted in order to render himself liable to dept. to pay compensation if the work is not carried out according to specification, time limit, conditions of contract.

- Work <2lakhs 10% on first lakh, 7-0.5% on rest

- Work >2lakhs 10% on first lakh, 7-0.5% on second lakh , 5% on rest. Deposit is refundable after prescribed maintenance period.

Once a tender is accepted the selected contractors has to deposit a certain amount with the owner. This amount of the deposit is known as the security deposit. Security deposit is taken as the rate of 10% of the tender amount. Earnest money of the contractor whose tender has been accepted is adjusted in the security deposit. Instead of collecting the whole of security money in one instalment before starting the work, it can be collected gradually by deducting suitable amount from the running account bills of the contractor up to the extent of 10%of total coat of whole work. The security money is refunded to the contractor after the satisfactory completion of the whole work after a specific time, usually after one rainy season or six months of completion of the work. The security amount is kept as a check so that the contractor fulfills the terms and conditions of the contractor and carries out the work satisfactory according to the satisfactory according to the specifications and maintains progress and completes the work in time. If contractor fails to fulfill the terms of contractor his whole part of the security money for forfeited.

For workers costing up to Rs. 100000/- as security money is 10% of the estimated cost. For costing more than one lakh and up to two lakh rupees the security money is 10% on first one lakh and 7.5% on the balance. In case of works costing more than two lakh the amount of security deposit will be 10% on the first, one lakh 7.5% on the next one lakh and 5% on the balance subjected to the maximum of Rs.one lakh only.

MEASUREMENTS

Measurement of a building occupies a very important place in the planning and execution of any civil engineering works from the time of first estimate to the final completion and settlement of payment for the project. The work is divided into sub heads for keeping accounts of money and materials accurately. Accuracy is a must in measurement and should be kept as under.

a) Dimensions shall be measured to the nearest 0.01 metre.

b) Area shall be worked out to the nearest 0.01 square metre.

c) Cubic contents shall be worked out to the nearest 0.01 cubic metre.

Measurement Book (MB):

Measurement Book is a very important document in case of Public Works department and hence it should be maintained carefully. The measurements of all the works and supplies are recorded in the Measurement Book Form 23. It is in form of a note book of size 15cms x 10cms and contains instructions how to write up the columns for particulars. It also contains details of actual measurements in terms of length, breadth and depth and the contents or area. All pages of every measurement book are machine-numbered and all measurement books are numbered serially. A register is maintained in the Divisional Office showing the serial number of each MB, the names of the Sub Division or Officer to whom issued, the Date of Issue, the Date of Return and Remarks. A similar register is maintained at the Sub Divisional Office showing names of the Officers to whom issued, Date of Issue, Date of Return etc. Each MB has some leaves for index, for review by the Divisional Accountant and for review by the Executive Engineer.

Loss of MB:

Loss of MB is a very serious matter and has to be reported to the highest authorities immediately. It is an initial document of accounts and hence a serious matter. After getting intimation on loss of MB, the Superintending Engineer investigates in detail the cause of loss. Suitable action is taken if any body is found responsible. If the lost MB could not be traced even at the lapse of 6 months, an application for sanction of write-off together with full report and explanation should be submitted to the Chief Engineer who is authorized to sanction the write-off.

Checking of Measurements: In order to exercise proper control and check, certain percentage of measurements recorded by subordinate officers are required to be checked by Assistant Engineer and Executive Engineer.

Percentage of checking is as follows.

a) In case work has been done by the departmental labour AE (Assistant Engineer) will check 15% of measurements and EE (Execute Engineer) 7.5 to 10% of the measurements of each Sub Division.
b) In case of works done by the contractor on item rate basis, AE is supposed to check 25% of measurements and EE 5 to 50% of measurements, of each Sub Division.

The checking of measurements should be done in the presence of the person who recorded the measurements.

On checking:

- If the difference is not more than 1% in the case of original work, 5% in the case of repair work and 10% in the case of earth work, the entries shall be corrected and initialed.
- If the difference exceeds the above mentioned limits the measurements shall be cancelled or order should be given for taking measurements again.

Standard Measurement Book (SMB):

SMB is mainly used for periodical repairs and maintenance works which are to be carried out at fixed intervals of time. For small works it may be single MB but in case of large works it consists of a set of MBs. Single MB or a set of MBs where the detailed measurements of certain items of works of a building is recorded correctly in ink after the completion of construction and whose accuracy is certified by an officer of the rank not less than AE is known as SMB. Any alteration in structure is entered

in SMB. SMB is checked every 5 years and this checking is termed as Quennial Checking.

QUALITY

Quality is perceived differently by different people. Yet, everyone understands what is meant by "quality." In a manufactured product, the customer as a user recognizes the quality of fit, finish, appearance, function, and performance. The quality of service may be rated based on the degree of satisfaction by the customer receiving the service. The relevant dictionary meaning of quality is "the degree of excellence." However, this definition is relative in nature. The ultimate test in this evaluation process lies with the consumer. The customer's needs must be translated into measurable characteristics in a product or service. Once the specifications are developed, ways to measure and monitor the characteristics need to be found. This provides the basis for continuous improvement in the product or service. The ultimate aim is to ensure that the customer will be satisfied to pay for the product or service. This should result in a reasonable profit for the producer or the service provider. The relationship with a customer is a lasting one. The reliability of a product plays an important role in developing this relationship

QUALITY CONCEPTS

1. Quality
2. Grade
3. Inspection
4. Quality control
5. Quality assurance
6. Quality management
7. Total quality management
8. ISO standards

1. Quality

A subjective term for which each person has his or her own definition.

- Characteristics of a product that bears on it's ability to satisfy the stated or implied needs
- A product or service free of deficiencies.

2. Grade

According to ISO 9001:2000 Category or rank given to different quality requirements for products, processes, or systems having the same functional use.

3. Inspection

- It is the sorting / segregation of Non conforming items from the conforming items
- Means separation of Defective items from the right items

4. Quality Control

Is the operational techniques and activities that are used to fulfill the requirements for quality .

5. Quality Assurance

Is all systematic and planned actions which are necessary to provide adequate confidence that a product or service will satisfy the given requirement for quality.

6. Quality Management

Is a systematic set of operating procedures which is companywide, documented, implemented and maintained while ensuring the growth of business in a consistent manner. So QMS is meant to establish a framework of reference to ensure that every time process is performed, the same information, method, skills, and controls are used and applied in a consistent manner.

7. Total Quality Management

The comprehensive approach towards quality management system. The process of individual & organizational development the purpose of which is to increase the level of satisfaction of all the stakeholders.

INSPECTION

Inspection is the art of comparing materials, products or performance with established standards. There can be no intelligent inspection without definite standard. In any such items that are to be inspected, some will fall outside a liberal allowance of variation from the standards some will be well within the limits of error, and others will be very close to the limits. Inspection is the art of selecting from these three classes of product which will be satisfactory for the work in hand.

Objectives of Inspection

i To errors in manufacturing system which tend towards poor quality and then to report to responsible officials in the producing departments so that action may be taken to prevent making units of product that are not acceptable or to a level of quality of produce that is below test specified.

ii To protect the consumer from receiving a product that is below the quality level and limits specified, by sorting the good units or lots from those which are below standard, permits only good quality to pass inspection.

iii To compile information regarding the conformance of the product with specification for the use of engineering, production, purchasing, quality control and other divisions responsible for quality performance.

Methods of inspection

i Sampling Inspection

This kind of inspection is performed over a random number of units which are drawn from a lot of product. This random number is considered as representative of the entire lot. The lot is accepted or rejected as the result of examination. This procedure may be employed in either of the two conditions.

a. To reduce the cost of production by inspecting a minimum number of units knowing that some defective elements are permissible

b. When the test procedure destroys the unit, there is a need to change necessary procedure.

The advantages of this type of inspection are that in this procedure the inspector is not fatigued and sometimes it may be more effective than 100% inspection.

ii Centralized Inspection

Comparatively light and small parts and assemblies are transported to the inspection department for examination. Usually this department is located in a place that is separated from manufacturing areas so that a proper care can be imparted to tools and inspection can be carrid over without interference.

iii Floor Inspection

Heavy parts and assemblies are examined at the production center itself, since they cannot be transported to inspection department.

iv First Piece Inspection

In case of semi-automatic or fully automatic machines some trial pieces are produced and inspected. If defects are found then machine is adjusted and another trial piece is made. When the trial piece fulfills the desired quality then the production time is released for production.

v Working Inspection

After a machine or machines have been released for production, the work be inspected periodically in the production time itself by inspection going to the machine itself. And if any defect occurs then machine may be corrected by shutting down it.

vi Key – operation Inspection

In this step, work is inspected and or after expensive or critical operation thus additional effort on defective unit is avoided.

vii Performance Inspection

Parts or full assemblies are usually subjected to a final inspection before they are being shipped to storage department of customer. This can be

a) Functional Inspection- an assembly is operated either in customers place or in the manufacturing plant to see that whether or not it performs according to the specification

b) Efficiency Inspection- Pumps, engines may be tested to see that whether they develop their rated horse power specified characteristics or not.

viii Endurance characteristic Inspection

Machines may be taken from assembly lines and seen for specified time or until failure occurs. Then the components of the machine are inspected to discover the effect of use. This type of inspection is common with automobiles.

QUALITY CONTROL

Quality control is the control over process. It consists of two major processes.

1. Statistical process control

2. Training on statistical tools

For attaining proper control everybody in an organization, workers as well as management should be provided with

- Means for knowing quality goals
- Means for knowing his performance on the quality goals
- Means for regulating or correcting his performance

The quality control in short means the continuous appraisal and measurement of the performance of an individual, department or function and organization vis-a vis the 'quality plan' and find out the deviations from the plan ,and take corrective action to eliminate the deviation and put the process back on track .The quality control activity also warrants taking preventive actions so that deviations does not occur in the future. The quality control activity ensures consistency in the performance of the product, process and service and helps to retain the present performance.

Total Quality Control defined as an effective system for integrating the quality development, quality maintenance and quality improvement efforts of the various groups in an organization so as to enable production and service at the most economical level which allow for full customer satisfaction.

It may be classified as a ''Management Tool'' for many industries outstanding improvement in product quality design and reduction in operating costs and losses. Product quality is defined as ''The composite product of engineering and manufacture that determine the degree to which the product in use will meet the expectations of the customer''.

''Control'' represents a tool with four steps :

- Setting up of quality standards.
- Appraising conformance to these standards
- Acting when these standards are exceeded.
- Planning for improvements in these standards.

Quality control emerges as a based function based on the collection analysis and interpretations of data on all aspects of the enterprise.

Total quality control is an aid for good engineering designs, good manufacturing methods and conscious inspection activity that have always been required for the production of high quality articles.

Quality of any product is effected at many stages of the industrial cycle :

- Marketing : Evaluates the level of Quality which customers want for which they are willing to pay.
- Engineering : Reduces this marketing evaluations to exact specification.
- Purchasing : Chooses, contracts with and retains vendors for parts and materials.
- Manufacturing Engineering : Select the jigs, tools and processes for production.
- Manufacturing Supervision and shop operators : Exert a major quality influence during parts making, sub assembly and final assembly.
- Mechanical Inspection and function Test : Check conformance to specifications.
- Shipping : Influences the caliber of packaging and transportation.
- Installation : Helps ensure proper operations by installing the product according to proper instructions and maintaining it through product service.

In other words, the determination of both quality and quality costs actually takes

place throughout the entire industrial cycle. Quality control is responsible for quality assurance at optimum quality costs.

Benefits:

- Improvements in product quality and design
- Reduction in operating costs and losses
- Reduction in production line bottle necks
- Improvement in employee morale
- Improved inspection methods
- Setting time standards for labour
- Definite schedule for preventive maintenance
- Availability of purposeful data for use in co-advertising
- Furnishing of actual basis for cost accounting for standard and for scrap, rework and inspection.

TOTAL QUALITY MANAGEMENT (TQM)

Total Quality Management is formally defined in, as management philosophy and company practices that aim to harness the human and material resources of an organization in the most effective way to achieve the objectives of the organization.

Total quality management can be summarized as a management system for a customer-focused organization that involves all employees in continual improvement. It uses strategy, data, and effective communications to integrate the quality discipline into the culture and activities of the organization.

CONCEPTS OF TQM

1. Top management should be aware of correct situation and needs to be committed towards TQM implementation.
2. Focus customer requirements and product/service expectations.
3. Involve employees in understanding the quality aspects and make them accountable

4. Continuous improvement in the process is required
5. Treat suppliers as your partners
6. Develop tracking mechanism for processes and improve it as per business requirements

PRIMARY CHARACTERISTICS OF TQM

Total quality management can be summarized as a management system for a customer-focused organization that involves all employees in continual improvement. It uses strategy, data, and effective communications to integrate the quality discipline into the culture and activities of the organization.

• Customer-focused. The customer ultimately determines the level of quality. No matter what an organization does to foster quality improvement—training employees, integrating quality into the design process, upgrading computers or software, or buying new measuring tools—the customer determines whether the efforts were worthwhile.

• Total employee involvement. All employees participate in working toward common goals. Total employee commitment can only be obtained after fear has been driven from the workplace, when empowerment has occurred, and management has provided the proper environment. High-performance work systems integrate continuous improvement efforts with normal business operations. Self-managed work teams are one form of empowerment.

• Process-centred. A fundamental part of TQM is a focus on process thinking. A process is a series of steps that take inputs from suppliers (internal or external) and transforms them into outputs that are delivered to customers (again, either internal or external). The steps required to carry out the process are defined, and performance measures are continuously monitored in order to detect unexpected variation.

Integrated system. Although an organization may consist of many different functional specialties often organized into vertically structured departments, it is the horizontal processes interconnecting these functions that are the focus of TQM.

o Micro-processes add up to larger processes, and all processes aggregate into the business processes required for defining and implementing strategy. Everyone must understand the vision, mission, and guiding principles as well as the quality policies, objectives, and critical processes of the organization. Business performance must be monitored and communicated continuously.

o An integrated business system may be modelled after the Baldrige National Quality Program criteria and/or incorporate the ISO 9000 standards. Every organization has a unique work culture, and it is virtually impossible to achieve excellence in its products and services unless a good quality culture has been fostered. Thus, an integrated system connects business improvement elements in an attempt to continually improve and exceed the expectations of customers, employees, and other stakeholders.

• Strategic and systematic approach. A critical part of the management of quality is the strategic and systematic approach to achieving an organization's vision, mission, and goals. This process, called strategic planning or strategic management, includes the formulation of a strategic plan that integrates quality as a core component.

• Continual improvement. A major thrust of TQM is continual process improvement. Continual improvement drives an organization to be both analytical and creative in finding ways to become more competitive and more effective at meeting stakeholder expectations.

• Fact-based decision making. In order to know how well an organization is performing, data on performance measures are necessary. TQM requires that an

organization continually collect and analyze data in order to improve decision making accuracy, achieve consensus, and allow prediction based on past history.

• Communications. During times of organizational change, as well as part of day-to

-day operation, effective communications plays a large part in maintaining morale and in motivating employees at all levels. Communications involve strategies, method, and timeliness.

EIGHT ELEMENTS OF TQM

To be successful implementing TQM, an organization must concentrate on the eight key elements:

1. Ethics
2. Integrity
3. Trust
4. Training
5. Teamwork
6. Leadership
7. Recognition
8. Communication

Key Elements

TQM has been coined to describe a philosophy that makes quality the driving force behind leadership, design, planning, and improvement initiatives. For this, TQM requires the help of those eight key elements. These elements can be divided into four groups according to their function. The groups are:

I. Foundation – It includes: Ethics, Integrity and Trust.
II. Building Bricks – It includes: Training, Teamwork and Leadership.

III. Binding Mortar – It includes: Communication.

IV. Roof – It includes: Recognition.

I. Foundation

TQM is built on a foundation of ethics, integrity and trust. It fosters openness, fairness and sincerity and allows involvement by everyone. This is the key to unlocking the ultimate potential of TQM. These three elements move together, however, each element offers something different to the TQM concept.

1. Ethics – Ethics is the discipline concerned with good and bad in any situation. It is a two-faceted subject represented by organizational and individual ethics. Organizational ethics establish a business code of ethics that outlines guidelines that all employees are to adhere to in the performance of their work. Individual ethics include personal rights or wrongs.

2. Integrity – Integrity implies honesty, morals, values, fairness, and adherence to the facts and sincerity. The characteristic is what customers (internal or external) expect and deserve to receive. People see the opposite of integrity as duplicity. TQM will not work in an atmosphere of duplicity.

3. Trust – Trust is a by-product of integrity and ethical conduct. Without trust, the framework of TQM cannot be built. Trust fosters full participation of all members. It allows empowerment that encourages pride ownership and it encourages commitment. It allows decision making at appropriate levels in the organization, fosters individual risk-taking for continuous improvement and helps to ensure that measurements focus on improvement of process and are not used to contend people. Trust is essential to ensure customer satisfaction. So, trust builds the cooperative environment essential for TQM.

II. Bricks

Basing on the strong foundation of trust, ethics and integrity, bricks are placed to reach the roof of recognition. It includes:

4. Training – Training is very important for employees to be highly productive. Supervisors are solely responsible for implementing TQM within their departments, and teaching their employees the philosophies of TQM. Training that employees require are interpersonal skills, the ability to function within teams, problem solving, decision making, job management performance analysis and improvement, business economics and technical skills. During the creation and formation of TQM, employees are trained so that they can become effective employees for the company.

5. Teamwork – To become successful in business, teamwork is also a key element of TQM. With the use of teams, the business will receive quicker and better solutions to problems. Teams also provide more permanent improvements in processes and operations. In teams, people feel more comfortable bringing up problems that may occur, and can get help from other workers to find a solution and put into place. There are mainly three types of teams that TQM organizations adopt:

6. Leadership – It is possibly the most important element in TQM. It appears everywhere in organization. Leadership in TQM requires the manager to provide an inspiring vision, make strategic directions that are understood by all and to instill values that guide subordinates. For TQM to be successful in the business, the supervisor must be committed in leading his employees. A supervisor must understand TQM, believe in it and then demonstrate their belief and commitment through their daily practices of TQM. The supervisor makes sure that strategies, philosophies, values and goals are transmitted down through out the organization to provide focus, clarity and direction. A key point is that TQM has to be introduced and

led by top management. Commitment and personal involvement is required from top management in creating and deploying clear quality values and goals consistent with the objectives of the company and in creating and deploying well defined systems, methods and performance measures for achieving those goals.

III. Binding Mortar

7. Communication – It binds everything together. Starting from foundation to roof of the TQM house, everything is bound by strong mortar of communication. It acts as a vital link between all elements of TQM. Communication means a common understanding of ideas between the sender and the receiver. The success of TQM demands communication with and among all the organization members, suppliers and customers. Supervisors must keep open airways where employees can send and receive information about the TQM process. Communication coupled with the sharing of correct information is vital. For communication to be credible the message must be clear and receiver must interpret in the way the sender intended.

There are different ways of communication such as:

A. Downward communication – This is the dominant form of communication in an organization. Presentations and discussions basically do it. By this the supervisors are able to make the employees clear about TQM.

B. Upward communication – By this the lower level of employees are able to provide suggestions to upper management of the affects of TQM. As employees provide insight and constructive criticism, supervisors must listen effectively to correct the situation that comes about through the use of TQM. This forms a level of trust between supervisors and employees. This is also similar to empowering communication, where supervisors keep open ears and listen to others.

C. Sideways communication – This type of communication is important because it breaks down barriers between departments. It also allows dealing with customers and suppliers in a more professional manner.

IV. Roof

8. Recognition – Recognition is the last and final element in the entire system. It should be provided for both suggestions and achievements for teams as well as individuals. Employees strive to receive recognition for themselves and their teams. Detecting and recognizing contributors is the most important job of a supervisor. As people are recognized, there can be huge changes in self-esteem, productivity, quality and the amount of effort exhorted to the task at hand. Recognition comes in its best form when it is immediately following an action that an employee has performed. Recognition comes in different ways, places and time such as,

- Ways – It can be by way of personal letter from top management. Also by award banquets, plaques, trophies etc.

- Places – Good performers can be recognized in front of departments, on performance boards and also in front of top management.

- Time – Recognition can given at any time like in staff meeting, annual award banquets, etc.

PRINCIPLES OF TQM

1. Add value to the process:

Every action by every employee should add value to the process or product in every way all the time. Enhance your work by your actions.

2. Deliver quality on time all the time.

Develop a pattern of delivering perfect products & services on time. Rate your sources by their ability to do this.

3. Base business relationships on mutual trust and confidence:

Providers and Suppliers build trust and confidence through quality and deliverability. Customers build it by quick payment and clear lines of communication. Reliability, Forthrightness, and Honesty are the Basis of forming Business Relations.

4. Train individuals and teams to solve problems:

Teach Problem -Solving Tools / Techniques & Teaming as the means to solve quality, safety, productivity, and deliverability problems.

5. Empower employees

-to be responsible for Quality, Safety, Productivity and Deliverability. Empowering means giving workers responsibility for their actions affecting their work.

6. Deed 'ownership' of process to employees

-who have proven their capability. Reward and reinforce empowerment with Incentives, Job Security and Equity Sharing. Make employees owners of the process, not attendants.

7. Implement the new technology:

Use modern information resources, internet, databases, telecommunications, applications software, and project scheduling as tools to improve productivity. Use Statistical Process Control (SPC) to eliminate errors and defects and continually improve the system.

8. Collect, measure and evaluate data

- before Making Decisions. "It never hurts to turn the light on." (J. DeSimone). Make Decisions based on evidence. "If you can't measure it, you can't evaluate it."

9. Apply the '80/20' principle:

Use this Problem-Solving Tool to put problems into 'Trivial Many' and 'Vital Few' categories. Record the causes and frequencies of problems on a Tally Sheet. Develop this into a Pareto Chart which plots the frequencies (most- to least- important) of the problems. 20% of the causes create at least 80% of the problems. Importance of resolving vital problems first.

10. Develop 'win-win' scenarios:

Create solutions that will benefit all parties. Cooperation that develops synergism is the best solution.

11. Develop a master plan:

Good Design Precedes Good Craftsmanship. A well-designed plan tracks and benchmarks an action through to its completion. "Quality begins at the Design Level." (Marty Madigan)

12. Plan for all contingencies:

Prepare for all solutions by developing alternatives. If necessary, flowchart plans dealing with all possible alternatives. Apply 'If-Then-Else' type of logic to problems.

13. Make zero defects and accidents your goal:

Use the tools of TQM, SPC, and Problem-Solving to achieve these goals by detecting and eliminating the causes.

14. Qualify your sources and suppliers:

Use Quality and Deliverability as the basis for selecting the source of your materials and services.

15. Deliverability:

The Right Product at the Right Place at the Right Time. In world-class Just-in-Time (JIT) delivery systems, source parts are used without delay and inspection in the process.

16. Meet the needs of your customers:

Customers are anyone affected by your work: co-workers, team members, management, & especially the end-users. They are the rationale for your work. The justification for your work is to deliver products or services that meet or exceed their requirements.

17. Improve continuously and always:

Institute continuous improvement & life-long education, principles based on the 14 Points by W. Edwards Deming. Optimize your curve. They constitute an ever expanding continuum. Add to this list.

IMPLEMENTATION OF TQM:

The implementation of the quality management is a fourteen-step implementation procedure as detailed below:-

1. Management commitment: The management should show their commitment by declaring a clear cut corporate policy on quality needs. The commitment in 'quality policy' should be simple, real and easily understandable. Secondly the quality should be periodically and regularly discussed in the 'Management Review Meeting' in specific quantifiable terms. The CEO in all his talks should reflect his commitment to the quality and motivate the employees accordingly.

2. Quality improvement team: It is cross-functional and the members should be capable of helping the individual teams and employees in quality improvement activities. The quality improvement team needs a clear direction and leadership. This team is one of the key parts of the process and helps in coordination and support. The quality improvement team should schedule the education programs and create company-wide events. The chairperson of the team should be one of the members of the top team and should have a clear understanding of the overall strategy and the power to influence the same.

3. Measurement : the quality improvement team must devise ways and means of measuring the evidence of improvement from the existing way of doing the things. Every function and sub-function is a process which has an input and an output. The objective of the process is value addition. The cost of input resources should be less than the value added for the process be efficient. The effectiveness of the process is determined by its extent of achievement of the organisational goal. All the assessment of input, output, value addition, cost of resources , business objective, etc. needs quantified measurements and units against which the same can be evaluated.

4. Cost of quality: the quality improvement team plans and implements a strategy to measure the cost of non-conformance and undertake quality improvement projects to minimise the same progressively until it reaches the target of ‘ zero defect’ by installing a full proof system ‘do it right the first time’. The quality improvement team should be able to bring the cost of non-conformance to nil. The cost of conformance should be maintained at a reasonable level to retain the improvements and hold the gains.

5. Quality awareness: The quality improvement team should create a no of education and training programmes to create the awareness about quality and its various aspects as propagated by Crosby. The team should create the significance of quality for the organisational success .the team should also define the losses due to

the cost of non-conformance and how to reduce it. The creation of quality awareness in the organisation will create self-motivated employees for an excellent performance.

6. Corrective action : The quality improvement team should identify all the cost of non-conformance and plan corrective actions and get it implemented to reduce the cost of non-conformance to zero.All the employees as well as the management should develop a habit of taking immediate corrective actions as and when deviations take place.

7. Zero defect planning : When the performance of the organisation and its employees has reached a reasonably good level the quality improvement team moves ahead and plans for a foolproof system of the zero defect or the DO IT RIGHT THE FIRST TIME culture. The suitable quality improvement tools are implemented for elimination of the organisational problems.

8. Employee education : now the quality improvement team with the help of the consultants imparts training and education on the 'quality improvement tools' for systematically and scientifically undertaking the quality improvement projects and reducing the cost of non-conformnace.

9. Zero defect days: the quality improvement team plans for occasional zero defect days as the practical implementation of the zero defect planning.The team closely monitors the processes and the activities on a zero defect day and ensures that the employees actually believes that zero defect is possible by seeing the actual zero defect day happening.

10. Goal setting : The quality improvement team should help individual functions and activities set up their on individual objectives and goals and suitable quality improvement project for the same.The team should set up for itself the attainment of the organisational objective and a strategic action plan for the same.

11. Error cause removal : the quality improvement team should not settle down for the corrective action alone after finding out the root cause of the problem as it will

give only temporary relief from the cost of non-conformance.there is a good likelihood that the problem may repeat again.hence the quality improvement team should find out the root cause of each problemand try to take preventive action for the removal of the root cause.

12. Recognization : the quality improvement team should recognize good efforts done by the individual or the quality improvement team by giving awards

,promotions.the recognition is important for the growth and prosperity of the organisation and the motivation of employee.

13. Quality council : The quality improvement team should submit a periodic report of the activity of the quality improvement projects to the quality council.concil discusses all the quality improvement activities and takes a decision on their implementation along with the resource allocation and revises their implementation periodically.

14. Do it over again : The quality improvement team take stock of the successful quality improvement projects and measure the gain from such projects . The quality council and the quality improvement team now examine critically all the functions and try to identify the area where the similar spin-off projects can be taken up straight way for implementation.

ADVANTAGES OF TQM

The advantages of total quality management (TQM) include:

- Strengthened competitive position
- Adaptability to changing or emerging market conditions and to environmental and other government regulations
- Higher productivity
- Enhanced market image
- Elimination of defects and waste

- Reduced costs and better cost management
- Higher profitability
- Improved customer focus and satisfaction
- Increased customer loyalty and retention
- Increased job security
- Improved employee morale
- Enhanced shareholder and stakeholder value
- Improved and innovative processes

BARRIERS TO IMPLEMENTING TQM

- Lack of management commitment
- Company culture cannot change
- Plans are not well thought out.
- Poor measurement techniques
- Lack of teamwork.
- Focus on short term profits
- High employee turnover
- Lack of training. No one to lead the company through the process
- Management does not reward success
- Employees are fearful of losing their jobs.