Impact on quality culture of total quality management practices factors

Faihan Mosaad Saud Alotaibi
School of Business Management (SBM)
University Malaysia, Kedah, Malaysia.

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Abstract
This study investigated total quality management practices and quality culture of Saudi Arabian contractors. Improving the quality can be achieved through implementation of total quality management although studies and researches work regarding this improvement is still lacking. 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 in Saudi Arabia. The collected data were analysed using correlation, and multiple regression analyses. The key findings were the confirmation of significant relationships between all total quality management practices and quality culture and a positive relationship between quality management practices and quality culture. Furthermore, total quality management practices were found to be able to explain 68.1% of the variance in quality culture, while quality culture explained 12.5% of the variance in competitiveness. Quality culture was found to only partially mediate the relationship between total quality management practices and competitiveness.

1. Introduction

Total Quality Management (TQM) implementation, quality culture has to be given due consideration because of the practical orientation of the total quality management philosophy towards management and the natural link between TQM and quality culture. To do this, quality should be a top priority of organizational members. If quality culture is based on TQM, a foundation of quality can be developed (Yong & Pheng, 2008). It is no surprise that TQM has now become the major business strategy in current management and has currently been taken up by companies around the globe (Rad, 2006).

Quality culture is considered to be one of the top most critical factors for competitiveness improvement. Based on Ehlers (2009)'s study, lack of proper quality culture, will lead companies to fail in enhancing its outcomes. Similarly, Ehlers (2009) and Rad (2006) revealed that quality culture is linked to several factors like technology, organizational culture, service design, process management, business strategy, and decision making of organization. Ehlers (2009) is of the opinion that quality culture is essential for TQM implementation success while Fotopoulos and Psomas (2009) reiterated the same notion by stating that quality culture generally assists in problem solving, and employee training improvement. They also found a relationship between quality culture and total quality management. Kanji *et al.* (1997) also observed that critical factors of total quality management are positively related to quality culture. Similar finding was also reported by Rad (2006) and Zadry (2005) who revealed quality culture as a critical factor for TQM implementation success.

Quality culture is referred to as an environment reflecting positive commitment to quality outcomes, products, systems, and processes; it stresses upon continuous improvement. This is intertwined with the organization's policy or mission statement and is described as a way of making decisions. It is generally referred to as an attitude and values about improving the quality level of service. It is used to enhance customer relationship, employee communication,

and employee attitude. The ideal way to develop a sustainable quality culture is by offering regular training and educational sessions.

According to Hart (1994), quality takes three meanings in a construction industry: getting the job done on time; confirming that the basic features of the final scheme fall within the obligatory stipulations; and receiving the job done within financial plan. Every quality construction project should encompass all three dimensions. Basically, quality in construction is straight linked with conformance to stipulations as well as suitability for usage. Also, in the construction industry, quality is often defined as satisfying the requirements of the individuals involved: the designer, the constructor, the regulatory agencies, and the owner (Ferguson & Clayton, 1988). Hackman and Wageman (1995) stressed that TQM programs signify more than the mere implementation of technical management practices as these programs call for a supporting culture and the organizational members' attitude in providing customers with products and services. For instance, if a firm is desirous of adopting TQM practices but does not have the proper culture to support such practices, its workers can feel powerless to stop manufacture even when they notice faults, and hence, will result in the practice's failure.

According to Gore (1999), the quality culture is an effective basis for the success of an organization and in addition, the organizational culture could affect the following three elements: behavior of individual workers (Bose, 2004), knowledge sharing (Ooi *et al.*, 2010), and job satisfaction (Ooi *et al.*, 2007). In other words, total quality management practices should go hand in hand with a kind of quality culture consisting the main elements; doing the right thing the first time, continuous improvement and achieving consumer satisfaction (Sitkin *et al.*, 1994; & Snell, & Dean, 1992).

In addition, the study identifies factors or characteristics of quality culture 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.

Improving the quality can be achieved through implementation of TQM although studies and researches work regarding this improvement is still lacking. This limitation stems from the oversight of the real variables and causal relations which are universally valid (Escrig-Tena, 2004). The limitations can also be attributed to the lack of speculative context that expounds on the impact of TQM on its outcome even though quite a number of studies have pointed out the influence of TQM practices on performance and competitiveness (Das, Handfield, Calantone, & Ghosh, 2000; Douglas & Judge, 2001; Kaynak, 2003; Flores, 2008). Studies in the past ten years have considerably shifted their concentration from competitive position to firm-specific features (Powell, 1995). TQM has been gaining critical importance but its effects on strategic management research is still ambiguous and studies to this effect are still lacking. Critics attribute the issues to the immense requirements entailed in the form of paperwork costs and formalities.

On other hand, Nesan and Holt (1999) stated that participants to the construction industry often react to economic, political, and technological pressures, often resulting in the industry's poor performance. As such, Love *et al.* (1998) emphasized that TQM can facilitate the organization's coping of changes as opposed to reacting to them. Additionally, Love and Li, (2000) stated that the construction sector, issues will keep on cropping until and unless the participants take responsibility and initiate organizational changes. They indicated that the said

change can be started through TQM effective implementation. Thus, the previous studies have focused primarily on the impact of TQM or performance alone without considering its impact on organizational competitiveness. There is a lack of sufficient study about the relationship between TQM, quality culture and their effect on an organization's competitiveness. Also, there is lack of studies concentrating on the Saudi Arabian economy addressing the determination of the successes and failures of firms on the basis of quality culture. In addition, as evidenced by Mellat-Parast and Digman, (2008), construction firms possess inter-firm connections that affect the level of compatibility of corporate culture (Mellat-Parast & Digman, 2008).

2. Materials and Method

2.1 Conceptual Framework

The conceptual framework is developed to link TQM, and quality culture, based on existing literature. A TQM practice is the independent variable while the dependent variable is competitiveness. Quality culture is considered as the link between TQM practices and quality culture because there is lack of studies investigating the role of quality culture in Saudi construction companies. Figure 1 below presents the cconceptual 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, and quality culture. Research Framework of the present study on figure 1.

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).

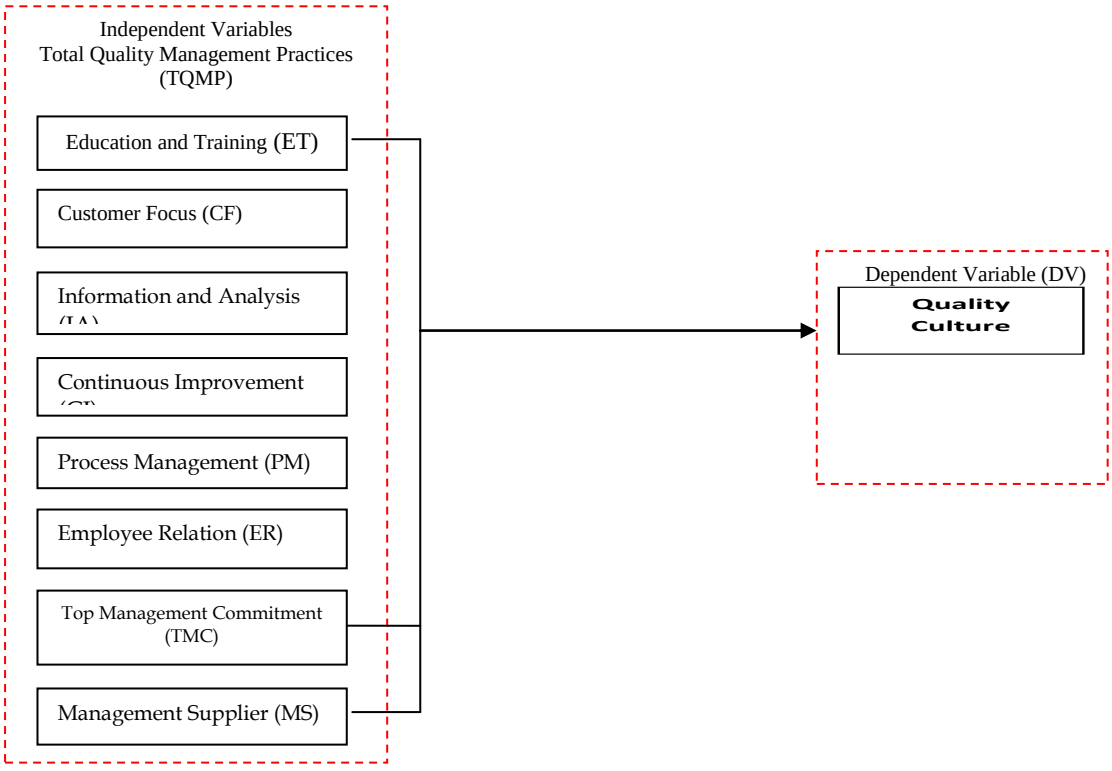

Figure 1: Conceptual framework

Education and training were also found to be important factors in improvement of skills in the organizations (Rad, 2006). Also, supplier quality management is considered to be a comprehensive paradigm to facilitate the enhancement of organizations and competitiveness because a qualified supplier can help increase the quality of manufactured products. Flynn *et al.* (1994) claimed that quality management is a crucial factor that affects the quality culture. They also found human resource management and process management are significant contributors to quality culture. Hence, the promotion of a cooperative spirit in the organization leads to the easy implementation of process management, and the inclination and the ability of the employees to learn. These in turn result in the continuous improvement of the processes and product/services (Anderson *et al.*, 1994). Also, quality culture is the main element of a successful TQM program (Westbrook, 1993). A quality culture can have a positive influence on the TQM implementation (Zadry, 2005). Abdullah *et al.*'s (2008) found a positive connection between TQM and quality culture.

2.3 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 shows the result.

a. Total Quality Management Practices (TQMP)

Variable	Factors	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	

Table 1: Reliability Analysis of Total Quality Management Practices

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 1 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.

b. Quality Culture (QC)

Variable	Factors	No. of items before reliability	No. of items after reliability	Alpha before reliability	Alpha after reliability	Overall reliability
Quality Culture	IO	6	6	0.914	0.914	0.906
	TO	5	4	0.645	0.884	
	MGO	5	5	0.852	0.852	
	MST	6	4	0.517	0.851	
	PIP	6	6	0.967	0.967	

Table 2: Reliability Analysis of Quality Culture

The Quality Culture variable (QC) consisted of five factors, namely, Improvement Orientation (IO), Teamwork Orientation (TO), Mission and Goals Orientation (MGO), Management Style (MST), and Personal Influence Performance (PIP). Result showed that all items of Improvement Orientation (IO), Mission and Goals Orientation (MGO), and Personal Influence Performance (PIP) were included. However, item TO5, MST5, and MST6 were excluded because they made the construct unreliable. Table 2 shows the result.

3. Results

3.1 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 3 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.

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
Quality culture	Improvement orientation	6	.929
	Team work orientation	4	.893
	Mission and goal orientation	5	.918
	Management style	4	.853
	Personal influence performance	6	.947

Table 3: Reliability Results

3.2 Factor Analysis on Total Quality Management Practices

The outcome emanating from the exploratory factor analysis on the total quality management practices is depicted in Table 4. The table shows the factor loading of eight aspects of total quality management practice items after every step of the procedure that showed either low factor loading (< .50) or double loading. The results indicated that the loadings of the all items ranged from .50 to .90.

	Components							
	1	2	3	4	5	6	7	8
ER5	.917							
ER1	.913							
ER6	.884							
ER2	.865							
ER3	.836							
ER4	.655							
ER7	.654							
CF4		.881						
CF2		.861						
CF3		.854						
CF1		.847						
ED1			.924					
ED2			.881					
ED4			.837					

ED3	.835					
TMC4		.912				
TMC2		.907				
TMC1		.804				
TMC3		.669				
PM4			.871			
PM3			.859			
PM1			.849			
PM2			.841			
IA2				.791		
IA3				.786		
IA1				.719		
IA4				.696		
MC2					.868	
MC4					.840	
MC1					.748	
MC3					.715	
CI1						.813
CI3						.803
CI2						.728
Percentage of variance explained (%)					74.04	
Kaiser-Meyer-Olkin					.751	
Bartlett's test of sphericity approx. chi square					1054	
Df					561	
Sig.					.000	

Table 4: Exploratory Factor Loading for Total Quality Management Practices

Table 4 indicates that the KMO measure for quality management practices items showed a value of .751. This indicates a 'meritorious' adequacy and thus appropriate for factor analysis to be used (Hair *et al.*, 2006). The observed value of Bartlett sphericity was also large (1054) and its associated significance level was very low (.000). The outcomes of both the KMO measures and Bartlett test of sphericity outcomes revealed that the items used in the quality management practices evaluation were seen as meeting the conditions for the given factor analysis. This also implies that factor analysis could be made applicable for the different items of total quality management practices.

3.3 Factor Analysis on the Quality Culture

The current study carried out exploratory factor analysis (EFA) on the quality culture comprising five aspects: improvement orientation, team work orientation, mission and goal orientation, management style, and personal influence performance. For improvement orientation six items were used; for team work orientation four items; for mission and goal orientation five items; for management style four items; and for personal influence performance six items. Table 5 shows the number of items for each dimension. The findings from the exploratory factor analysis regarding quality culture are presented in Table 5. The table includes

the factor loadings of five dimensions of quality culture items after every procedure showing either low factor loading (< .50) or double loading; the results showed that all items' loadings ranged from .569 to .946.

	Component				
	1	**2**	**3**	**4**	**5**
PIR1	.946				
PIR3	.946				
PIR6	.932				
PIR4	.884				
PIR2	.884				
PIR5	.638				
IO5		.935			
IO1		.914			
IO6		.883			
IO2		.865			
IO3		.854			
IO4		.569			
MGO2			.859		
MGO3			.858		
MGO5			.854		
MGO4			.844		
MGO1			.770		
TO1				.925	
TO2				.882	
TO4				.837	
TO3				.807	
MGS4					.861
MGS1					.796
MGS3					.766
Percentage of variance explained (%)					72.64
Kaiser-Meyer-Olkin					.732
Bartlett's test of sphericity approx. chi square					4848
df					620
Sig.					.000

Table 5: Exploratory Factor Loading for Quality Culture

Table 6 indicates that the KMO measure for quality culture items is .732, which indicates a sufficient high level appropriate to be utilized in the factor analysis (Hair *et al.*, 2006). Bartlett sphericity's value for the study was large (4848) with a significance level of .000. Both KMO measure and Bartlett test of sphericity results indicates that the items utilized satisfied the requirements for the factor analysis, and hence, implying that factor analysis could be made applicable to the quality culture items.

3.4 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 6. In Table 7, a summary of the variables' correlations is presented.

R	Strength of relationship
.l0 to .29	Low
.30 to .49	Moderate
.50 to l.0	High

Table 6: Cohen's Guideline of Correlation Strength

Study variables	Correlation coefficient	Strength of relationship
TQMP and Quality Culture	0.762**	High

** p <.01

Table 7: Summary of Correlations of Variables

3.5 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 8 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.

Variables	Skewness		Kurtosis	
	Statistic	Std. Error	Statistic	Std. Error
Total quality management practices	.286	.124	.167	.247
Quality culture	-.250	.124	.840	.247

Table 8: Statistic Values of Skewness and Kurtosis (Descriptive Statistics)

3.6 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 9. The result showed that the value declined among the acceptable values, indicating that auto-correlation problems were not found.

Model	IV	DV	R square	Adjusted R square	Std. error of the estimate	Durbin-Watson
2	TQMP	Quality Culture	.580	.579	.29397	1.782

Table 9: Durbin-Watson Statistical Value

3.7 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 10.

		Colinearity Statistics	
IV	**DV**	**Tolerance**	**VIF**
TQMP factors	Quality Culture	0.70	1.44

Table 10: Tolerance Value and the Variance Inflation Factor (VIF) Test

From Table 10, 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.

4. Discussions

4.1 Relation between TQMP Factors and Quality Culture

The research question sought to investigate the relationship between TQMP factors (education & training, customer focus, information & analysis, continuous improvement, process management, employee relations, top management commitment, and management of supplier) and Quality Culture in Saudi Arabia. In order to investigate the relationship between TQMP factors and quality culture, Pearson correlation coefficient was used. Table 11 shows the result.

Factors	Quality Culture
Education and training	0.274**
Customers focus	0.508**
Information and analysis	0.335 **
Continuous improvement	0.286**
Process management	0.169**
Employee relations	0.555**
Top management commitment	0.478**
Management of supplier	0.245**

** p <.01

Table 11: Correlation between TQMP Factors and Quality Culture (n=388)

4.2 TQMP factors that Affect Quality Culture among Contractors in Saudi Arabia

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 quality culture among contractors in Saudi Arabia.

The TQMP factors explained a significant percentage of variance in Quality Culture (R^2 = .681, F = 101.278, 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 68.1% of the total variance in quality culture. Table 12 shows the result.

Table 12: Multiple Linear Regression Analysis between Total Quality Management Practices (TQMP) Factors as IVs and Quality Culture as DV.

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

Model Summary

Model	Sum of squares	df	Mean square	F	p
1	54.145	8	6.768	101.278	.000
	25.327	379	.067		
	79.472	387			

ANOVA(b)

		Unstandardized		S.zed		
Model		**B**	**Std. Error**	**Beta**	**t**	**p**
1	(Constant)	.385	.143		2.689	.000***
	Education and training	.131	.012	.323	10.796	.000***
	Customer focus	.164	.021	.276	7.977	.000***
	Information and analysis	-.031	.024	-.045	-1.281	.201
	Continuous improvement	.017	.021	.027	.816	.415
	Process management	.004	.014	.010	.328	.743
	Employee relations	.245	.017	.475	14.740	.000***
	Top management commitment	.207	.023	.304	8.885	.000***
	Management of supplier	.092	.026	.144	3.517	.000***

*** p <.001

Coefficients(a)

As portrayed in Table 11, the results indicated that five TQMP factors (education & training, customer focus, employee relations, top management commitment, management of supplier) significantly affected quality Culture while three TQMP factors (information& analysis, continuous improvement, process management) had no significant effect on quality culture.

5. Conclusion

This study highlighted the particular importance of working with employees, ensuring top management commitment, and having a customer focus though all the TQM factors were found to be significantly related to quality culture. It also established the importance of quality culture given that TQM factors explain more than two-thirds of the total variance, and also the impact on competitiveness given that TQM factors did explain more than a third of the total

variance. Moreover, despite only a partial mediation being found, quality culture contributed to facilitating the impact of TQM practices on competitiveness to a significant degree, hence the importance of establishing a conducive quality culture.

Future research could also be focused on the strategic aspects of implementing TQM practices and establishing a quality culture to best develop competitive advantages, and help devise a possible model that Saudi contractor firms could use to bring the theoretical methods and advantages into practical reality. In such case, it would not be necessary to undertake a geographically diverse study; rather, it may suffice to focus on a few companies to better understand their particular processes, problems, etc. and, if possible, demonstrate how the working culture can be made more suitable and the specific chosen TQM practices can be usefully implemented. Such a case study could become an example for others to follow.

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