



Effect of total quality management practices factors on competitiveness

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ABSTRACT

This study investigated the total quality management practices and competitiveness in Saudi Arabia contractors. The effectiveness of total quality management initiatives that result in sustainable competitive advantage and enhanced business performance have been a major subject of interest for business and academia. Total quality management is about continuous organisational success based on customer satisfaction and the contribution of all employees constantly working to enhance organisational processes, services, and products. Thus, a quantitative approach using the survey method was employed. With assistance from the Saudi Arabia Ministry of Municipal and Rural Affairs, survey questionnaires were distributed to selected contractors from across five geographically diverse areas in Saudi Arabia. The collected data were analysed using correlation, multiple regressions. The key findings were the confirmation of significant relationships between all total quality management practices and competitiveness, significant relationships between total quality management practices and quality culture, and a positive relationship between total quality management practices and competitiveness. Furthermore, total quality management practices were found to be able to explain 36.6% of the variance in competitiveness while quality culture explained 12.5% of the variance in competitiveness.

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Introduction

Total Quality Management (TQM) practices in construction industries can be described as the processes that align business performance strategy with business processes to achieve customer satisfaction and product and services quality. The TQM program implementation requires extensive survey research carried out periodically. The rationale is to obtain feedback from the customers regarding the company's performance compared to their competitors measured through employees' attitudes. The findings allow managers to measure the company's performance against the benchmarked standard. TQM implementation is a continuous process for consistent quality improvement on the basis of customer satisfaction needs (Zikmund, 2003). Thus, the expectation is such that the study allows authorities to be aware of the change requirements in the construction industry. Moreover, the study highlights particular TQM practices and culture in the context of Saudi Arabia. In short, the present research attempts to provide empirical evidence concerning the relation between TQM, quality culture and firm competitiveness both for academic and practical consumption.

Competitiveness at the firm level is confined to Porter's five forces of competition – threat of new entrants, bargaining power of suppliers, bargaining power of buyers, strength of the firm against current competitors, and threat of substitutes (Vilanova et al., 2008). Therefore, a competitive firm is considered to be the one possessing a large market share, strong power over its buyers and suppliers, barriers to new entrants, and it has no substitutable products.

Competitiveness is the business firm's capability to leverage its competitiveness in a competitive marketplace by offering products and services in the efforts to attract customers and satisfy them (Fujimoto, 2004). Enterprise competitiveness is the ability of the firms to create development in the market

compared to the ability of other enterprises (Shi-Rong & Guang-kun, 2008).

Competitiveness presents the position of any economic entity – a country, industry, enterprise or household – in comparison with the qualities and activities of other entities. It is a term that has both a narrow and broad definition. In the former definition, competitiveness is investigated in conditions wherein the interests of the entities are at odds; for instance, one entity's achievement hinders the others. In the latter, achievement of one entity does not entail the failure of others to do so.

Competitiveness is a relative concept referring to the capability of a company to sell and provide goods and/or services in a certain marketplace. TQM practices generally result in competitive advantage as evidenced by empirical research (Mellat-Parast & Digman, 2008). Generally created frameworks such as Crosby's 14 Steps (1979), Deming's 14 Prescriptive Points (1982), and Juran's trilogy act as guides for firms to achieve competitive advantage, and specify the beginning of quality or else the assessment of progress (Kumar et al., 1999). TQM is generally popular in the U.S. and in Western Europe and has been implemented in most developing countries (Mohamed & YuanJian, 2008).

Competitiveness is a multi-faced notion and can be observed through varying stages namely country, industry, and company. Competitiveness originates from a Latin word, 'competer,' which means the participation in a business competition in the market. It has become widespread to explain the economic forte of an entity based on its competitors in the worldwide market economy of goods, services, people, abilities, and notions that go through geographical boundaries (Murths, 1998).

Competitiveness at the company level is realized as the firm's capability to produce, design or market products that are better in quality (price and non-price) than the ones offered by competitors (D'Cruz, 1992). To be competitive and to gain

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competitive advantage, main processes like strategic management, human resource, operations management, and technology management should be emphasized. Competitiveness at firm level has been a topic well researched by specialists. The Nations be able to be competitors just if their organizations are competitive. According to Christensen of the Harvard Business School, firms and not homelands, compete in global markets (Porter, 1998). For all competing companies, the environmental factors are similar as research reveals that 36% of the variance in firms' profitability is based on their appearances and events (McGahan, 1999). Additional views advocating company level competitiveness (Prahalad & Hamel, 1990) have concentrated on individual firms along with the strategies they employ on a global scale in addition to their resource positions to facilitate the identification of the actual sources of competitiveness.

In addition, the study identifies factors or characteristics of quality culture and competitiveness of the Saudi construction industry and presents the impact of TQM practices implementation. This can contribute to knowledge regarding TQM diffusion in Saudi organizations. The study's emphasis on TQM practices implementation outcome in the context of Saudi construction sector adds to the literature regarding the effect of the implementation of such practices on the sector's competitiveness. It also determines the part of quality culture as a mediator between TQM practices and competitiveness and contributes to the knowledge regarding the facilitation of TQM practices implementation outcome.

Materials And Method

Conceptual Framework

The conceptual framework is developed to link TQM, quality culture, and competitiveness, based on existing literature. A TQM practice is the independent variable while the dependent variable is competitiveness. In addition, quality culture is the mediating variable in the relationship between TQM practices and competitiveness. Figure 1 below presents the conceptual framework of the present study. Organizations are increasingly recognizing the strategic significance of TQM practices. Thus, this study will examine the inter-relationship between the quality of organization management practices, quality culture, and competitiveness.

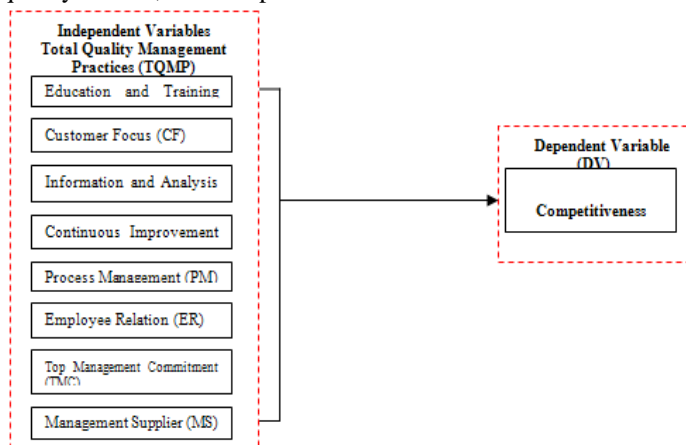


Figure 1: Conceptual framework

Review of literature reveals that the effort expended to synthesize quality management theory from research which was conducted by Anderson *et al.* (1994). They included both managers and academic officers in their study to examine quality. Anderson *et al.* (1994) stated that, the theoretical essence of the Deming management method concerns the creation of an organizational system that fosters cooperation and

learning for facilitating the implementation of process management practices, which, in turn, leads to continuous improvement of process, products, and services, and to employee fulfillment, both of which are critical to customer satisfaction, and, ultimately, to firm survival. Implicit in this theoretical statement is the crucial role that organizational leadership plays in ensuring the success of quality management (1994, p. 473).

The Deming's method of management is encapsulated in his fourteen-point principle (Anderson *et al.*, 1994). Anderson and his colleagues opined that the effectiveness of Deming's management method stems from the efforts of top management to develop learning and cooperative organization in an attempt to allow process and management practices implementation support the organization's survival and customer satisfaction. This process is undergone through sustained employee fulfillment and consistent improvement in processes, products and services (Anderson *et al.*, 1994).

Relationship between TQM practices and Competitiveness

TQM is still considered a strategic source that remains under-searched. Among the existing literature, Powell (1995) carried out an examination of TQM and tested it as a possible source of competitive advantage. Agus and Sagir (2001) found that TQM does have a strong influence upon competitive advantage which eventually results in a significant effect on financial performance. Powell (1995) revealed that TQM practices indirectly affects financial performance and is mediated by competitive advantage. Preliminary evidence seems to indicate that TQM-adopting firms obtain a competitive advantage over firms that do not adopt TQM (Brah *et al.*, 2002; Powell, 1995). Therefore, it can be assumed that TQM on its own normally results in improved competitiveness and should not be utilized with any other strategies or for that matter, any other processes. Hence, the following hypothesis is formulated:

Questionnaire Items and Structure

Prior to organizing the survey questions, it is very important to develop clear and understandable instructions. For this purpose, a cover letter was attached to the questionnaire containing the instructions of its completion. The cover letter contained the purpose of the research, the approximate time to complete it, the sections of the questionnaire, an example of each type of question, and the Likert scale utilized within the questions.

The questionnaire was categorized into four parts, namely, Demographic Questions, Total Quality Managements Practices Questions, Competitiveness Questions, and Quality Culture Questions. According to Neuman (2003), the benefit of questionnaire structuring is to allow respondents to complete it without any problem. Furthermore, the organization of the questionnaire into four sections was to prevent ambiguity and discomfort, as recommended by Neuman (2003). The measurement of the variables is provided in Table 1. The following describes each section:

- **Section 1** had 6 questions soliciting demographic information and questions concerning general information about the participant and the company.
- **Section 2** had 43 questions investigating the effect of Total Quality Management Practices (TQMP) on contractor's Competitiveness.
- **Section 4** had 35 questions, 11 of which investigated the external environment of contractor and 24 questions investigated the contractor organizational resources and capabilities in order to measure contractor competitiveness.

Table 1: Measurement of Variables

Factor Categories	Main Variables	No. of items	Total
Demographic	Background information, company profile	6	6
Total Quality Management Practices	Education and Training (ET)	4	
	Customer Focus (CF)	6	
	Information and Analysis (IA)	6	
	Continuous Improvement (CI)	3	
	Process Management (PM)	6	
	Employee Relation (ER)	8	
	Top Management Commitment (TMC)	6	
	Management Supplier (MS)	4	
	Teamwork Orientation (TO)	5	
	Mission and Goals Orientation (MGO)	5	
	Management Style (MST)	6	
	Personal Influence/ Performance (PIP)	6	
	Competitiveness	Description (D)	5
Task Environment (TE)		6	
Corporate Image (CIM)		3	
Technology and Innovation (TI)		4	
Marketing and Capability (MC)		4	
Financial and Capability (FC)		4	
Project Management Skill (PMS)		5	
Organization and Human Resource (OHR)		4	
Total			84

The questions in the questionnaire were close-ended and measured on a five-point Likert scale with the exception of the demographic questions. The five point Likert scale used ranged from '1' "Strongly disagree" to '5' "Strongly agree."

Reliability Analysis

Reliability is the extent to which the measurement has neither errors nor biases (Sekaran, 2003). The test of Cronbach alpha was performed to determine each scale's reliability. The test was used in such a way that a Cronbach alpha coefficient over 0.70 was acceptable (Nunnally & Bernstein, 1994; Sekaran, 2000). In other words, the recommended acceptable cut-off level of 0.70 was employed in the present study. Additionally, the corrected item-total correlating all items has to be over 0.30, as suggested by Henryson (1971), Hair *et al.* (1998), and Palant, (2007). Their recommendations were applied in the research for the assessment of scale reliability and internal consistency. The following Table 2 shows the result.

a. Total Quality Management Practices (TQMP)

Table 2: Reliability Analysis of Total Quality Management Practices

Variable	Factor s	No. Of items before reliability	no. of items after reliability	alpha before reliability	Alpha after reliability	Overall reliability
Total Quality Management Practices	ET	4	4	0.930	0.930	0.855
	CF	6	4	0.566	0.851	
	IA	6	4	0.637	0.854	
	CI	3	3	0.806	0.806	
	PM	6	4	0.591	0.831	
	ER	8	7	0.669	0.759	
	TMC	6	4	0.388	0.951	
	MS	4	4	0.953	0.953	

A reliability test was performed on the Total Quality Management Practices variable (TQMP). The variable consisted of eight factors namely Education and Training (ET), Customer Focus (CF), Information and Analysis (IA), Continuous Improvement (CI), Process Management (PM), Employee Relation (ER), Top Management Commitment (TMC), and Management Supplier (MS). Table 2 presents the results of the reliability test for the Total Quality Management Practices factors. Based on the result, all items of Education Training (ET), Continuous Improvement (CI), and Management of Supplier (MS) were included. However, item CF5, CF6, IA5, IA6, PM5, PM6, ER8, TMC5, and TM6 were deleted because they made the construct unreliable.

Competitiveness

Competitiveness (C) consisted of eight factors, namely, Description (D), Task Environment (TE), Corporate Image (CIM), Technology and Innovation (TI), Marketing and Capability (MC), Financial and Capability (FC), Project Management Skill (PMS), and Organization and Human Resource (OHR). Result showed that all items of Description (D), Task Environment (TE), Corporate Image (CIM), Technology and Innovation (TI), Marketing and Capability (MC), Financial and Capability (FC) were included. However, item PMS5 and OHR4 were not included because they made the construct unreliable. Table 3 shows the result.

Table 3: Reliability Analysis of Competitiveness

Variable	Factor s	No. of items before reliability	No. of items after reliability	Alpha before reliability	Alpha after reliability	Overall reliability
Competitiveness	D	5	5	0.912	0.912	0.806
	TE	6	6	0.848	0.848	
	CIM	3	3	0.909	0.909	
	TI	4	4	0.827	0.827	
	MC	4	4	0.874	0.874	
	FC	4	4	0.960	0.960	
	PMS	5	4	0.664	0.898	
	OHR	4	3	0.632	0.860	

Results

Reliability Test

Pallant (2003) recommended that new measures of scales should have a minimum reliability of 0.60. Reliability refers to the extent to which there is uniformity amongst the varied measurements of the variables (Hair *et al.*, 2006). It serves as a means to measure levels of consistency of the given performance levels and behaviors. According to Sekaran (2003), Cronbach's alpha is frequently used as an indicator for reliability and internal consistency. It is mostly agreed that the most widely accepted value for Cronbach's alpha is 0.70 and above (Hair *et al.*, 2006).

Table 4 below summarizes the reliability tests of the different items. As evident, the values of Cronbach's alpha of the measurements were above 0.70, suggesting that all measures were found have considerable reliability.

Correlation Analysis

Correlation analysis is a statistical method used to describe the strength and direction of the linear relationship between two variables (Pallant, 2001). The degree of correlation concerned is to measure the strength and importance of a relationship between the variables. Pearson's correlation coefficient (r) with significance levels was utilized in order to assess the correlations between the variables. Cohen (1988) provided a guideline to explain the strength and the degree of the correlation between two variables as presented in Table 5. In Table 6, a summary of the variables' correlations is presented.

Table 4: Reliability Results

Constructs	Variables	No. of items	α Cronbach's Alpha
Total quality management practices	Education and training	4	.899
	Customers focus	4	.930
	Information and analysis	4	.817
	Continuous and improvement	3	.766
	Process management	4	.887
	Employee relations	7	.929
	Top management commitment	4	.884
	Management of supplier	4	.803
Competitiveness	Task environment	5	.840
	Corporate image	6	.933
	Technology and innovation	3	.862
	Marketing capability	4	.889
	Financial capability	4	.876
	Project management skill	4	.720

Table 5: Cohen's Guideline of Correlation Strength

R	Strength of relationship
.10 to .29	Low
.30 to .49	Moderate
.50 to 1.0	High

Table 6: Summary of Correlations of Variables

Study variables	Correlation coefficient	Strength of relationship
TQMP and Competitiveness	0.412**	Moderate

** p < .01

Regression Analysis

For the purpose of answering the research questions, multiple linear regressions were performed. However, several assumptions must be met in order to conduct multiple linear regression analysis. There are mainly normality, linearity, homoscedasticity and independence of errors terms, multicollinearity and multivariate outliers (Coakes & Steed, 2003; Hair et al, 1998; 2006; Pallant, 2001).

All the variables were tested using skewness and kurtosis levels to determine normality. According to Hair *et al.* (1998), the acceptable level of skewness and kurtosis is between -2.00 and + 2.00 at the significance level of 0.05. It is clear from Table 7 that none of the variables showed skewness or kurtosis over 2.0, implying that data was suitably distributed. It indicates that analysis of skewness and kurtosis at univariate levels results to prior confirmation of multivariate normality only.

Table 7: Statistic Values of Skewness and Kurtosis (Descriptive Statistics)

Variables	Skewness		Kurtosis	
	Std. Statistic	Std. Error	Std. Statistic	Std. Error
Total quality management practices	.286	.124	.167	.247
Competitiveness	-.052	.124	-.246	.247

Independence of Error Term

For the purpose of making an assessment and validation of the independence of error assumptions, the Durbin-Watson statistics were utilized. Based on Coakes and Steed (2003), the

independence of error term is considered invalid if the Durbin-Watson values are between 1.50 and 2.50. For the present study, the Durbin-Watson value is summarized in Table 8. The result showed that the value declined among the acceptable values, indicating that auto-correlation problems were not found.

Table 8: Durbin-Watson Statistical Value

Model	IV	DV	R square	Adjusted R square	Std. error of the estimate	Durbin-Watson
1	TQMP	Competitiveness	.170	.168	.33484	1.507
2	TQMP	Quality Culture	.580	.579	.29397	1.782
3	Quality Culture	Competitiveness	.125	.122	.34384	1.576

Multicollinearity Test (Independence of Independent Variables)

Besides the above assumptions, multicollinearity is another assumption that is considered to be a significant one to make sure of multicollinearity's absence. Accordingly, the processes of colinearity were carried out for the assessment and determination of multicollinearity problems of predictors. To achieve such a process, Tolerance Value and the Variance Inflation Factor (VIF) were analyzed. According to Hair *et al.* (2006), the tolerance values ranges between 0 - 1. A value of 1 indicates the variable's non-relation with the other variables while a value of 0 indicates the variable's perfect correlation with another variable. VIF has a standard cut off value of 10 with all the predictors required to have a VIF value of less than 10. The present study's multicollinearity test values are shown in Table 9.

Table 9: Tolerance Value and the Variance Inflation Factor (VIF) Test

IV	DV	Colinearity Statistics	
		Tolerance	VIF
TQMP factors	Competitiveness	0.73	1.37

From Table 9, it is clear that multicollinearity did not exist amongst all independent variables as the tolerance values registered less than 1.00 and VIF values were less than 10.0. Hence, the resulting data can be explored through the use multivariate techniques like the relevant regression analysis. Overall, the underlying assumptions that could negatively influence the regression analysis results were met and achieved. Thus, the hypothesis and research questions can be investigated and answered.

Discussions**Relation between TQMP Factors and Competitiveness**

The research question sought to investigate the relationship between the TQMP factors (education & training, customer focus, information & analysis, continuous improvement, process management, employee relations, top management commitment, and management of supplier) and contractor competitiveness in Saudi Arabia. In order to investigate the relationship between TQMP factors and contractors' competitiveness, Pearson correlation coefficient was used. Table 10 shows the result.

Table 10: Correlation between TQMP Factors and Competitiveness (n=388)

Factors	Competitiveness
Education and training	0.129*
Customer focus	0.127*
Information and analysis	0.168**
Continuous improvement	0.154**
Process management	0.176**
Employee relations	0.567**
Top management commitment	0.133**
Management of supplier	0.168**

** p < .01

Total Quality Management Practices Factors that Affect Competitiveness

The research question sought to investigate the effect of TQMP factors (education & training, customer focus, information & analysis, continuous improvement, process management, employee relations, top management commitment, and management of supplier) on competitiveness among contractors in Saudi Arabia.

Linear regression analysis was conducted to test the research hypotheses. The analysis helps determine the contribution of every factor and pinpoints the factor that is the best predictor of any outcome. For example, R^2 indicates the manner in which the contingency variables can predict a given result in light of quality culture and competitiveness. Accordingly, the normal value of R^2 can be considered as 1, implying a perfect linear correlation among the dependent and independent variables. If the value of R^2 is 0, it indicates the absence of such linear relationships. Moreover, it is revealed that standard multiple regression analysis is also linked to a modified R^2 value. "The adjusted R^2 statistic 'corrects' R^2 value to provide a better estimate of the true populations value" (Pallant, 2001, p. 145). The TQMP factors explained a significant percentage of variance in contractor competitiveness ($R^2 = .366$, $F = 27.346$, $p < .001$). Therefore, TQMP factors (education & training, customer focus, information & analysis, continuous improvement, process management, employee relations, top management commitment, and management of supplier) explained 36.6% of the total variance in contractor competitiveness. Table 11 shows the result.

Table 11: Multiple Linear Regression Analysis between Total quality Management Practices (TQMP) Factors as IVs and Competitiveness as DV

Model Summary

Model	R	R ²	Adjusted R ²	Std. error of the estimate
1	.605(a)	0.366	0.353	0.2953

ANOVA(b)

Model	Sum of squares	df	Mean square	F	p
1	19.081	8	2.385	27.346	.000
	33.055	379	.087		
	52,136	387			

Coefficients(a)

Model		Unstandardized		S.zed	t	p
		B	Std. Error	Beta		
1	(Constant)	2.438	.164		14.907	.000***
	Education & training	-.008	.014	-.024	-.560	.576
	Customers focus	-.051	.024	-.105	-2.146	.033*
	Information & analysis	.009	.028	.015	.315	.753
	Continuous improvement	.040	.024	.076	1.653	.099
	Process management	.039	.015	.106	2.503	.013*
	Employee relations	.235	.019	.562	12.369	.000***
	Top management commitment	.003	.027	.006	.124	.901
	Management of supplier	.092	.026	.144	3.517	.000***

* $p < .05$, *** $p < .001$

As shown in Table 11, the results indicated that four TQMP factors (customer focus, process management, employee relations, management of supplier) significantly affected competitiveness while four TQMP factors (education & training, information & analysis, continuous improvement, top management commitment) had no significant effect on contractor competitiveness.

Conclusion

In the Saudi context, the literatures highlight that the Saudi contractor sector is considered to be the largest in the world, yet it raises certain issues that need to be addressed if this industry is to remain competitive in the face of increasing globalisation as well as internal competition and the constant threat of new entrants. This is an important concern because the bargaining power of buyers is quite high due to the sector's low barriers to entry and the similarity in service provided by different contractors. Moreover, public clients especially tend to have high quality standard expectations (Al-Kharashi & Skitmore, 2009). In particular, there is a slow adoption of information technologies, and even where computers are present on construction sites, they are unable to apply Electronic Data Interchange (EDI) effectively, which suggests a lack of e-commerce capabilities (O'Brien & Al-Biqami, 1999). It is noted that O'Brien and Al-Biqami's study was undertaken over a decade ago, so the situation may have changed since then. Nonetheless, it was suggested that Saudi contractor firms take advantage of Corporate Social Responsibility (CSR) as a strategy to achieve competitive advantage, given that it is not uncommon for firms elsewhere to also fail to benefit from IT due to lack of strategic planning (Stewart, 2007). On the other hand, the interconnectedness of Saudi contractors could enable them to gain competitive advantage by other means such as through enhanced efficiency in cooperation and minimised procurement time and cost (Al-Hammad, 1993).

Future researchers are recommended to focus on the specific aspects, factors, and practices that were found to be most significant in this study as they are likely to be most relevant and applicable to the Saudi contractor sector. Moreover, it is recommended that deeper qualitative insight is gained into the specific TQM, quality culture, and competitiveness factors and how they relate and impact upon one another. This study employed an entirely quantitative method, so the results are entirely numerical. Although this had helped to identify the more important from the less important factors and confirmed important relationships and impacts, qualitative insight, gained for example through interviews, could provide the necessary finer details of barriers, ways of overcoming them, development of an appropriate quality culture, and devising of suitable strategies peculiar to the Saudi contractor sector and specific company. The study could also be widened to include sectors in other GCC countries where there are likely to be similar cultural characteristics, barriers to change, and operating conditions.

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