

## **BARRIERS AND BENEFITS OF TOTAL QUALITY MANAGEMENT IN THE CONSTRUCTION INDUSTRY: EVIDENCE FROM TURKISH CONTRACTORS**

**Gul Polat**  
Istanbul Technical University  
Istanbul  
Turkey

**Atilla Damci**  
Istanbul Technical University  
Istanbul  
Turkey

**Yalcin Tatar**  
TAV Construction  
Istanbul  
Turkey

### **ABSTRACT**

*Implementation of Total Quality Management (TQM) in the construction industry promises several benefits such as more repeat customers, reduced rework, improved employee job satisfaction, higher productivity, improved budget performance, improved schedule performance, better chances in bidding process with pre-qualification, increased market share, etc. Yet, there are several barriers to the extensive deployment of TQM in the construction industry. The construction industry is different from other industries in many aspects such as one one-of-a-kind product, lack of top management's leadership and support, unqualified workforce, lack of effective teams, etc. It is commonly believed that TQM cannot be successfully implemented due to these peculiarities. Moreover, many construction companies consider quality programs as extra cost because of the fact that they are not totally aware of that the cost of nonconformance to quality is much higher than that of operating a quality program. This paper aims to investigate the potential benefits derived from implementing TQM and barriers to the extensive implementation of TQM in the construction industry. For this purpose, a questionnaire was designed and delivered to 120 large-scaled Turkish contractors, who are the members of Turkish Contractors Association (TCA). Out of these 120 contractors, 80 returned duly completed questionnaires. The survey results revealed that contractors are aware of the benefits of TQM implementation but there are still several barriers to implementation. According to the survey results, lack of top management's support, commitment and leadership are the three most important barriers to TQM implementation.*

**Keywords:** total quality management, construction industry, survey.

### **1. INTRODUCTION**

The chronic problems of the construction industry are well known: low productivity, poor health and safety, inferior working conditions, and inadequate quality [1]. Great amount of time, money and resources, both human and material, are wasted each year in the construction industry because of inefficient or non-existent quality management procedures [2]. Similar problems had also been encountered in the manufacturing industry, yet great performance improvements have been attained in manufacturing in the last decades because of successful quality management programs such as Total Quality Management (TQM) [3].

TQM is a customer-oriented and quality focused management philosophy for achieving continuous improvement [4]. The roots of TQM can be traced back to the early 1920s, when Walter Shewhart of Bell Laboratories first applied statistical process control to measure variance in production systems [4,5]. This concept was further developed in the Japanese manufacturing industry in the 1940s led by American quality gurus such as Deming, Juran, and Feigenbaum. In the 1950s, the Japanese adopted, developed and adapted the methodologies introduced by the Americans, begun to develop distinctive approaches suited to their own culture led by Japanese quality gurus such as Ishikawa, Taguchi and Shingo, and achieved considerable performance improvements. An awareness of quality in western countries increased in the 1980s with a new wave of western quality gurus such as Crosby, Peters and Møller [6,7].

TQM refers to a new concept in which the focus is shifted from quality of products to quality of all issues within an organization. In other words, it compasses all aspects of business, makes quality a strategic objective, and requires an integrated effort among employees at all levels to increase customer satisfaction by continuously improving performance [2]. TQM aims to establish quality enhancement as an organizational dominant priority and improve organizational effectiveness through eight principles, which include: 1) top management leadership, 2) customer management, 3) people management, 4) supplier management, 5) quality information management, 6) process management, 7) learning, and 8) continual improvement [8].

The process of producing quality work and improvement must start with the leadership, commitment and involvement of the top management as it is responsible for creating an organization culture for quality, defining organizational quality values and goals, and providing necessary resources and infrastructure for operating a quality management system. Customer satisfaction is the key principle of TQM. All goods and services should fulfill the customer's needs. For this purpose, communication and feedback processes on the customer's concerns and satisfaction should be developed. TQM adopts the system approach to management, which involves collaboration between all parties including employees at operational and managerial levels, customers, suppliers, etc., as the performance can be improved through partnership among the parties and creating teamwork environment. Resources play critical role in producing quality products. Therefore, developing interdependent and mutually beneficial relationships with suppliers/subcontractors increases the ability to create value. Management of an organization involves making sound decisions to achieve improvement and solve problems based on the analysis of factual data and information. It can be achieved by developing quality information systems. Several interrelated and interdependent processes are carried out in a company. The quality of final product and/or service provided is highly dependent on the quality of these processes. A company should adopt a process management approach, which involves inclusion of quality measures in the processes and continuous monitoring and control of these processes, in order to eliminate or reduce the root causes of variances. Developing an organizational learning mechanism enables companies to learn from their past mistakes and ensures that those mistakes are not repeated. In this respect, learning is vital in improving the existing processes. The ultimate goal of TQM is achieving continuous improvement of technical and managerial processes within an organization in order to meet the mounting expectations of the customer and thereby create competitive advantage [8].

The implementation of TQM in the manufacturing industry brought about increased productivity, decreased product cost and improved product reliability [2]. As a result of successful TQM implementations in the manufacturing industry, the construction industry has turned to the manufacturing industry as a source of innovation, and endeavored to adopt and implement this concept in the construction industry. It is commonly acknowledged that

implementation of TQM in the construction industry promises several benefits such as more repeat customers, reduced rework, improved employee job satisfaction, higher productivity, improved budget performance, improved schedule performance, better chances in bidding process with pre-qualification, increased market share, etc. [3,4]. In spite of the benefits that it promises, TQM implementation in the construction industry is not easy due to the peculiarities of the industry such as one one-of-a-kind product, lack of top management's leadership and support, unqualified workforce, lack of effective teams, etc. [2,8]. Moreover, many construction companies still consider quality programs as extra cost because of the fact that they are not totally aware of that the cost of nonconformance to quality, i.e., the cost of rework, waste, errors, customer complaints, budget deficiencies, and schedule delays, is much higher than that of operating a quality program [4].

Although TQM has been widely implemented in the Japanese construction industry since the 1970s and in the U.S. construction industry since the 1990s, it has not been implemented widely and successfully in the Turkish construction industry [9]. The main objective of this study is to investigate the potential benefits derived from implementing TQM and barriers to the extensive implementation of TQM in the Turkish construction industry. For this purpose, a questionnaire was designed and conducted among 80 large-scaled Turkish contractors, who are the members of Turkish Contractors Association (TCA).

## **2. RESEARCH METHODOLOGY**

This paper aims to investigate the potential benefits derived from implementing TQM and barriers to the extensive implementation of TQM in the construction industry. For this purpose, a questionnaire was designed and delivered to 120 large-scaled Turkish contractors, who are the members of Turkish Contractors Association (TCA). Out of these 120 contractors, 80 returned duly completed questionnaires. It corresponds to a response rate of 67%. The contact persons were top managers or quality management representatives.

Questions 1 to 8 record the general characteristics of the respondent company, such as number of technical and administrative personnel, total turnover in international and domestic markets, type of work (i.e., building, civil, industrial, or other type), services (i.e., design, engineering, and contracting) provided by the respondent company, client profile, existence of ISO 9001: 2008 Quality Management System certificate, and existence of any quality management system other than ISO 9001: 2008 Quality Management System certificate. Questions 9 and 10 were asked to identify the potential benefits that can be derived from implementing TQM and barriers to the extensive implementation of TQM in the construction industry.

## **3. FINDINGS AND DISCUSSION**

Table 1 summarizes the general characteristics of the respondent construction companies. Responses were drawn from small-scaled construction companies employing less than 50 technical and administrative personnel to large-scaled construction companies employing over 500 technical and administrative personnel. The respondent companies range from those with total turnover between \$0–50,000,000 to those with over \$500,000,000 in both international and domestic markets.

Overall, 74% of the respondents were involved in building work alone or building work in addition to civil, industrial or other types of work, while the remaining 26% were not involved in building activities. All of the respondents served as construction contracting companies as well as providing design and engineering services. As shown in Table 1, 19% of the respondent companies' clients were from the private sector and 95% of the respondent companies utilized ISO9001:2008 QMS. 75% of the respondents who did not have ISO9001:2008 QMS certificate utilized another quality management system.

Table 1. General characteristics of respondents

Characteristic	Percentage of Respondents
Number of technical and administrative personnel	
1-49	18%
50-99	22%
100-499	30%
>500	30%
Total turnover in international markets (\$ Millions)	
<50	23%
50-100	5%
100-500	32%
>500	40%
Total turnover in domestic markets (\$ Millions)	
<50	11%
50-100	8%
100-500	29%
>500	52%
Type of work	
Building	74%
Civil	75%
Industrial	63%
Other	10%
Services provided	
Design	24%
Engineering	36%
Contracting	100%
Client profile	
Public sector clients	17%
Private sector clients	19%
Both public and private sector clients	65%
Existence of ISO9001:2008 QMS certificate	
Yes	95%
No	5%
Existence of any QMS other than ISO9001:2008 QMS certificate	
Yes	75%
No	25%

Question 9 was asked to identify the potential benefits that can be derived from implementing TQM in the construction industry. Table 2 shows the importance that contractors attach to each potential benefit of implementing TQM in the construction industry in a descending order. The survey results indicate that out of 16 potential benefits only “better chances in winning contracts in domestic markets” scores 2.86, which is lower than “very important”, whereas the remainders score higher than “very important”. “Better customer satisfaction / more repeat customers” scores 3.64, which is close to “critical”. “Reduced rework” scores 3.50 and ranks closely behind “better customer satisfaction / more repeat customers”. “Improved employee job satisfaction” and “better chances in winning contracts in international markets” score 3.08 and 3.18 respectively, which are slightly higher than “very important” (Table 2).

Although these findings indicate that contractors are highly aware of the potential benefits that TQM implementation promises in the construction industry, a study by Turk (2006) reveals that TQM has not been implemented widely and successfully in the Turkish construction industry.

Table 2. Benefits of implementing TQM in the construction industry

Potential Benefits	Average Score <sup>1</sup>
Better customer satisfaction / more repeat customers	3.64
Reduced rework	3.50
Reduced nonconformities	3.43
Improved relationships with architects /engineers / subcontractors	3.36
Higher productivity	3.36
Reduced waste of resources (e.g., labor, material, money, etc.)	3.34
Reduced cost of poor quality	3.33
Increased competitive advantage over competitors	3.33
Success in realizing long-term strategic plans of the company	3.33
Better chances in bidding process with pre-qualification	3.28
Improved budget performance	3.24
Improved schedule performance	3.23
Increased market share	3.20
Better chances in winning contracts in international markets	3.18
Improved employee job satisfaction	3.08
Better chances in winning contracts in domestic markets	2.86

Question 10 was meant to find out the barriers to the extensive implementation of TQM in the construction industry. The importance that contractors attach to each barrier is presented in Table 3 in a descending order. Out of 18 potential barriers only “incompatibility of standardized quality management systems with the construction industry” scores 1.91, which is slightly lower than “important”, 14 barriers score higher than “important”, and 3 of them, namely “lack of top management commitment”, “lack of top management support” and “lack of top management”, score higher than “very important”. Based on the survey results, top level managers do not adequately believe in the importance of TQM implementations, therefore, they do not provide necessary resources to develop and utilize a QMS, lead the entire process, and motivate the employees in involving TQM implementations.

Table 3. Barriers to the extensive implementation of TQM in the construction industry

Barriers	Average Score <sup>1</sup>
Lack of top management commitment	3.19
Lack of top management support	3.13
Lack of top management leadership	3.06
Difficulties in mapping processes and developing standardized procedures	2.85
Difficulties in taking corrective and preventive actions	2.79
Difficulties in employing statistical quality control techniques in construction process	2.72
Lack of workforce qualified in quality management implementations	2.70
Lack of effective teams / team building skills	2.67
Difficulties in including quality measures, continuously monitoring and controlling construction processes	2.61
Need for employing skilled workforce	2.58
Difficulties in developing quality information systems in construction process	2.52
Difficulties in quantifying cost of poor quality	2.42
Increases in paperwork	2.41
Difficulties in finding workers, who can claim to be experts in both construction and quality	2.36
Need for conducting continuous training programs for employees	2.33
Difficulties in quantifying cost of quality	2.32
High cost of developing and utilizing a quality management system	2.05
Incompatibility of standardized quality management systems with the construction industry	1.91

<sup>1</sup> Scale 0-4: 0 = unimportant, 1 = slightly important, 2 = important, 3 = very important, 4 = critical.

The next three barriers, namely “difficulties in mapping processes and developing standardized procedures”, “difficulties in taking corrective and preventive actions” and “difficulties in employing statistical quality control techniques in construction process”, score slightly lower than “very important” and they are all obstacles stemming from one-of-a-kind product nature of construction projects. Top level managers’ apathy may result from their belief in that implementing TQM in the construction process is very difficult as construction operations are unique and non-repetitive and the construction process cannot be standardized. “Lack of workforce qualified in quality management implementations”, “lack of effective teams / team building skills”, and “need for employing skilled workforce” score 2.70, 2.67 and 2.58 respectively, which are higher than “important” and close to “very important”. These barriers stem from the lack of expertise in TQM concept and unqualified workforce problem prevailing in the construction industry. This finding is reasonable given the fact that many construction workers are untrained, under-qualified, unskilled and inexperienced in Turkey as well as in many other developing countries [10]. It was encouraging to see that none of these barriers score higher than “very important” and “high cost of developing and utilizing a quality management system” is not considered to be one of the most important barriers to the extensive implementation of TQM in the construction industry.

#### **4. CONCLUSIONS**

The construction industry suffers from several problems such as low productivity, poor health and safety, inferior working conditions, and inadequate quality. TQM can be a solution to these problems. However, there are several barriers to the extensive deployment of TQM in the construction industry. This study investigated the potential benefits and barriers to the extensive implementation of TQM in the construction industry through a questionnaire survey. The survey results revealed that contractors are aware of the benefits of TQM implementation but there are still several barriers to implementation. Lack of top management’s support, commitment and leadership are the three most important barriers.

#### **5. REFERENCES**

- [1] Koskela, L.: Lean production in construction, Lean Construction, Ed. Alarcon, L., Balkema, Rotterdam, 1997.
- [2] Arditi, D.; Gunaydin, H. M.: Total quality management in construction, International Journal of Project Management – Pergamon, ISSN 0263-7863, Vol. 15, No. 4, 1997, pp. 235-243.
- [3] Hoonakker, P.; Carayon, P.; Loushine, T.: Barriers and benefits of quality management in the construction industry, Total Quality Management – Routledge, ISSN 1478-3363, Vol. 21, No. 9, September 2010, pp. 953-969.
- [4] Elghamrawy, T.; Shibayama, T.: Total quality management implementation in the Egyptian construction industry, Journal of Management in Engineering – American Society of Civil Engineers, ISSN 0742-597X, Vol. 24, No. 3, July 2008, pp. 156-161.
- [5] Dale, B. G.: Managing Quality, Blakwell Publishing Ltd, Oxford, 2003.
- [6] Besterfield, D. H.; Besterfield-Michna, C.; Besterfield, G. H.; Besterfield-Sacre, M.: Total Quality Management, Pearson Education Inc., 2003.
- [7] Naidu, N. V. R.; Babu, K. M.; Rajendra, G.: Total Quality Management, New Age International Publishers, Inc., New Delhi, 2006.
- [8] Koh, T. Y.; Low, S. P.: Empiricist framework for TQM implementation in construction companies, Journal of Management in Engineering - American Society of Civil Engineers, ISSN 0742-597X, Vol. 26, No. 3, July 2010, pp. 133-143.
- [9] Turk, A. M.: ISO 9000 in construction: An examination of its application in Turkey, Building and Environment – Elsevier, Vol. 41, No. 4, April 2006, pp. 501-511.
- [10] Kazaz, A.; Manisali, E.; Ulubeyli, S.: Effect of basic motivational factors on construction workforce productivity in Turkey, Journal of Civil Engineering and Management, Vol: 14, No. 2, 2008, pp. 95–106.