Critical Factors Affecting the Implementation of Total Quality Management in the Construction Industry in U.A.E

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Received: 10 February 2015 Accepted: 3 March 2015 Published: 15 March 2015

Abstract

The Purpose of the paper is to examine the most critical and important factor which will affect the implementation of Total Quality Management (TQM) in the construction industry in the United Arab Emirates. It also examines the most effected Project outcome from implementing TQM. A framework was also proposed depending on the literature studies. The method used in this paper is a quantitative study. A survey with a sample of 60 respondents was created and distributed in a construction company in Abu Dhabi, which includes 15 questions to examine the most critical factor that will affect the implementation of TQM in addition to the most effected project outcome from implementing TQM. The survey showed that management commitment is the most important factor in implementing TQM in a construction company. Also it showed that Project cost is most effected outcome from the implementation of TQM. Management commitment is very important for implementing TQM in any company. If the management loose interest in quality then everyone in the organization will do so. The success of TQM will depend mostly on the top of the pyramid. Also cost is reduced and money is saved when the project team implement TQM. While if no quality measures are present within the team, the project will suffer a commercial failure. Based on literature, more factors can be examined and added to the model. In addition, more construction companies could be surveyed in order to obtain more accurate results. Also this study could be conducted outside the United Arab Emirates for further enchantment.

Index terms— construction project, total quality management, management commitment, cost, theoretical framework.

1 I. INTRODUCTION

HE United Arab Emirates has a high developing economy which depends on oil production. This economic growth is spreading into other vital sectors such as manufacturing, tourism, banking, logistics, finance and education. An obvious construction boom has been experienced in the UAE for the past decade to support the developing economy and as per 2007 reports, the construction industry in UAE is valued at $221 billion which is the highest in the region [8].

The construction industry around the globe faces almost the same problems such as bad workmanship, time delays and over cost [3]. Such problems in a country like The United Arab Emirates with a high construction industry value will cost construction firms millions. According to **??**11], construction is the backbone for any economy or infrastructure. Unless each company in the construction sector initiates changes within their own organization, the industry problems will be carried on over and over [7].

This paper will focuses on the implementation of Total Quality Management (TQM) in a construction organization within the U.A.E market and the factors which affect it. The concept of TQM develops the

traditional view of quality from looking only at the quality of the final product to the quality of the whole process [2]. The aspect of quality is becoming a vital requirement for clients in UAE, so any enterprise that implements TQM may have a competitive advantage in the market.

The objective of this paper is to test and discuss the most critical success factors effecting TQM implementation along with the outcomes of implementing it. A literature review section will show how the factors were derived then a questionnaire of fourteen questions were developed is to examine those factors. The data obtained from the study will show the most important factors in implementing TQM in the construction industry.

The importance of this study is to provide a better understanding of Total Quality Management in the UAE construction industry. Most of the researches and articles talk about TQM implementation in many parts of the world such as USA, Hong Kong, Ghana, South Africa and Australia. UAE has different laws and working environment from other countries so the study will be helpful for UAE based construction companies.

The following research questions will be looked upon throughout the paper:

? What is the most important factor that will affect the implantation of TQM in a construction company in UAE? ? What is most effected aspect in the performance of a construction project the U.A.E after taking into consideration implementing TQM?

2 II. LITERATURE REVIEW

This section will provide a clear definition of TQM and all related variables that impact its implementation. Also the quality and performance problems of the construction industry will be discussed and how TQM will contribute for solving those problems. The aim of the literature review is to derive the factors from previous studies and use them in this paper.

3 a) Total Quality Management (TQM)

According to [9], TQM is the adoption of quality assurance through all levels of an organization. Quality assurance is the process of ensuring that errors do not occur in the first place which is referred to 'get it right first time every time' **??**9]. Total quality management is a broad management methodology which aims to satisfy and delight customers [1]. Also TQM works horizontally across all departments through all employees top to bottom in an organization **??**12]. TQM has been defined by the international Academy of the American Society for Quality as [3]:

'The management approach of an organization centered on quality, based on the participation of all of its members and aiming at long-term success through customer satisfaction and benefits to all members of the organization' According to [3] the goal of TQM is to achieve:? Cost effectiveness ? Defect free work ? Customer satisfaction

So many researches and articles talk about TQM and its elements since the 1980s and 90s. Defining the elements varies from author to author and the most recent one which summarizes most of the articles since the 80s are [3]:? Leadership and Management Commitment ? Training ? Communication ? Teamwork ? Customer Satisfaction ? Continues improvement ? Empowerment

It can be concluded that TQM is mainly focusing on customer satisfaction and is the implementation of quality assurance and quality control throughout the entire segment of any organization. Please submit your manuscript electronically for review as e-mail attachments. When you submit your initial full paper version, prepare it in two-column format, including figures and tables.

4 b) Quality and Performance factors in Construction industry

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In the construction industry, consultants, contractors, specialists, subcontractors and engineers have their own professional practices which may affect? Staff's mobility ? Diversity of projects ? Geographical dispersion ? Contractual relationships ? Frequent prototyping of projects ? Unnoticed delicate forms of waste.

Many researches discussed the success factors in construction projects and derived many variables influencing the quality of buildings. Reference [6] identified important factors and are ranked below in their order of importance: ? Rectification works due to rejection of workmanship (55%). ? Conflict between time, cost and quality (25%).

? Communication of quality standards (15%).

? Incompetence of staff (5%).

5 c) Factors affecting the implantation of TQM in construction industry

There are varieties of factors that affect the implementation on TQM positively or negatively. Reference [4] researched the implementation factors and found out the following success ones ranked in their order of importance:? Management commitment and involvement ? Customer focus ? Well-developed planning ? Participative management style ? Continuous improvement measurements ? Workers trained in TQM

The results above show clearly that Management commitment and involvement are the key factors for a successful TQM implementation. Managers must provide the initiative to apply TQM and must support quality programs [4]. Meanwhile workers involvement is rare and this must be solved because labors are the main source for a construction company.

As shown in [4], some critical barriers in implementing TQM were found and are listed below ranked in their order of importance:

? Too much paper work the building process. The construction industry is not like manufacturing which makes TQM more challenging. The construction industry is a one-time process and is unique in the following ways [3]:

? Lack of interest within subcontractors and suppliers Some barriers in implementing TQM were also identified were one of the major difficulties is the traditional way of accepting tenders and the lowest price [3]. Also the long term implementation of TQM can sometimes lead to major problems like the sudden change of the market [3]. Also changing the organization's culture is a difficult task in order to implement TQM [3]. Another study was made on implementing TQM in a company located in India, and demonstrated the following obstacles [1]:

? Lack of knowledge regarding TQM ? Doubts about management intentions ? Lack of commitment especially in the managerial level ? Not knowing the effectiveness of TQM

6 d) Impact of TQM on Construction

In order to understand the importance of applying TQM, the benefits of TQM to an organization should be known. Reference [3] researched the benefits of applying TQM in some Australian construction organizations and reported the following:

? The Process starting from design to delivery is being more controlled. ? Reduced Cycle time.

? Reduced goods damaged.

? Reduced delivery time.

? Better measurement of performance ? Better customer satisfaction.

Also reference [5] reported in their research other benefits of implementing TQM which included:? Reduction in rework ? Client satisfaction ? Better staff morale ? Better measurement of performance ? Successful bidding

Many articles and studies have shown almost the same results of implementing TQM such as better work performance, customer satisfaction and reduction in cost. The decision of implementing TQM is to understand clearly how it works and set a plan to over pass the barriers. Construction business is different of the manufacturing one so more studies must be conducted on how to apply TQM on the construction industry globally.

This paper as discussed is more concerned on the factors that affect TQM implementation and how Project outcomes are affected by it. The following research questions are considered in this paper: RQ1: What are the most influencing factors that affect the implantation of TQM in a construction company in UAE? RQ2: What is the impact of TQM on the performance of a construction project in the in U.A.E?

7 III. Framework a) Model

The following model which is presented in Figure 1 will be used in the study. The factors above will be considered as independent variables that will affect directly the TQM implementation in the construction industry in U.A.E as per the literature review. The aim of this paper is to find the most critical factor which will affect implementing TQM either positively or negatively.

8 c) Channel (Moderating variable)

Total quality management is considered the channel for connecting the independent with the dependent variables. In other words TQM will be considered as a moderating variable in the model. The basic role of TQM is to control the factors which affect the performance of construction by reducing the negative effects and empowering the positive ones.

9 d) Dependent Variables

Finally, the three basic outcomes of any project as discussed in most theories talking about TQM are Quality, Cost and time [3]. The outcomes are directly affected by TQM so they are considered dependent variables in the proposal.

? Cost: the total cost of the project, or the cost up-todate against the budget. Also the cost forecast is important since it will help in future planning.

? Quality: the quality of completed job and how much it's error-free.

? Time: time schedule of meeting the milestones and completing the project on time.

10 IV. METHODOLOGY a) Results

A 5-scale 15 questions survey was distributed to 60 employees in a Construction company in which all respondents answered the full survey. Two questions were used for each variable in addition for two questions which asks

about years of experience and level in the company. The following are the demographics of the employees that answered the survey along with the results:

11 b) Analysis

As mentioned the sample size is 60 personnel in which 5 are in the top management, 15 in middle management and 40 for senior employees. One has 5 to 10 years of experience, 18 have 10 to 15 years, 39 have 15 to 20 years and 2 have above 20 years.

12 c) Discussion

The survey didn't contain any errors or missed values in addition to that all the respondents had answered the survey. The study showed that Management Commitment and culture are the most important factor in effecting the implementation of TQM were management commitment is a bit higher in value. Also project cost is found to be the most effected variable from applying TQM. This study will give an idea for management on the factors that they should consider when applying TQM. Top management should take into consideration that their commitment for applying TQM is the key for such strategy. Also they must expect that cost will be reduced in projects that implemented TQM. More research on TQM should be conducted in order to enhance companies' productivity as this paper proved.

13 d) Limitations

The survey was only conducted in one company in the United Arab Emirates. Further studies can involve more construction companies which will enhance the data and introduce new factors which will effect TQM. Also this study can be conducted worldwide since TQM is a global phenomenon and must be merged with every culture on this planet.

14 V. CONCLUSION

This study focused on the factors that effects TQM implementation in a construction organization in the UAE. The objective of the research is to examine the most critical factors affecting the implementation of TQM along with the benefits of applying TQM and how it will affect the cost time quality triangle. A literature review was conducted to understand the concept of TQM and to derive the factors related to the main objective. Then theoretical framework was developed were factors affecting TQM were the independent variables and the project outcomes were the dependent ones.

After knowing the framework, the paper discussed the methodology and how the survey was conducted. The results showed that Management commitment is the most important factor in implementing TQM and that cost will be effected mostly if TQM is applied.

The study at the end proved that the factors derived from previous papers can comply in the U.A.E industry. Further research in more companies could be conducted to derive more factors effecting TQM from inside the UAE market rather than depending on previous researches. [1]

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Figure 1: ?

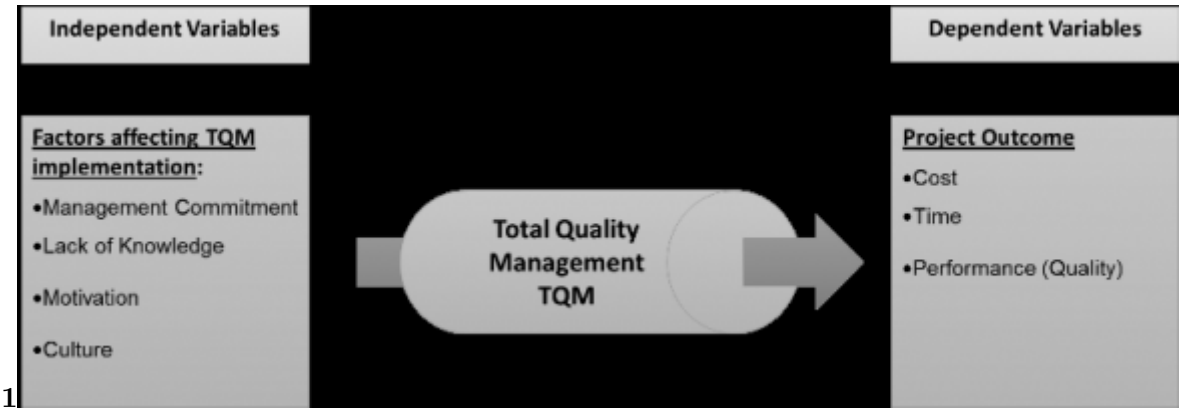

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Figure 2: Figure 1 :

I

Experience	Number
5 to 10 years	1
10 to 15 years	18
15 to 20 years	39
20 and above	2
Total	60

Figure 3: Table I :

II

Level	Number
Top Management	5
Middle Management	15
Senior Management	40
Total	60

Table III : Mean Calculations

Variables	N	Minimum	Maximum	Mean	Std. Deviation
Management Commitment	6	0	1	5	4.76 .721
Knowledge	6	0	1	5	3.05 .594
Motivation	6	0	1	5	3.93 .660
Culture	6	0	1	5	4.53 .769
Cost	6	0	1	5	4.48 .791
Time	6	0	1	5	4.08 .671
Quality	6	0	1	5	4.10 .729

Figure 4: Table II :

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