

Implementation of Quality Management Concepts in Managing Engineering Project Site

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ABSTRACT

Quality has been considered one of the most important and competitive factors amongst the constructing companies during the past two decades.

Reviewing literature pertinent to quality management concepts and its application in construction industry has formulated the definition of "Quality Management" as meeting the owner's requirements or compliance with the set standards and specifications. This definition can be realized through the application of quality management concepts which are represented by "Total Quality Management" TQM as a higher management level which has been achieved by quality management works.

It has become clear that the responsibility of achieving applications of quality management concepts shall be borne by the construction management and its personnel. In turn, such management can be attained by a specialized management field named "Quality Management".

The researchers have recommended a proposed Quality Management System for Construction Site aiming: firstly to raise the quality level of works in construction projects, and secondly to improve the construction staff consciousness, in different managerial levels, about quality management concepts and its importance for improving the quality of construction works.

The researchers have come out with certain conclusions, above all is that this proposed quality management system for construction site will improve conducting quality management concepts in achieving construction works by construction companies.

KEYWORDS: Construction projects, Quality management.

INTRODUCTION

Quality management systems can be considered one of the important management systems that industrial companies deal with to improve the level of their performance. The competition between them is a good stimulus that makes these companies adopt this system in order to crown their works by quality without

forgetting time and cost.

A chronological survey of the available relevant studies and researches on quality of construction projects indicated that research work in this field is limited. The recent of these researches are:

1- In 1990, in CIB, J. Benes and J. Bruijn published a paper in which they stated the requirements to judge the communication between various partners in the construction process for taking the right decisions about quality.

2- In 1990, in CIB, W.B. Ledbetter and J.L. Burali

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published a research in which they aimed to reduce the total cost of quality by managing it more effectively and striving for zero rework through a system which provides the project management with relevant, timely information concerning the details of quality efforts and results.

- 3- In 1997, Ibtisam Al-Talibi has conducted a research aiming to develop a system for managing quality of design and using it as a tool to minimize design faults. This is done by identifying the reasons of design faults and their effects, the current applied activities concerning design quality management and measures to improve it.
- 4- In 1998, D. Arditi and H. Hurat published a paper in which they dealt with a Total Quality Management programme in the construction process. This research explained the main elements of total quality management in construction industry with explaining the main obstacles that may prevent the engineer to apply this system in construction projects.
- 5- Recently, Al-Ani (2005) has conducted a research on the quality requirements for designing the engineering project. He concluded that there are certain factors affecting the quality of engineering project design. An integrated quality management system has been proposed to improve the quality of the engineering project design.

The above literature review has concluded that there is a crucial need to deal with modern quality management systems. In order to make this experiment successful, it is required to move in a parallel way, step by step, with the quality management system development in the world, especially in the construction industry.

This research tackles different levels of quality management systems in the world, since the 1920s up to now. It also includes a trial to propose a system for the construction site as an Integrated Quality Management System for Construction Site, which is inspired from the new science.

ELEMENTS OF QUALITY CONTROL

One way of distinguishing the elements of quality control shows that there is a classification of four natural elements. This classification is (Feigenbaum, 1997):

- 1- New Design Control;
- 2- Incoming-Material Control;
- 3- Product Control;
- 4- Special Product Studies.

New Design Control

Through the first element, the quality control effort on a new product is being conducted, while its marketable characteristics are being selected, the design parameters are being established and proved by prototype tests and the manufacturing process is being planned and initially costed. While the quality standards are being specified, both the product and process designs are reviewed to eliminate any possible sources of quality troubles which may appear before the start of a formal production and to improve maintainability and eliminate any threats to product reliability.

Incoming-Material Control

The second element represents the procedures for actual acceptance of materials, parts and components that are purchased from other companies or, perhaps, from other operating units of the same company. Occasionally, incoming material control applies to the parts that are produced in one area of a factory to be used in another area of the same factory.

Product Control

The product control element involves the control of products at the source of production so that departures from quality specifications can be corrected before defective products are manufactured. It does not only involve the materials, but also the control of processes that contribute to the quality characteristics during the manufacturing operation. This control seeks to deliver a reliable product that will perform satisfactorily during its expected life and under the conditions of use.

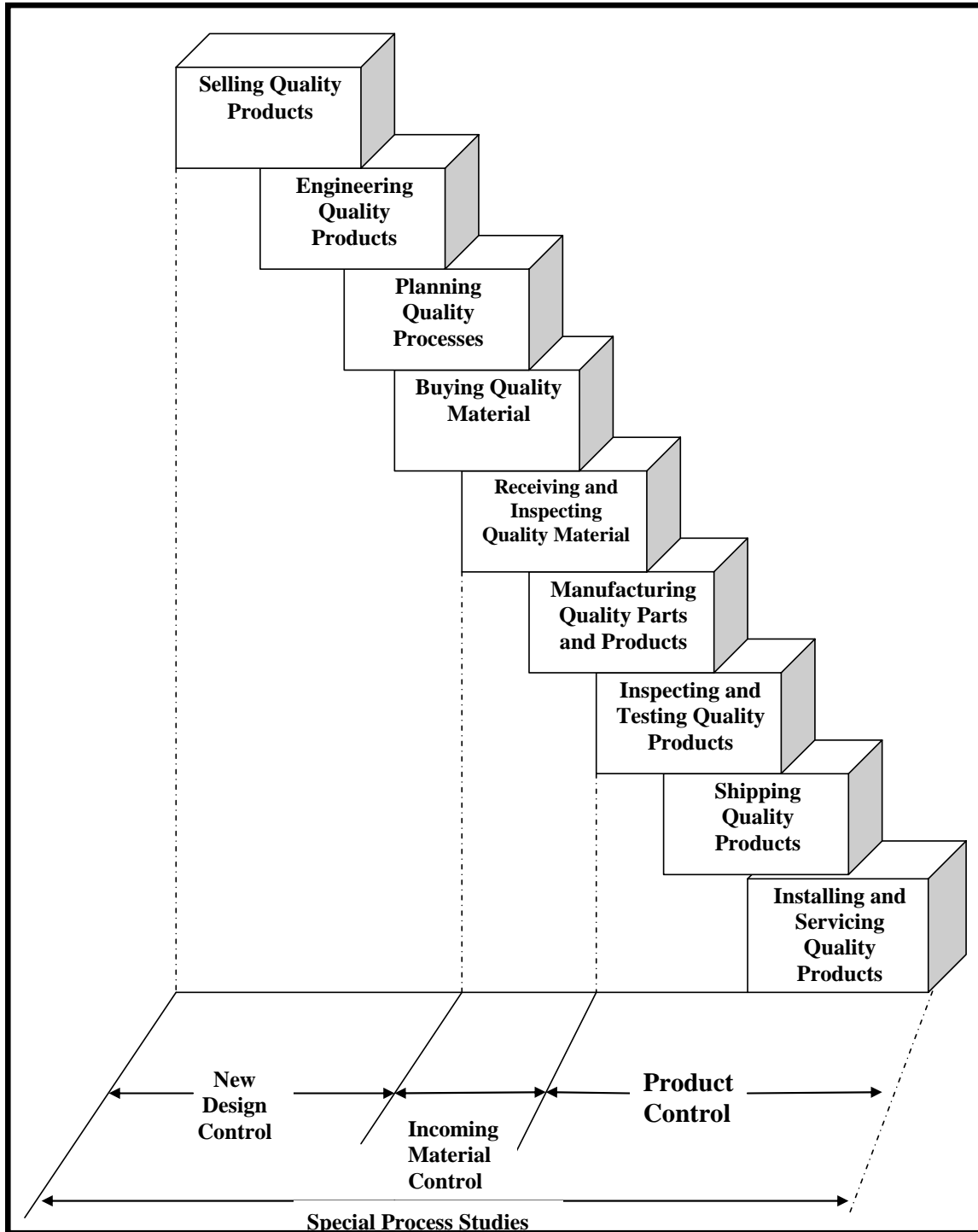


Figure 1: Quality control activities during the production cycle

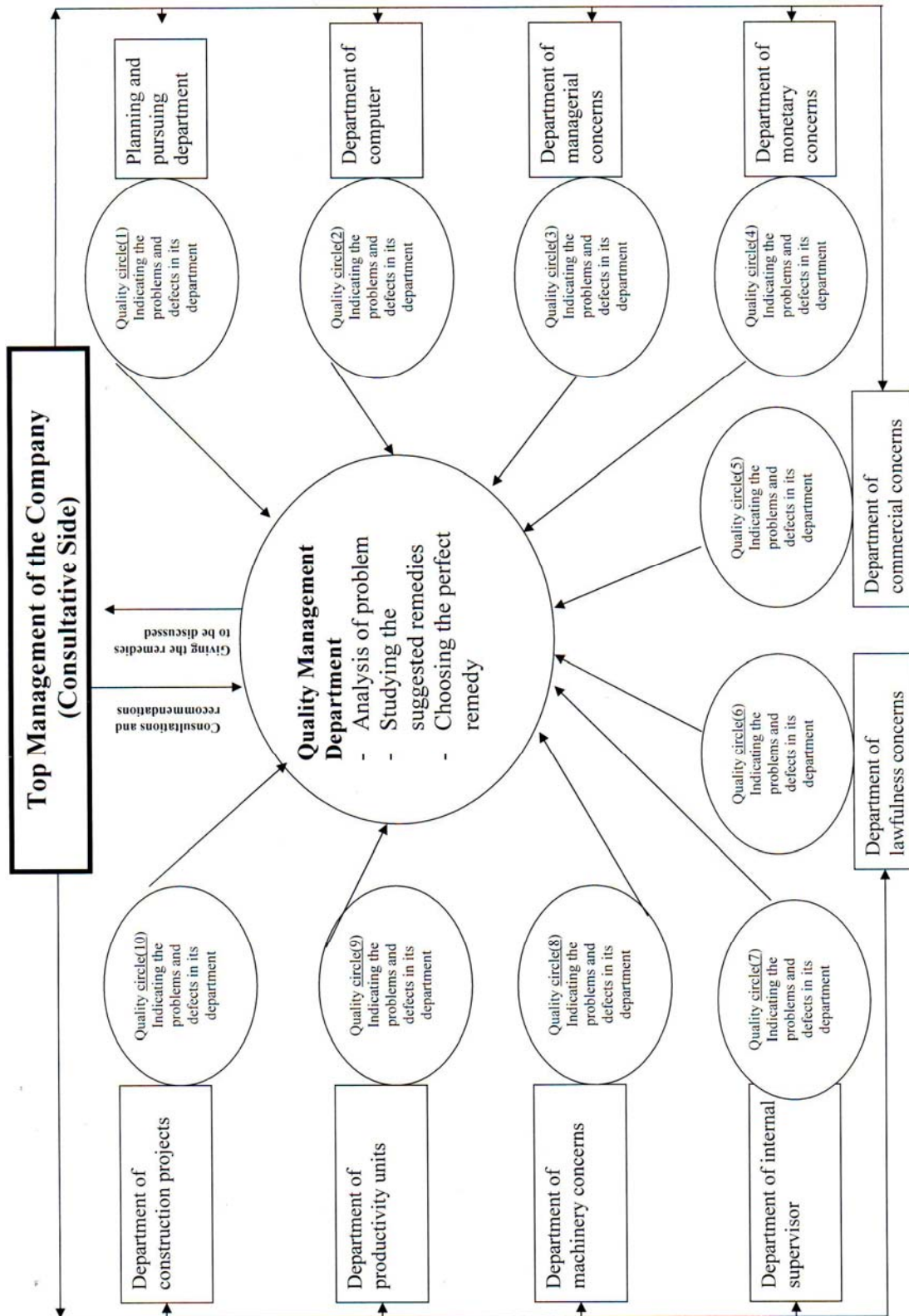


Figure 2: The relationship between quality circles and quality management department in construction companies

Special Product Studies

The last element of quality control is concerned with investigations and tests to allocate the causes of defective products. Elimination or control of these causes results in product and process improvement, not only improving the quality characteristics, but also reducing the cost of production. Fig.(1) shows how the quality control elements gear in with the production process.

QUALITY MANAGEMENT REQUIREMENTS FOR CONSTRUCTION PROJECTS

The contractor (one of the parties in the project contract) is responsible for planning and developing a program, which assures that all his management and technical responsibilities for achieving quality are effectively executed at the site. The program is aimed primarily to ensure an efficient quality control system at the construction site and take corrective actions, when necessary. The project management team PMT must be responsible for applying the quality control requirements at the site. The requirements are concentrated in three main points; these points are as follows (Columbus and Spite, 1984):

- 1- Quality Assurance Program;
- 2- Suitable Organization;
- 3- Necessary Quality Assurance Documents.

Quality Assurance Program

The contractor's quality management team shall plan, establish, implement and maintain an efficient quality assurance program that complies with the requirements of work quality.

Suitable Organization

The contractor has to organize some limitations and instructions to the quality control working staff on the shape of organizational measures. These limitations and instructions can be explained as follows (Burati et al., 1992):

- Clearly define the management policies, objectives

and responsibilities for quality assurance, including the responsibilities of each division within a multidivisional organization.

- Appoint a representative who shall report regularly to the quality control to ensure that the quality assurance requirements are not subordinated to design, manufacturing, construction or delivery, and define his authority to resolve quality matters.
- Use competent persons for inspection, other than those performing or directly supervising the work being inspected unless specifically designated otherwise in the quality plan. Generally, inspectors shall verify the conformance to the specifications and drawings. In cases of problems or difficulties, they shall request clarifications from the design or other competent organizations and initiate appropriate measures.
- Define the responsibility and authority for quality of those managing and performing the work and of those verifying conformance to quality requirements, and show their relationships on organization charts.
- Define the responsibility and authority of personnel who are primarily responsible for quality control and their organizational independence during audits.
- Assure that the inspection and quality control personnel report to an adequate level of management, excluding direct report to supervisors responsible for producing the work being inspected.

Quality Assurance Documents

The constructor and his working team are responsible to prepare the following documents, which will be used as standards to control the work at the construction site:

- 1- Quality Assurance Manual;
- 2- Quality Plan.

Quality Assurance Manual

The constructor shall;

1. Prepare a quality assurance manual, approved and

signed by a senior management official, and submit it for the client's concurrence before the contract is awarded or at the latest before the site work is started.

2. Review and update the manual to reflect current quality assurance policies and procedures and resubmit the revised and updated manual.
3. Implement the quality assurance program according to the provision specified in the manual.

The quality assurance manual shall deal appropriately with the following (Feigenbaum, 1997):

- a- **Organization**- The manual shall define the organizational measures as specified in the suitable organizational article.
- b- **Quality plan**- The manual shall identify the group responsible for the quality plan specified in the following article and define its main principles and features in adequate procedures.
- c- **Quality assurance procedures** – Documents of QA procedures shall be included or outlined and cross- referenced. Referenced QA procedures shall be made available to the quality assurance representative.

Quality Plan

Quality plan can be considered as a work program organized by the constructor and the quality control staff. All the tests and inspections for any construction projects are expected to be explained in this plan. To prepare the plan, the constructor shall (Simmons, 2001):

- 1) Plan the inspections and test activities;
- 2) Identify in the quality plan that the inspections and tests to be performed on the items are listed in the contract in compliance with contractual and/or technical condition requirements;
- 3) Submit the plan for the client's concurrence following the award of the contract and before the work start;
- 4) Up-date the plan during the project life to reflect the current conditions of manufacturing, construction, inspecting and testing and resubmit the plan to the client.

The quality plan may be of any format to suit the execution approach that has been followed by the constructor. The quality plan shall deal as appropriate with;

- a- Identification of the characteristics or items to be inspected and tested;
- b- Identification of required inspection, tests and special process operations and their relative locations in the construction cycle;
- c- Identification of hold points beyond which the activity shall not proceed until the required inspections or tests have shown satisfactory results and been documented;
- d- Provisions for the client to insert witness points at which activities are to be observed.

The quality plans for subcontracted items or service, when are concurred by the contractor, shall be submitted to the client, as applicable, for concurrence and insertion as witness points.

QUALITY ASSURANCE ORGANIZATION

The quality assurance organization differs from other phases of a project control system and reflects the varying and often conflicting interest of the contract parties as well as the interests of the society as imposed through the governmental regulation. Briefly stated, there is often considerable emphasis on keeping the quality assurance function separate from project operations in order to ensure that third part objectivity will prevail in decision making (Burati, 1992).

The quality assurance organization is the management's tool for delegating authority and responsibility for quality control. The task of a quality assurance organization is administrating the activities of the personnel working within the technological framework represented by the quality control jobs (Feigenbaum, 1997).

CURRENT SITE QUALITY MANAGEMENT SYSTEMS OF CONSTRUCTION PROJECTS

A field survey has been carried out, by the researchers, on thirty project managers and thirty

constructors, to identify and evaluate the current site quality management systems used for controlling the quality of site works of construction projects. The answers were then; collected, tabulated and analyzed to be discussed. The discussion of the answers has come out with the following points:

1. The absence of quality management in the constructing companies was the main reason which had made most of the answers indicate that the best starting point for applying quality management works is at the design stage, in order to ensure the decrement in fault rates in all construction project stages to the minimum level.
2. The analysis of the data collected from the questionnaires showed that the work size which had been re-executed because of faults in the project's requirements such as; contract conditions, design, specifications ...etc. was huge. The reason of these faults is the absence of an integrated monitoring system through which these faults can be prevented as early as possible.
3. According to the analysis results, quality management in the contracting company's head office is responsible for determining the faults in the project's requirements, especially in; design, bill of quantities and specifications before their arrival to the contractor hand at the site. From the researchers' point of view and depending on the questionnaire participants' opinions, quality control works are series of conjugated works starting from the planning stage till the commissioning stage.
4. The achievement of a successful TQM system occurs through a complete understanding of the top management to this system, in addition to its success dependancy on the managerial participation of all parties involved in the construction projects. So, this participation will continuously support the quality management processes by making them permanent works in construction companies. That was the researchers' opinion based on the opinions of managers and contractors who participated in the questionnaire.
5. The questionnaire's answers indicated that most of participants agreed that the benefit of TQM system is to develop the work performance and to participate in creating a state of competition between construction companies, so that this competition will assist in developing the construction industry through rising the quality level of construction work executed by these companies.
6. According to the managerial engineers' opinions, the required period for achieving the TQM system at the head office is less than that required at the construction site, as this system is facing so many difficulties at the site in comparison to the head office.
7. The questionnaire's results showed that there is a lack in applying quality management, and the achievement of such is usually depending on the construction staff. Meanwhile, the site quality control is limited by laboratory tests of some construction materials. Most of the constructors' answers agreed on the importance of an independent quality management system, through which the achievement of early detection of site faults will be obtained in order to prevent any delays, extra costs or site problems.
8. The application of an independent control system for site quality has a direct effect on the companies and their site staff. Regarding the company, the benefit is represented by a continuous watching of site works' quality in order to get a rapid determination of the construction faults.
9. The main reason for not applying the independent management system for site quality is the lack of knowledge of the elements and the requirements of the TQM system, in addition to the poverty of financial support to such system. In spite of that, the questionnaire's answers indicated that there is a strong desire of the companies' top managements towards applying an independent management system which concerns site quality.

PROPOSITION OF A SITE QUALITY CONTROL SYSTEM FOR CONSTRUCTION PROJECTS

The proposition has included two steps:

1. Proposition of a Management Department;
2. Proposition of a Site Quality Management System.

Proposition of a Management Department

The first step of proposing and applying the site quality management system is creating a management department as one of the company's departments.

This department concerns itself with the concepts of the Total Quality Management (TQM) system in order to reach the required level of quality of the construction work. This department has to be directly connected with the top management of the company. By applying the (TQM) system, the department will surely achieve the following tasks;

- a) Improving the quality of the office works, such as design drawings, bills of quantities...etc;
- b) Improving the performance of the company's personnel by training them on the concepts of Quality Management, and creating a competition between the quality management team and the other teams in the company;
- c) Giving the personnel of quality management independency and protecting them from dissolution;
- d) Giving the quality management personnel high spirits connected with the department responsible for managing the quality of site work, especially toward the top management of the company; and
- e) Facilitating the flow of quality information between the quality management department and the top management of the company.

Personnel of a Quality Management Department

All the companies have to prepare a team for the proposed quality management department. This team must include engineers with experiences not less than ten years, and each one is employed according to his specialization. An administrator with an experience not less than ten years is chosen, in order to administer this

department.

The personnel in the team need to be trained for the concepts and elements of the (TQM) system.

Responsibility and Authority of the Quality Management Department

In order to achieve the requirements of quality management for the quality management department, the high management for these companies has to give this department the necessary authorization and give each person who works in this department his/her responsibility.

These authorizations and responsibilities must be delegated and assigned to the quality management department to improve its ability in:

1. Indicating the weaknesses in any department or section in the company, and giving solutions to the top management of the company about those weaknesses;
2. Suggesting new systems for quality management to serve the site work;
3. Modifying the decisions of the site quality management, when necessary;
4. Ensuring the quality of the design;
5. Checking the construction team's requirements to be employed for the site;
6. Giving advises that are concerned with the cost of the required quality;
7. Improving the qualification of the company's personnel by training them on the quality management concepts;
8. Choosing the work team to achieve the site quality management requirements;
9. Establishing the suitable site quality system and giving the work team their responsibilities;
10. Developing a computerized information center concerned with the site quality management of the construction projects. The purpose of this center is to keep documented all the quality management information to be used for cost analysis of any quality management decision.

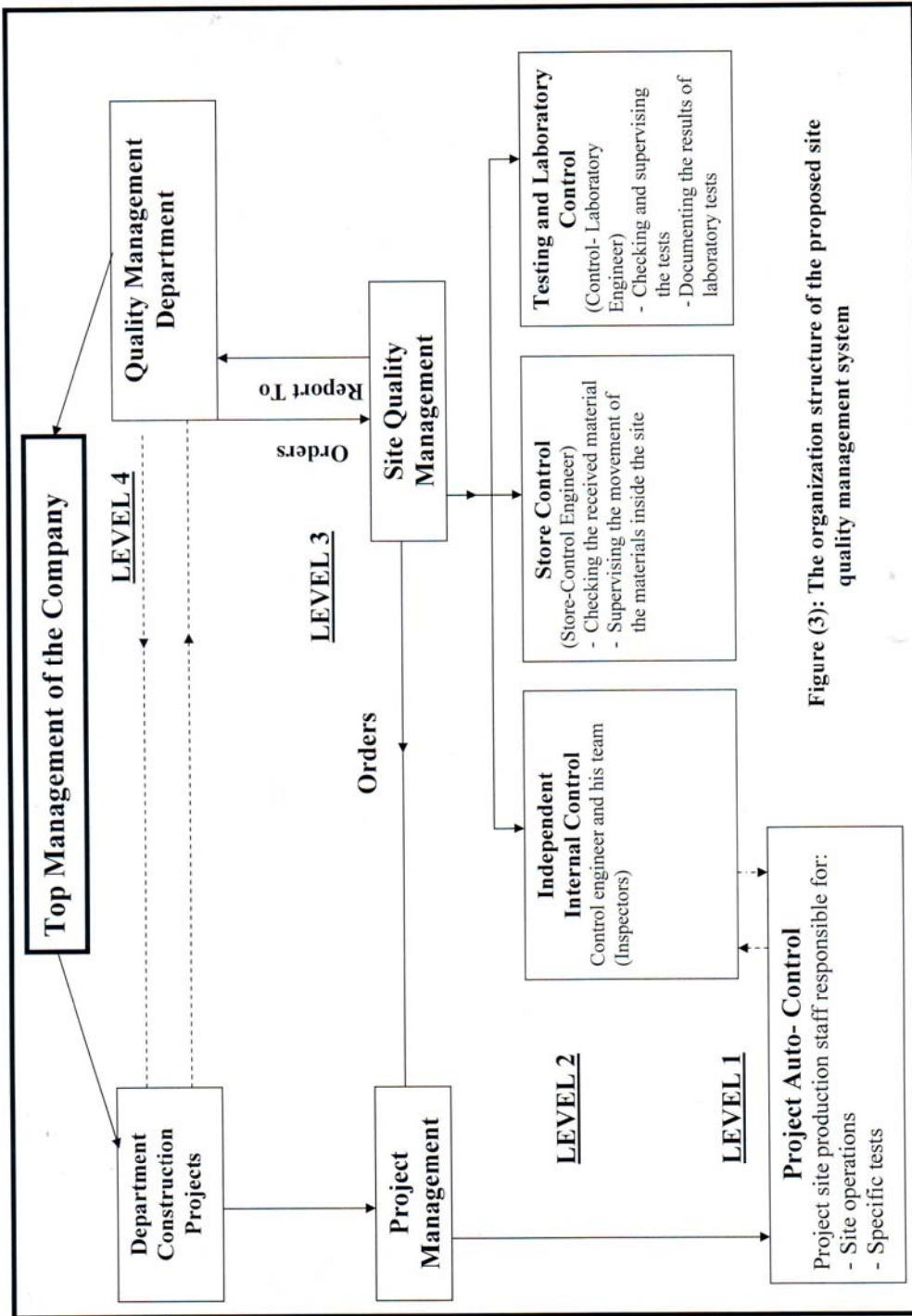


Figure (3): The organization structure of the proposed site quality management system

Quality Circles

Quality circles can be expressed as groups of persons who are selected by each department according to their experiences and abilities. Each circle has at least four persons with different specialties. This circle is responsible for indicating quality problems in its department, and then suggesting the remedies for the problems, in cooperation with the quality management department.

Once the remedy is suggested, it is passed to the top management of the company by the quality management department in order to be discussed and confirmed as an order to the other departments. When the remedy is approved, the quality circle will be responsible for supervising the achievement of the remedies on behalf of the top management. Fig. (2) explains the relationship between the quality circle and the quality management department.

According to what has been mentioned, the quality circle is responsible for:

1. Identifying the quality problems of the company's departments to the quality management department, aiming to get perfect remedies to these problems;
2. Indicating and declaring any weaknesses or defects that may occur in these departments;
3. Executing the quality management department's remedies, the quality circle will be responsible for supervising the implementation of the suggestions, in order to improve the quality achievement of the department.

Proposition of a Site Quality Management System for Construction Projects

The main purposes of the proposed site management system are to:

1. Verify, during the course of the contract, that the site works are executed according to the required levels of quality specified in the contract document;
2. Produce documents, which demonstrate that the quality of the related matters has been monitored during the course of the site works.

Management Levels of the Proposed Site Quality System

The proposed system for site quality management, which is established for the construction sites, is based on the following levels of management:

1. Level 1: Auto – Control;
2. Level 2: Independent Internal Quality Control;
3. Level 3: Site Quality Control Management;
4. Level 4: Quality Management Department.

Level 1: Auto – Control

This level of quality management is a self-checking, performed by site supervisors/engineers regarding the site operations, which they are responsible for. The site manager chooses a representative engineer to represent the site supervisors/engineers, called auto-control engineer. This selected engineer represents auto-control toward site quality management.

Level 2: Independent Internal Quality Management

This level of quality management is carried out by an independent section as a team of inspectors of site management acting under the direction of the Site Quality Management. This section has the following tasks:

1. Testing and Control Laboratory; this laboratory is in charge of all materials' tests regarding, particularly, concrete and associated materials.
2. Internal Control Site; besides the test performed by the laboratory, a team of inspectors is in charge of:
 - a- Verifying the validity of the self-check controls performed at level one; and
 - b- Performing directly certain specific quality controls or inspections on site.
3. Store Control; a work team which belongs to the site quality control. This team is responsible for the store control. The manager of the site quality control is supplied with a report every two weeks. The movement of materials in the store should be indicated in this report.

MONTHLY REPORT OF STOCKING MATERIAL

.....Company
Quality Management Department
() Material
Table No./

Date/
Project Name/

No.	Description Control Engineer	Quantity Received / /	Cumulative Quantity Received	The Actual Existing Quantity in the Store	Total Quantity in the Work (Cumulative) To / /	Distribution of Material used on the Situations (Cumulative) Site Quality Manager					Comments	
						1	2	3	4	5		
Storekeeper						Auto- Control Engineer						Store Control Engineer

Figure (6): Semi-monthly of stocking materials in the store

ENGINEER CARD

.....Company
Quality Management Department
() Material
Card No. /

Project Name.....
Supervisor Engineer.....
Situation.....

No.	Material Description	Unit	Quantity of receiving Material	Date of Receipt	Type of Work	Its Location	No. of Reference Drawing	Confirmati on of Store Control Engineer	Confirmation of Storekeeper

Figure (7): Engineer card

Level 3: Site Quality Management

The management of internal quality control section is entirely independent of the site production team and oversees all control activities that are performed at levels one and two.

The site quality management reports are sent directly to the Quality Management Department in the company. The main tasks of the site quality management are:

3. Ensuring the effective setting-up of the quality management system;
4. Directing and monitoring the laboratory and internal quality management team at level two;
5. Carrying out directly a certain and specific quality management of a critical or complex nature;
6. Verifying and evaluating the functions of the system by independent inspections or audits at level one or two;
7. Reporting to the Senior Management of Quality Management Department by means of regular analysis reports.

All the staff constituting the site quality management as well as the team of inspectors at level two is under the technical authority of the Site Quality Manager.

Level 4: Quality Management Department

It has been previously explained.

Responsibilities of the Site Quality Management System Personnel

The quality management has to determine the responsibility of each one of the personnel working for site quality management. Those are:

3. Site Quality Manager;
4. Chief of Auto-Control and His Team (Supervisors);
5. Chief of Supervising (Control Engineer) and His Team (Inspectors);
6. Chief of Laboratory Control;
7. Chief of Store Control.

Site Quality Manager

Quality management elects the site quality manager; he is always questioned by the quality management department.

Chief of Auto-Control and His Team (Supervisors)

The project management elects the chief of the auto-control. He is always questioned by the site management; i.e. he has to do the following:

1. Producing the reasons that justify all the unacceptable works;
2. Confirming the control's documents.

Chief of Supervising (Control Engineer) and His Team (Inspectors)

Site quality management elects the chief of this team. He is always questioned by the site quality manager; i.e. he has to do the following:

1. Continuously checking the site work, in order to keep it coping with the standards;
2. Writing all the control documents and confirming them;
3. Executing all the site quality management decisions and suggestions;
4. Supervising all the sub-contractors' site works, by depending on the control certificates.

Chief of Laboratory Control

Site quality management elects the chief of laboratory control. He is questioned by the site quality management; i.e. he has to do the following:

1. Participating in taking samples and sending them to the laboratory;
2. Receiving the results of the tests from the laboratory;
3. Documenting the laboratory's instructions or the consultants' instructions about the refused materials on site;
4. Producing monthly reports on the laboratory tests to the site quality manager.

Chief of Store Control

Site quality management elects the chief of the store control. The chief is always questioned by the site quality manager; i.e. he has to do the following:

1. Documenting the materials' movement into and out of the store;

2. When the materials are received from the store, the chief of the store control confirms the site supervisor card;
3. Producing semi-monthly reports showing the materials' movement from the store to the site;
4. Preparing a control certificate for the site materials, and submitting it to the site quality management in order to be confirmed and accepted.

THE MANUAL OF THE PROPOSED SITE QUALITY MANAGEMENT SYSTEM

Quality management department has to set a manual. This manual is expected to explain the following:

1. Organization Chart for Site Quality Management System;
2. Quality Plan.

1. Organization Chart for the Proposed Site Quality Management System

This chart explains the organization structure for the proposed site quality management system, as shown in Fig. (3). The continuous line in this figure means that the orders are obligatory; i.e. each one who has the authority can order the others according to his priority in the project. The hidden line in this figure means that there are no orders, but they negotiate with each other.

Quality Plan

Quality management department has to prepare a quality plan for each construction project. This quality plan contains the site quality control team's procedures and the documents used at the site. This plan is required to show the movement of the documents between site quality management, project management and quality management department in the head office of the company. So, the quality plan must contain:

1. Control documents and work program;
2. Documents that evaluate the performance;
3. Successive tests and sorts of registration.

MANAGEMENT DOCUMENTS OF THE PROPOSED SYSTEM

These documents include:

Weekly Pursuance Table

Each supervisor has to fill a weekly pursuance table. This table has to be submitted to the quality management department in order to check the works against the required standards according to the designs, with the existence of the chief of auto-control.

The table will inform the project manager and his/her site team about the decision, in order to confirm it, as shown in Fig. (4).

Material Control Certificate

This certificate is used as a document of receiving materials and giving payments to sub-contractors, in order to approve the actual use of materials and site works before giving permission for payment, as shown in Fig. (5).

Monthly Repot of Stocking Materials

This table is filled every fifteen days by the storekeeper who is elected by the project management and by the chief of the store control. This table shows the materials taken from the store and sent to the situations, as shown in Figure (6).

Engineer Card

The site quality manager prepares this card, which is given to each supervisor at the site. It explains the quantity of materials received by the supervisor, according to the situations. Each engineer has to keep this card and submit it to the site quality management, when the necessity requires that, as shown in Figure (7).

Monthly Material Wastage Report

The site quality management fills this table. The percentage of actual waste is determined in order to compare it with the allowable waste, as shown in Figure (8).

.....Company Quality Management Department () Material Table No. /			MATERIAL WASTAGE										Date/ Project Name/																		
No.	Mat.	Unit	Actual Quantity of Material used in the Work According to the Situations (Cumulative)	1	2	3	4	5	Required Material for Work Actually According to the Situations (Cumulative)	1	2	3	4	5	Total Required Amount (Cum.)	Waste Material According to the Situations (Cumulative)	1	2	3	4	5	Total Waste Amount (Cum.)	(%) of Waste According Situations	1	2	3	4	5	Total (%) of Allowable Waste	Comments	
			1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5				

Control Engineer

Site Quality Manager

Confirmation of Project Manager

Figure (8): Monthly wastage table

.....Company Quality Management Department Table No. /			PERFORMANCE APPRAISAL TABLE					Date/ Project Name/	
No.	Situation	Total Cost Actual Waste Material.	Allowable Total of Waste Material.	The Situation of Weekly Modification's Proposal for Unacceptable Works.	Performance Appraisal	Comments	Site Quality management's Suggestion for Performance Improvement the Situations		
					Acceptable				
					Unacceptable				

Figure (9): Semi-monthly performance appraisal table

Performance Appraisal Table

This document is represented as a monthly table for performance appraisal. The site quality management fills this table in order to evaluate the performance of the site team. When the performance is unacceptable, the table shows the suggestions to improve it. These suggestions have then to be confirmed by the project management, as shown in Figure (9).

The Monthly Observation Report

This document is represented as a monthly observation table. The site quality management fills this table in order to determine all the obstacles and defects in the project's requirements, like; working staff, condition of materials in the project...etc. In addition, it is responsible for determining the remedies to overcome obstacles and defects in the table, as shown in Figure (10).

Laboratory Test Report

This document is represented as a monthly table for laboratory tests.

In this table, all the laboratory tests are documented with the suggestions of the consultant engineer about the results of the refused tests. The laboratory control engineer and the auto-control engineer fill this table on a monthly basis to be given to the site quality management, as shown in Figure (11).

All the documents of the quality plan have to be written in two copies; one remains at the site for documentary purposes. The second copy is given to the quality management department for obtaining information and taking any necessary procedures.

CONCLUSIONS

The researchers have come out with the following points as the overall conclusions of the research work:

1. When organizing a well structured and effective site quality management, emphasis should be placed on the identification of actual or potential quality

problems and the initiation of improvement measures, by ensuring the following:

- a) What must be achieved?
 - b) Determining the quality management activities.
 - c) Who will carry out each part of the work?
 - d) Determining the quality management responsibilities;
 - e) How will the activities be undertaken?
 - f) Determining the quality activities;
 - g) When will the activities be started and completed?
 - h) Determining the quality activities' scheduling and timing.
2. Quality management works mean checking and judging site works against the required specifications; before, during and after the completion of the works. When the work is completed, there is another step for evaluating it, which should not be done by the constructor;
 3. Site quality management for construction works does not mean a temporary work, but it must be a continuous work during the whole construction period of the project;
 4. The constructing companies still suffer from a lack of a system of site quality management. The importance of this system lies in enabling the company to know the quality level of the site works for any project at any time;
 5. There is no site team that is specialized in quality management in the constructing companies. The constructing team members manage the quality of their works by themselves;
 6. Through interviewing the managers and the constructors, the researchers have concluded that there is a misunderstanding of the concept of quality management and its application in the construction industry;
 7. The managers indicated that the main two reasons of quality faults are: the scarcity of proper building materials and the poor level of techniques used in construction industry.

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