

## QUALITY MANAGEMENT DEVELOPMENT AND IMPLEMENTATION IN CONSTRUCTION COMPANY

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### ABSTRACT

*Quality is a key factor leading to business success, growth and enhanced competitive position. A construction firm must organise itself in such a way that human, administrative and technical factors affecting quality will be under control. The owner, architect (designer) and constructor have important roles in a process of quality management and improvement. There are written in my contribution their triple role and analyse process of building planning and realisation. The aim of good QMS is to provide the operator with consistency and satisfaction in terms of methods, materials and equipment. An effective QMS leads to client satisfaction, increased productivity, efficiency, higher profitability and increased competitiveness.*

**Keywords:** quality, management, building process, system.

### 1. INTRODUCTION

For construction, the needs must be defined by the client. The inclusion of services is pertinent to construction, where both designers and contractors supply services as well as the product (completed work). The quality of these services is vital, not only in meeting the client's requirements, but also in completing to time and budget (FACT: function, aesthetic, cost, time) [1].

For a building organisation to be truly effective, every single part of it must work properly together. Every part, every activity, every person in a building company affects and is in turn affected by others. Every party in a process has three roles: *supplier, processor, customer*. *J.M. Juran* defines this as the **triple role** concept. This concept can be applied to construction and is illustrated in Fig.1. [2].

The owner, designer and constructor, each have the three roles to perform. Customers can be internal or external. *Internal customer* is from within the engineering and construction organisations. Internal customers receive products and information from other groups or individuals within their organisation. Satisfying the needs of these internal customers is an essential part of the process of supplying the ultimate external customer with a quality product. *External customer* is not part of the company producing the product or service, but is impacted by the product or service. Designer is customer of owner requirements. His products are plans and specification and the customers are the construction organisation and the owner. For construction the products are the completed facility and the customer is final user of the facility.

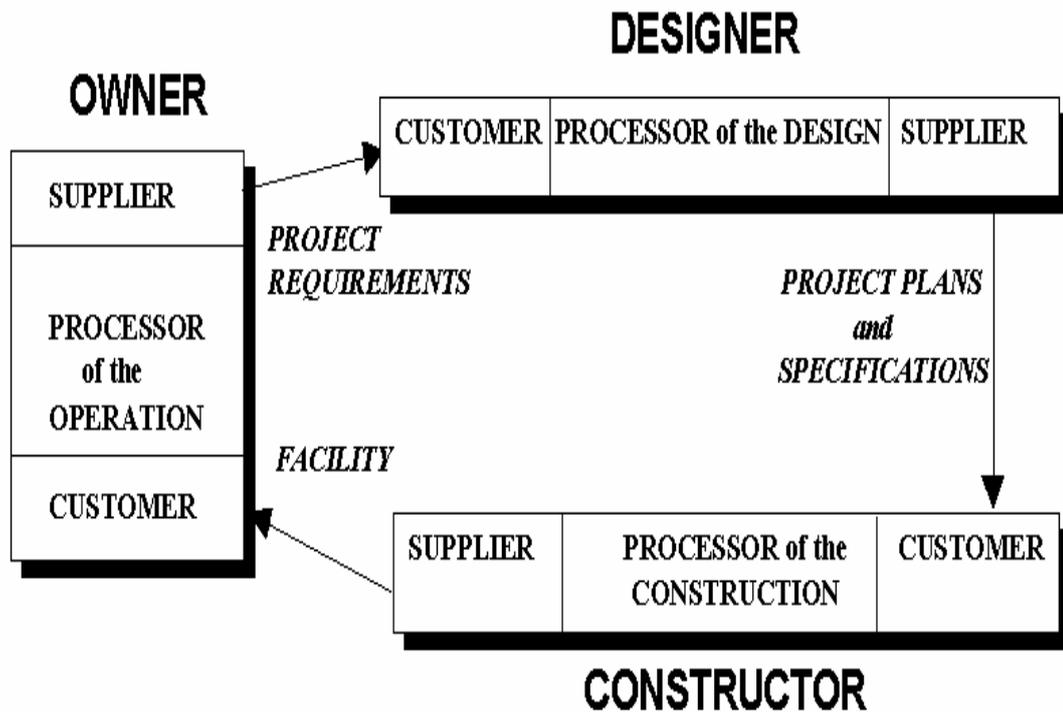


Figure 1. Juran's triple role concept applied to construction

## 2. QUALITY MANAGEMENT SYSTEM (QMS)

QMS is management system to direct and control an organisation with regard to quality.

### 2.1. Plan for a quality system

Plan for a quality system consists of next steps [3]:

1. A clear written **quality policy** should be issued by the director of construction company.
2. **The objectives** of quality management programme should be define and set down in some detail.
3. Quality must be the direct operational **responsibility of the management**. Appoint person as **quality manager**. Prepare job descriptions and line charts showing the areas of individual managerial responsibilities.
4. **Establishment of a QMS**. The requirements of the customer and of the organisation must be met and the system clearly defined, widely disseminated, understood and operated by all.
5. **Regular audits** of the operations areas will lead to identify and continual updating of potential problems.
6. **Quality improvement programme (QIP)** should be designed to achieve established objectives.
7. **QIP implementation** requires the commitment and involvement of all employees.
8. **QIP** should be kept to the agreed timetable (**monitor progress**).

9. **Audit and review overall effectiveness.** The practical implementation and appropriateness of the quality system should be continually compared with the objectives. A method for changes in the plan should be defined.

## 2.2. Setting up, developing and documenting the QMS

The top management of construction firm is responsible for:

- the efficiency of the organisation,
- the quality of the buildings or the services which that firm offers.

There is the need to satisfy customer requirements by supplying services or products which *fit for purpose* within budget and on schedule. The second thing is to supply these services or products in the most efficient and cost effective manner.

An effective QMS involves all departments and functions. Development the quality policy must come from the top of organisation. *Quality manager* is a person designated by director of firm with responsibility for setting up of the system, which enables the quality standards to be achieved and the continuous monitoring and improvement of the system.

The QMS should apply to and interact with all activities of the organisation: marketing, design, procurement, process planning, development and assessment, process operation and control, product testing or checking, packaging, storage, service, maintenance etc. The first step is to prepare the necessary documentation: *procedures, forms and records and quality manual*. [4].

**Procedures** describe what is to be done, by whom and how, when, where and why an activity is to be carried out. Job instructions are subordinate documents to procedures. Such instructions may be required for specific tasks, processes or operations, test or inspection activities. It is useful when all basic activities are described in flow chart form.

**Quality manual** is document setting out the general quality policy, organisation, QMS processes and procedure index. It is very good management tool to keep employees aware of their responsibilities within the quality system. The quality manual could be described as a "company shop window to quality".

## 3. BUILDING REALIZATION

*Building process and product realization* (Fig.2) is characterised as the overall series of linked activities beginning with the identification of need and conception of the project and ending with the occupation and initial use of the construction after its commissioning [1]. The quality required by the customer in construction is in the end product, the finished building, not in the separate QMS of the participants. Manufactured products account for only 10 % of building failures [1]. Thus, for specialist subcontractors who also install their products, product manufacturing systems are only part of the story. Nevertheless, ISO 9001 has its part to play.

The building company shall ensure that all manufacturing operations including written work instructions which directly affect quality shall be carried out under controlled conditions.

If any operation or process is excluded or missed, the result may be below-standard products. Good work instructions cut out confusion, and show what work must be done or services provided. Procedures and work instructions should cover every phase of manufacture, assembly and installation.

Special processes shall be performed by qualified personnel using approved written procedures and controlled equipment. The example of some special processes: welding, plastic moulding, penetrate inspection, radiography, ultrasonic examination etc. Any special

processing carried out by a supplier shall require engineering department concurrence prior to placement of order [5]. *Inspection and testing* is very important part of building process control and management.

### **3.1. Receiving inspection and testing**

All products received shall be verified upon receipt for condition, completeness, identification and general compliance with procurement document requirements, including availability of required documentation. Products in compliance with procurement requirements shall be released to the storage area.

The documentation received in support of purchased items substantiating acceptance shall be filed with the purchase order. Items shall be withheld from production pending completion of inspection and test or receipt of reports. Release of withheld items shall be permitted only when under positive recall control. Items rejected on receipt shall be clearly identified as being on *hold* and shall be placed in quarantined area pending implementation of non-conformance report. Resulting from an evaluation of the non-conformance, corrective and preventive action shall be agreed with the supplier.

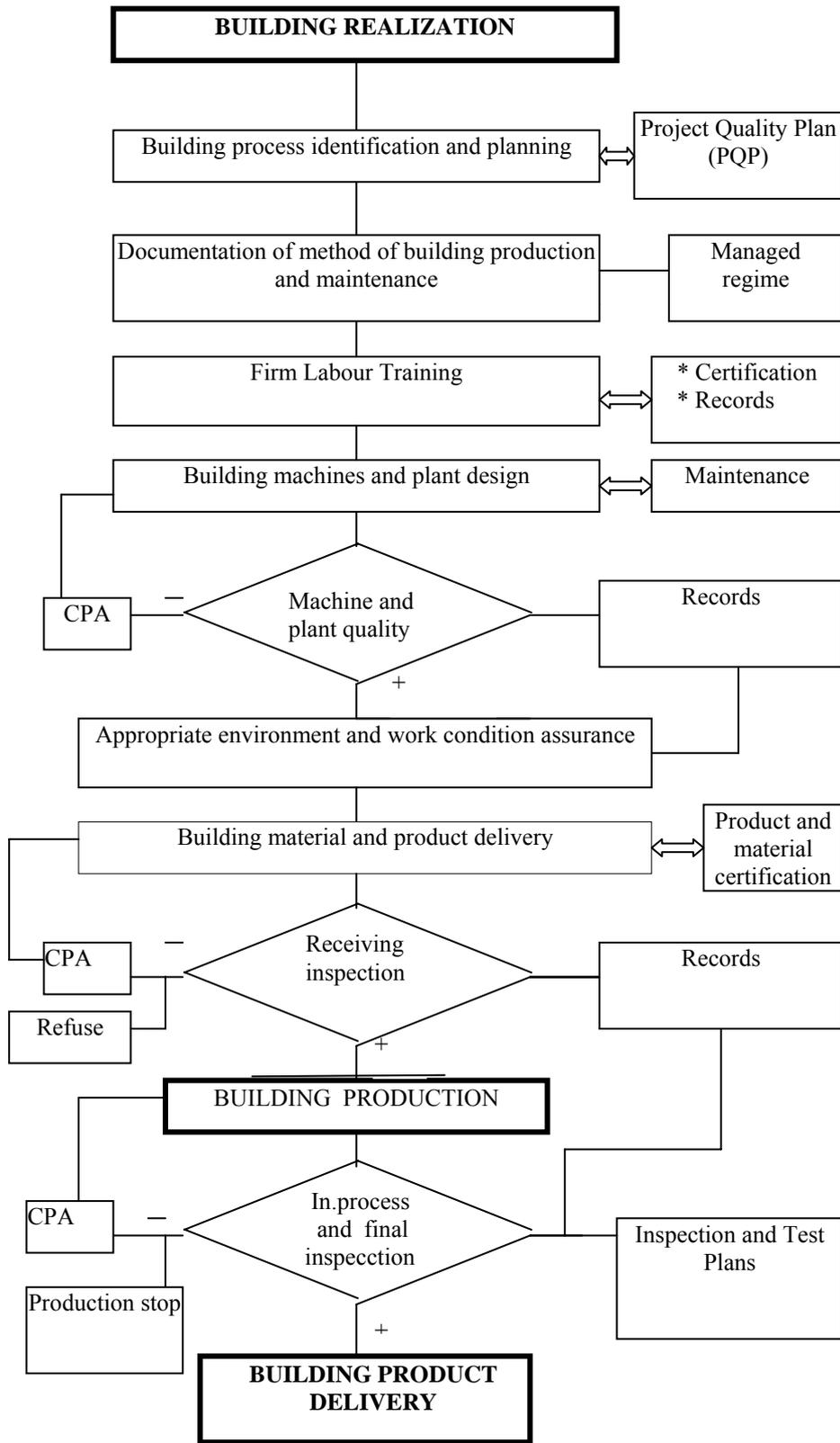
### **3.2. In-process inspection and testing**

The control of quality during manufacture and installation shall be maintained by monitoring the building processes and the results of inspections. Except when released under a positive recall procedure, product shall not be released for further processing until all the required inspection and tests have been completed and reported. Each complete inspection and test shall be recorded on the relevant route or stage inspection and test card with the date and identify of the inspector, tester and operator. As each inspection point is cleared on the relevant route card, previous inspection results shall be verified. Inspection points and the requirements for special instruction shall be detailed on route cards with an assigned operations number. Non-conforming items shall be processed in accordance with the written procedure established for this activity. Test specification and data shall be verified, recorded and accepted on forms compatible with contractual requirements. All production operations shall be performed using the most appropriate equipment, with special tooling requirements as required.

### **3.3. Final inspection and testing**

Acceptance of finished items shall be indicated by the inspection function authorising the final inspection operation on the route card, after verifying that all previous inspection and process stages have been accepted and authorised. Records and data shall include the following:

- compliance with material specification,
- compliance with drawing requirements,
- inspection records to substantiate acceptance of items in-process, and acceptability and certification of processing operations,
- identification of non-conforming items for rejection, rework or non-conforming item review action.



CPA: Corrective and preventive action

Figure 2. Building Realization

Inspection stamps, where used as an authorising process, shall be designed to indicate company identity and the inspector. A flow chart of the various activities involved in building process control appears in Fig.2.

*The quality assurance manager* has an important role in the process of *building quality assurance*. He would occupy a position on the construction site analogous to that of a company quality manager within the corporate structure. He would report on a day-to-day basis to the *project manager* who would delegate to him the tasks of preparing a *project quality plan* in accordance with the company's quality policy and in compliance with any contractual requirements of the purchaser. *The project manager* would approve the project quality plan and thereafter ensure, that its requirements are correctly implemented by all personnel on the project. *Quality assurance manager* would not be responsible for quality control. This, together with the preparation of procedures and work instructions, and the training of persons would be line management responsibilities. These responsibilities would also embrace the supervision of sub-contractors and suppliers, including the approval of their procedures and work instructions, and the execution of inspection and testing programmes. *Responsibilities for quality of performance and products have operators.*

#### 4. CONCLUSION

*Quality management system* starts with commitment from the senior management demonstrated in the form of a quality policy. The implementation of the full quality system then needs to be planned and monitored to ensure it is effective [6,7, 8]. The International Standards Organisation (ISO) 9000 Series sets out the methods by which a management system incorporating all the activities associated with quality, can be implemented in a building organisation to ensure that all the specified performance requirements and needs of the client are fully met. *The owner, architect (designer) and constructor* have important roles in a process of quality management and improvement. The aim of good QMS is to provide the operator with consistency and satisfaction in terms of methods, materials and equipment. An effective QMS leads to client satisfaction, increased productivity, efficiency, higher profitability and increased competitiveness.

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