Total Quality Management Implementation in the Egyptian Construction Industry

Tarek Elghamrawy¹ and Tomoya Shibayama²

Abstract: Total quality management (TQM) has been recognized as a successful management philosophy that can be successfully implemented in the construction industry. By examining the Japanese contractors working in Egypt and comparing their managing systems to the local ones, a comparative analysis of the two contractors working in the Egyptian field is presented in this paper to illustrate how TQM can be implemented effectively in the Egyptian construction industry. Bearing in mind the location bound nature of the production process, the competitive bidding, which emphasizes cost and the absence of the quality culture of the clients, subcontractors and site operatives are some of the constraining factors for implementing the quality policy. Based on the research findings, the paper presents some features of the Japanese construction industry that could be implemented in the Egyptian field in addition to a new model for TQM implementation that appropriates the Egyptian construction industry.

DOI: 10.1061/(ASCE)0742-597X(2008)24:3(156)

CE Database subject headings: Quality control; Egypt; Construction industry.

Introduction

Total quality management (TQM) is a customer-oriented, quality focused management philosophy for continuous improvement (Rogers 1996). It is often termed a journey, not a destination (Burati and Oswald 1993). TQM has but a single purpose: to improve the performance of one’s business. It is a means to that end, not an end in itself (Anschutz 1995).

There has been a dearth of scholarly work on total quality management and a large debate for the success of its implementation in the construction industry. Much research has been done with regard to the implementation of TQM and it is believed that the benefits of higher customer satisfaction, better quality products, and higher market share are often obtained following the adoption of TQM by construction companies. Although TQM has been widely implemented in the Japanese construction industry since the 1980s and in the American construction field since the 1990s, it has not yet been implemented successfully in the Egyptian construction field (Abdel-Razek 1998).

The quality movement dates back to the 1920s when Walter Shewhart of Bell Laboratories developed a system of measuring variance in production systems, known as statistical process control (SPC). SPC is still used to help monitor consistency and diagnose problems in work processes. Shewhart also created the plan-do-check-act (PDCA) cycle, which applies a systematic approach to improving work processes. When the PDCA cycle is applied on an ongoing basis, it results in continuous improvement.

Across the ocean, the United States occupation forces in Japan invited W. Edwards Deming, a physicist and census bureau researcher, to help Japan with their postwar census; he was also invited to lecture business leaders on statistical process control and quality. He ended up teaching the Japanese much more; his lectures became the genesis of the modern quality philosophy.

Culp et al. (1993) reported the experience of HDR Inc., Omaha, Neb., a large engineering firm, in applying a TQM program. Based on the program recommendations, the consulting firm had significantly improved customer and employee satisfaction, and established an environment to constantly improve quality. McCabe (1996) presented a study of U.K. companies representing different industries that have implemented different quality policies such as ISO 9000 and TQM. The study discussed the difficulties that practitioners faced while introducing and maintaining such policies and claimed the overall success of these companies against a number of performance indicators.

The aim of this paper is to examine how TQM can be applied more actively in the construction industry. It seeks to assist contractors in identifying the steps necessary for the implementation of TQM. For this purpose, a comparative analysis of two contractors working in the Egyptian field is presented to identify obstacles and benefits experienced in their cases. The first case is a local Egyptian contractor and the second one is a Japanese contractor that has its district office in Egypt. The Japanese contractor is one of the six Japanese giants.

The objectives of this paper are as follows:

1. To address the characteristics of the Egyptian construction industry;
2. To address the issue of applying TQM in the construction industry and present two case studies: a local contractor and a Japanese one;
3. To present some features of the Japanese construction industry that could be implemented in the Egyptian field; and
Characteristics of Egyptian Construction Industry

The construction sector is one of the most dynamic sectors in the Egyptian economy and has been growing rapidly since the 1980s. In 2000, the Egyptian construction market ranked 36th in the global construction market, constituting 0.4% of this market, for a value of $12.711 billion. Despite its fall from 33rd in the 1998 ranking, the Egyptian construction market actually increased in size by 23%.

The sector has a significant impact on gross domestic product (GDP), employment, and investment. In 2001–2002 its GDP share reached a value of LE16.56 ($3.84) billion [LE=livre égyptienne (French for Egyptian pound)], representing 4.7% of the total GDP. Construction investments reached LE41.2 ($9.5) billion in 2001–2002 which represents 48.2% of the country’s total investment. In 2001–2002, the construction sector employed an estimated 1,550,000 employees, which corresponds to 16.2% of employment in the commodity sector and 8.3% of grant total employment.

The quality philosophy is better suited for the Egyptian business environment than the traditional management systems that did not succeed quite well because the Egyptians did not accept it as a western, purely materialistic approach (Abdel-Razek 2000). On the other hand, TQM with its different characteristics like principles and loyalty, makes it easier to guide organizations into it. It is easier to guide organizations in Egypt towards a spiritual philosophy rather than a materialistic one; religion is a powerful motive in Egypt.

The agriculture nature of Egypt has many effects on the Egyptian character. It developed their sense of dependency, leadership chain, imperialism, and lack of importance of time. Even though it seems to have bad qualities it also has good ones such as believing in the leader, loyalty to family, tribes, and cooperation in facing disasters. In addition, the continuous change of the ruling chain, imperialism, and lack of importance of time. Even though it seems to have bad qualities it also has good ones such as believing in the leader, loyalty to family, tribes, and cooperation in facing disasters. In addition, the continuous change of the ruling political changes caused management to lose its flexibility and also caused a much more passive attitude as well as fear of responsibility.

Therefore, by comparing these qualities with the Japanese culture which helped in the success of applying TQM, the concept of TQM can be applied within the Egyptian construction industry. However, it should be accomplished by avoiding the bad qualities through training and changing the traditional managing culture.

Resistance to TQM in Construction

Total quality management implementation problems (within construction and engineering) generally result from the fact that these industries are different from the manufacturing industry; the industry that has most effectively utilized TQM (Kupernas et al. 1996). The construction industry has a large number of organizational collapses, especially during a downturn in the economy (Sommerville and Robertson 2000). Therefore, commitment toward TQM policies that may take several years to provide “pay-offs” may be considered a misdirection of resources. Teams specially formed for a project may cease to work after contractual obligations end (Pheng and Teo 2004).

Moreover, many contractors consider quality program as extra cost, but little realize that it is the nonconformance to quality that is expensive. The sources of costs associated with the nonachievement of quality include the cost of rework, waste, errors, customer complaints, budget deficiencies, and schedule delays.

Methodology and Analysis

The research presented in this paper has been based on structured interviews proceeded with a detailed questionnaire sent two weeks prior to each interview. The interviews with the management representatives of two contractors working in Egypt were conducted in the summer of 2006. Each interview has been followed by a site visit to one of the contractors’ sites. The questionnaire consists of three sections. The first section covers questions intended to reveal the corporate profiles of the firms. The second section includes the perceptions of firms about TQM implementation. The third section consists of general questions covering the experience and obstacles facing the Egyptian construction industry to effectively imply the quality policies. By analyzing the data excluded from the interviews and site visits, one new model has been derived to appropriate the implementation of TQM in the Egyptian construction industry.

Background of Case Studies

Two construction companies working in the Egyptian field were studied. The first is a local construction company while the second is a Japanese contractor that both have been interviewed in Egypt and in Japan as well. The case studies aim to examine how each organization practices TQM and what tools have been used to assist them. The research in this study made use of interviews and site visits to both contractors’ sites.

Contractor A

Contractor A is a local G2 construction company. (Note: construction companies in Egypt are registered with the Egyptian Union of Building and Construction Contractors in one of seven financial categories. These range from G7, the smallest, to G1 the largest financial category.) Contractor A is known for its high quality standards in building projects. The personnel interviewed was the project department manager who has worked for Contractor A for seven years.

By this time, Contractor A has already obtained the certificate of ISO 9001:2000 standard. The project department manager agreed that certification to the ISO 9001:2000 standard helps in facilitating continual improvement to respond more positively toward client needs and expectations. However, he admitted that the reason behind ISO 9001:2000 certification was largely motivated by international requirements and not because it helps in TQM implementation in the first place.

Contractor B

Contractor B is a G1 Japanese contractor who has been involved in local construction projects for more than 25 years. The General Manager of the Egypt District Office, who has worked for the firm for more than 15 years, was interviewed for this case study. In addition, one of the executive members of the steering committee, who worked for the firm for more than 30 years, was interviewed in the main headquarters in Japan. Contractor B is one of the six Japanese contractor giants, and has previously won...
several quality awards. Contractor B was founded in the 19th century and quickly grew to become an industry leader in the field of construction, where they have remained as such ever since, headquartered in Tokyo. Contractor B ranks as one of the top construction firms in the world.

**History of Total Quality Management Implementation**

**Contractor A**

Ten years ago, Contractor A started to implement their quality management policy in order to fulfill the requirements of ISO standards, beginning with the ISO 9001:1994 standard which focused on individual quality elements, and was followed by the new ISO 9001:2000 standard that helps to facilitate continual improvement. However, the project department manager added that much work is still needed concerning the continuous improvement phase in the construction process.

He added that in order for the company to achieve quality objectives, he established a steering committee that regularly meets once every two weeks. The committee members represent the chief executive officer and the department head managers. The steering committee is responsible for establishing policies for every area that needs guidance in the quality effort. However, particular attention is paid to revise the undergoing projects and to solve any problems arising between different departments. Moreover, the steering committee also reduced traditionally structured operational levels and unnecessary positions within the organization. This can be seen in the lean organization chart of Contractor A in Fig. 1. Three years ago, the company appointed an external consultant to review the quality procedures being performed either on site or in the head office. The consultant is responsible for training the staff to cope with the ISO 9001:2000 standard requirements. The project manager believed that hiring an external consultant would accelerate the company transformation toward the total quality management phase.

**Contractor B**

Since Contractor B is a branch office of a large Japanese firm, TQM was implemented precisely from the start. In Japan sent technical staff of all levels to help with the implementation of the quality policy initially. The locals then learned from the Japanese with on-the-job training plus sending local engineers to Japan for training courses and other routines. When receiving a new tender, Contractor B usually sends three to four Japanese staff directly from Japan including a project manager, an administrative manager, a site engineer, and a technical specialized engineer.

This way, Contractor B ensures that the quality policy is accurately performed. The successful implementation of TQM was largely due to the commitment of the top management. Employees are aware of their responsibilities and obligations, including aspects of TQM. The organization gives the project manager the full authority to handle the cost and the quality matters of the project but with an obligation to ensure that the budget is not exceeded.

**Overview of Quality Policies Applied by Two Contractors**

**Contractor A**

Although the quality policy of Contractor A reflects their perseverance to perform any assigned job on time, within the allocated budget, and to the specifications set for the job, Contractor A still faces the following:

1. The full commitment of the CEO toward the quality management policies is not sufficient; therefore, the implementation of TQM is still limited throughout the company;
2. The ISO 9001:2000 standard requirements have been achieved by only 70%, which is clear due to the number of the nonconformity reports;
3. The consultant training is directed mostly to site engineers and is focused on technical matters. The training does not include the middle and top managers. In addition, the training sessions are not enough at this stage. The training system is not well specified toward the company requirements;
4. There is no clear data collection system. The cost of waste and defect works are not systematically recorded which means that the problems could be repeated;
5. The quality level varies between projects and it is mainly determined by the consultant specification; and

---

Fig. 1. Chart of Contractor A
6. Most of the site meetings are not conducted according to a schedule or detailed agenda. The number of these meetings seems to be insufficient when compared with the Japanese sites.

**Contractor B**

It was clear that the quality standard is maintained even on overseas projects. The main features recognizing the quality policy of the Japanese contractor are:

1. They have project management manuals for worldwide application. The manual on construction methods is distributed to every project manager overseas, who in turn prepares supplementary technical manuals for supervisors and other site engineers;
2. The project manager is responsible for clarifying all construction details to the site engineers and, in some cases, directly to the site operatives;
3. The Headquarter is responsible for providing all technical backup needed for the project. Management focus is shifted from the head office to the site in advance of the actual construction work. Once work commences, all tasks including material purchasing, payments, labor engagement, and design work are carried out on site;
4. They spend a lot of time studying the specifications of the contract in order to be fully aware of any details and to finish the project exactly as specified in the contract. Material quality and construction activities are constantly monitored;
5. They have a specified list of subcontractors that they have worked with before. It should be noted that this list is unchangeable unless there is a new scope of work and a need to deal with new subcontractors; and
6. Time control (as with cost and safety) is achieved through a consistent series of meetings: daily morning meetings; daily afternoon coordination meetings; weekly coordination meetings with M&E subcontractors; weekly coordination meetings with nominated subcontractors; weekly management meetings with section managers; weekly design coordination meetings; weekly supervisor meetings; and biweekly logistic meetings.

**Some Features of Japanese Construction Industry That Could Be Implemented in Egyptian Field**

1. The close working relationship between government and business has contributed to the success of the Japanese construction industry. The segments of industry that are targeted are supported by grants, tax relief, tariff protection, and market sharing agreements. Egyptian construction companies can only benefit if the government reviews their policies;
2. Research and development in Japan can be distinguished from work carried out in other countries in a number of ways. Japan is one of the few countries in the world where the major construction companies invest heavily in research and development;
3. There appears to be real competitive advantage over western companies in the pattern of shareholder relations in Japanese companies. Management is freed from the need to constantly improve the earnings per share. In Japan the system encourages the manager to take a long-term view (Haley 1994);
4. Part of the Japanese success is attributable to the form of building contract used and the contractual relationship achieved with the client, the subcontractors, and the suppliers. The Japanese are not normally restricted to the written terms and conditions. In addition, it is important for both parties of a contract to sustain the good and long-term relationship between them. The Japanese do not produce detailed claims; the contract is more likely to be adjusted and problems are solved by gentle negotiation; and
5. A feature which undoubtedly contributes to a successful project is the relationship between the main contractors and the subcontractors. They work together on a regular basis. Each main contractor has a limited number of subcontractors classified by districts in Japan.

**New Proposed Model of TQM Implementation**

The new proposed model for implementing TQM is explained in Fig. 2. This model consolidates research findings and suggests a routine to be followed for implementing TQM. The model consists of the following steps: commitment by management; orientation; planning of the program; training on TQM; conducting quality projects; improving jobsite quality; and measuring results. The company employees would be trained on TQM concepts while performing executive reform procedures to improve the job site quality. Meanwhile quality improvement projects shall be started to enhance the total quality of the company. The new model addresses the jobsite reforms at an early stage.

**Planning of Program**

In order to apply TQM, the company has to rearrange its organizational structure and establish a steering committee chaired by the top manager to plan and guide the TQM process. The committee would be responsible for the following: (1) establishment of policies guiding the quality efforts; (2) preparation of quality manuals covering all companywide applications; (3) development of an action plan for implementing the program; (4) selection of initial quality improvement projects and teams; (5) establishment of a system to get accurate feedback on the program success; and (6) being visible and available to all employees.

**Training on TQM**

Training topics typically include quality awareness, teamwork, leadership, interpersonal communication, job-related technical skills, and problem solving techniques. In addition, quality improvement teams often receive instructions as a unit. Topics include interpersonal communication and teamwork to help them work together. Companies that lead in quality management provide five days or more of training per year for each employee. Among the essential tools for the successful adoption and application of TQM are: flowcharting, client-feedback surveys, brainstorming, force-field analysis, and cause-effect diagrams.

**Conducting Quality Projects**

Conducting quality improvement projects is the core of the TQM process. The goal is to promote a way of thinking and behaving throughout the organization to foster a continual search for ways of improving the quality of the work. The steering committee will strive for all departments to brainstorm and submit initial quality improvement projects. The team members will represent all departments (to break down barriers between groups) including de-
sign and technical engineers, project managers, technicians, and accountants. Meeting time will be once a week (1.5–2h)/lunch time. Time is split 50:50 with the company. The team process is iterative, not linear. The team will cycle through three stages: getting started, working together, and reaching an agreement, at least twice.

**Improving Jobsite Quality**

In order for successful TQM implementation in an engineering and construction company, jobsite quality improvement should be applied parallel to other organization structure reforms. The jobsite improvement should be directed according to the following:

- (1) design and contractor selection phases;
- (2) preconstruction sessions including owner, designer, general contractors;
- (3) jobsite orientation held for all employees, including subcontractors;
- (4) periodical daily and weekly planning meetings to thoroughly review schedule, cost, and safety measurements;
- (5) provision for recognition of quality accomplishments on the jobsite;
- (6) development of indicators of jobsite quality; and
- (7) better job reviewing shop drawings in a timely and thorough manner.

**Measuring Results**

There are several general measurements that can be used to measure the overall impact of the TQM process on a firm. Among the relatively short-term measurements are:

- (1) number of schedule milestones missed;
- (2) amount of overtime by staff;
- (3) cost of rework after final check; and
- (4) number of inconsistencies for different items.

Among the relatively long-term measurements are:

- (1) client and consultant perception of project quality;
- (2) ratio of final construction cost to estimated construction cost; and
- (3) claims, settlement, and litigation expense which are considered relatively long-term measurements.

**Conclusion and Recommendations**

TQM provides a valuable philosophy for use in the construction industry. In this paper, a comparative analysis of two construction contractors working in the Egyptian construction field emphasized the applicability of TQM implementation in the Egyptian construction industry. The Japanese contractor has been successful in adopting TQM practices in his domestic and international operations while the Egyptian contractor appears to lack commitment and perseverance in his overall quality policy.

By analyzing the data excluded from the interviews and site visits, a new model has been derived to appropriate the implementation of TQM in the Egyptian construction industry. In addition, the paper provides some tips that could be learned from the Japanese construction industry.

Egyptian construction companies can only benefit if the government reviews its policies toward quality and supports the construction segments by grants, tax relief, tariff protection, and market sharing agreements.

Finally, in order to fully implement TQM in the construction industry, the government should adopt new reforms toward quality policies. Moreover, the three construction parties: the contractor, the consultant, and the owner, should work together to emphasize on the quality concepts in the construction projects.

**References**


