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The Meadiating Effect of Quality Culture on the Relationship Between Total Quality Management Practices and Competitiveness

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Abstract: Quality culture conditions are strongly linked with project outcomes and hence, initiatives undertaken should be incorporated to the organizational cultural changes. Total quality management practices in construction industries can be described as the processes or that aligns the business performance strategy to the business processes in the hopes of achieving customer satisfaction and product and services quality. The aim of the study is to evaluate the mediating effect of quality culture on the relationship between quality management practices and competitiveness. In order to achieve the study objective in the present study, a survey conducted. Questionnaires distributed to the contractor's managers in Saudi Arabia. The findings of the study turn out to be true; the study will contribute to both theory and practice. Through the present study, the researcher expects the findings to shed light on the research conducted hierarchical regression to analysis using quality culture as a mediator in the relationship between total quality management practices and competitiveness.

Key words: Mediating effect · Quality management practices · Competitiveness · Quality culture

INTRODUCTION

Quality culture conditions are strongly linked with project outcomes and hence, initiatives undertaken should be incorporated to the organizational cultural changes. Also, quality culture is impacted by societal culture and it's a blueprint of how the employees should behave. It impacts the commitment that employees show to quality efforts and in their interaction with others. As a consequence, cultural factors may be biased to the Total Quality Management (TQM) program implementation and such bias will be reflected in its quality culture [1].

TQM practices in construction industries can be described as the processes or that aligns the business performance strategy to the business processes in the hopes of achieving customer satisfaction and product and services quality. 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 [2, 3].

The relation between the TQM and competitiveness is such that several organizations are failing to achieve competitive advantage through TQM practices' implementation while some others have succeeded. The failure is attributed to the incomplete implementation of the crucial TQM practices and the absence of the assisting assets that must be simultaneously used with TQM for the achievement of competitive advantage [4].

The culture is stated to comprise of knowledge, belief, law, morale, art, custom and any other habitual activity acquired by man in the society [5]. Quality culture's impact upon the organization's total quality management practices dealt with in literature. Quality culture's analysis is important prior to the implementation of TQM practices. The TQM program is expected to be successful if the quality culture is parallel to the values

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and basic assumptions suggested by the TQM principles [6]. It comes to reason that failure in the attempts to implement TQM can be due to the incompatibility between quality culture and competitiveness.

Competitiveness is considered as a comparative concept of the ability of the firm and its performance in selling and supplying goods and/or services in a certain market. Total Quality management Practices generally results in competitive advantage as evidenced by empirical research [7]. Generally created frameworks such as: [8] 14 Steps' (1979), [9] 14 Prescriptive Points (1982) and Juran's trilogy act as guides for the firms to achieve competitive advantage and specify the beginning of quality or the evaluation of progress [10, 11]. TQM is generally popular in the U.S. and in Western Europe and has been implemented in most developing countries [6]. The study contributes to the development of the Saudi construction industry by assisting firms in understanding and enhancing their competitiveness because in Saudi Arabia, the construction industry is the engine behind a sustainable economic development as evidenced in other studies implying the contribution of the Saudi real estate sector in the country's Gross domestic product –GDP [12, 13].

MATERIALS AND METHODS

The cross-sectional design is commonly employed as a sample survey, whereby selected people are demanded to give response to a group of questions which are standardized and structured concerning the method they think and the feelings they have and what they do [14].

Generally, research methodology deals with the issue of proper sampling which statistically represents the construction companies' employees in Saudi Arabia, the instruments for the measurement of quality management practices, quality culture and competitiveness. The research design used is the quantitative method. This also includes the methodology of data collection and the precautions observed prior to data analysis carried out through Statistical Package for the Social Sciences (SPSS). Figure 1 depicts a summary of the research design.

Reliability Analysis: Reliability is the extent to which the measurement has neither errors nor biases [15]. The test of Crobach Alpha is performed to determine each scale's reliability. The test is used in such a way that a Cronbach alpha coefficient over 0.70 is acceptable [16]. In other words, the recommended acceptable cut-off level of 0.70 is employed in the present study. Additionally, the corrected item total correlating all items has to be over 0.30 as suggested by [17].

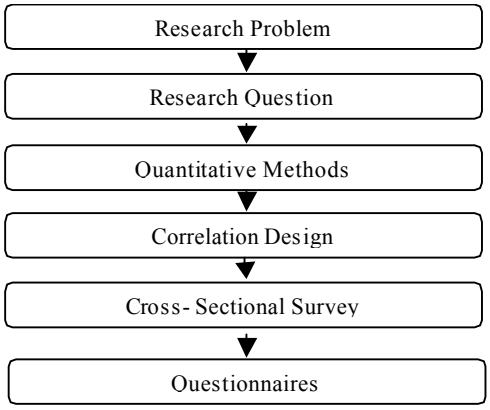

Fig. 1: Flowchart of the research design

Total Quality Management Practices (TQMP): A reliability test is performed on the Total Quality Management Practices variable (TQMP).

The Total Quality Management Practices 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.

In terms of Total Quality Management Practices (TQMP), the results of the tests are exhibited in Table 1. It is seen that all items for Education Training (ET), Continues Improvement (CI) and Management of Supplier (MS) are included. However, item CF5, CF6, IA5, IA6, PM5, PM6, ER8, TMC5 and TM6are not included because it makes the construct unreliable.

Quality Culture (QC): 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). The Improvement Orientation (IO), Management Style (MST) and Personal Influence\ Performance (PIP) factors have six items while the other two factors have five items. Table 2 presents the results of the reliability test for the Quality Culture variable.

Table 1: Reliability Analysis of the Total Quality Management Practices Factors

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	
Total		8	43	34		

Table 2: Reliability Analysis of the Quality Culture Factors

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	
Total		5	28	25.000		

Table 3: Reliability Analysis of the Competitiveness Factors

Variable	Factors	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	
Total		8	35	33.000		

In terms of Quality Culture (QC), the results of the tests are exhibited in Table 2. It is seen that all items for Improvement Orientation (IO), Mission and Goals Orientation (MGO) and Personal Influence\ Performance (PIP) are included. However, item TO5, MST5 and MST6 are not included because it makes the construct unreliable.

Competitiveness: The 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).They have five items, six items, three items, four items, four items, four items, five items and four items respectively. Table 3 presents the results of the reliability test for the Competitiveness variable.

In terms of Competitiveness factors, the results of the tests are exhibited in Table 3. It is seen that all items for Description (D), Task Environment (TE), Corporate Image (CIM), Technology and Innovation (TI), Marketing and Capability (MC), Financial and Capability (FC) are included. However, item PMS5 and OHR4 are not included because it makes the construct unreliable.

RESULTS AND DISCUSSION

Goodness of Measures: To confirm the efficiency and the effectiveness of the adapted measures, certain procedures have to be carried out prior to the main analysis, including validity tests (reliability and exploratory factor analysis) for the different variables. The findings relating to reliability and exploratory factor analysis for the entire items measured for variables were included in the study.

Table 4: Exploratory Factor Loading for Total Quality Management Practices

	Component							
	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				
TMC1				.907				
TMC2				.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
C13								.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

Factor Analysis for Total Quality Management Practices: Table 4 shows the factor loading of eight aspects of total quality management practices items after every step of the procedure that showed either low factor loading (< .50) or double loading. The results indicate that the loadings of the all items are from .50 to .90.

The result in 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 using factor analysis [18]. The observed value of Bartlett sphericity is also large (1054) and its associated significance level is 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.

Table 5: Exploratory Factor Loading for Quality Culture

	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	
MGS2					.891
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

Factor Analysis on the Quality Culture: 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 range from .569 to .946.

Table 5 indicates that the KMO measure for leadership styles is .732, which indicates a sufficient high level appropriate to be utilized in the factor analysis [18].

Table 6: Exploratory Factor Loading for Competitiveness

	Component							
	1	2	3	4	5	6	7	8
TEF6	.932							
TEF1	.928							
TEF3	.878							
TEF2	.875							
TEF4	.830							
TEF5	.700							
D2		.839						
D5		.806						
D3		.785						
D1		.700						
D4		.691						
TAI4			.908					
TAI1			.907					
TAI2			.813					
TAI3			.704					
MC4				.870				
MC3				.861				
MC1				.834				
MC2				.825				
PMS2					.880			
PMS4					.851			
PMS1					.767			
PMS3					.764			
CIMAGE1						.867		
CIMAGE2						.851		
CIMAGE3						.702		
FC3							.788	
FC4							.765	
FC1							.667	
FC2							.645	
OHR1								.840
OHR2								.794
OHR3								.723
Percentage of variance explained (%)								71.47
Kaiser-Meyer-Olkin								.767
Bartlett's test of sphericity approx. chi square								8434
df								528
Sig.								.000

Bartlett sphericity's value for the study is large (4848) with a significant level of .000. Both KMO measure and Bartlett test of sphericity results indicate that the items utilized satisfied the requirements for the factor analysis and hence, implying that factor analysis could be made applicable to the leadership styles' items.

Factor Analysis for the Competitiveness: The result of exploratory factor analysis on the competitiveness is presented in Table 6. The table presents the factor loading of eight dimensions of competitiveness items after every step of the procedure was met. The table shows either low factor loading (< .50) or double loading. The results indicate that the loadings of the all items are from .645 to .932.

The result in Table 6 indicates that the KMO measure for competitiveness items revealed a value of .767, which indicates a good adequacy and is thus is suitable for testing against factor analysis [18]. The demonstrated values of Bartlett sphericity are also large (8434) and it is associated with a significance level of .000. Both of the KMO measure and Bartlett test of sphericity results demonstrate that the items used in the competitiveness measure obviously met the conditions for factor analysis. This means that factor analysis could be applied for the competitiveness items.

Correlation Analysis: Correlation analysis can be defined as the statistical method that is adopted in describing the strengths and direction taken by the linear relationship amongst two different variables [19].

Hypothesis 1: It is evident from Table 7 that total quality management practices are related with competitiveness. The correlation coefficient values relative to the examined relationships amongst the two was found to be .412, which can be termed as a positive moderate correlation at the given levels whereby ($p < .01$). As a significant positive relationship exists, therefore, there is a support for this hypothesis.

Hypothesis 2: As shown in Table 7, total quality management practices are related with quality culture. It was found that the values for correlation coefficients in terms of the examined relationships amongst the two variables are .762, which is suggestive of high positive correlation at the well accepted level of ($p < .01$). Therefore, there is a support for this hypothesis.

Hypothesis 3: As evident from Table 7, quality culture has a relationship with competitiveness. It was found that the value of correlation coefficient for the analyzed relationship amongst the two variables is .353, which is considered a positive moderate correlation at significant level ($p<0.01$). Hence, this hypothesis is supported.

Regression: All the variables were tested using skewness and kurtosis levels to determine normality. According to [17], 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.

Table 7: Summary of Correlations of Variables

		Competitiveness	Total Quality Management Practices	Quality Culture
Competitiveness	Pearson Correlation	1	.412**	.353**
	Sig. (2-tailed)		.000	.000
	N	388	388	388
Total Quality Management Practices	Pearson Correlation	.412**	1	.762**
	Sig. (2-tailed)	.000		.000
	N	388	388	388
Quality Culture	Pearson Correlation	.353**	.762**	1
	Sig. (2-tailed)	.000	.000	
	N	388	388	388

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

	Skewness		Kurtosis	
Variables	Statistic	Std. Error	Statistic	Std. Error
Total Quality Management Practices	.286	.124	.167	.247
Quality Culture	-.250	.124	.840	.247
Competitiveness	-.052	.124	-.246	.247

Table 9: 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

Table 10: Simple linear regression analysis between Total quality management practices (TQMP) as IV and Competitiveness as DV

Model Summary

Model	R	R^2	Adjusted R^2	Std. Error of the Estimate
1	.412(a)	0.170	0.168	0.3348

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	P.
1		8.859	1	8.859	79.018	.000(a)
		43.277	386	.112		
		52,136	387			

Coefficients(a)

		Unstandardized		S.zed		
Model		B	Std. Error	Beta	t	P.
1	(Constant)	2.536	.161		14.630	.000***
	TQMP	.385	.043	.412	8.889	.000***

*** p <.001

Table 11: Simple linear regression analysis between Total quality management practices (TQMP) as IV and Quality culture as DV

Model Summary

Model	R	R^2	Adjusted R^2	Std. Error of the Estimate
2	.762(a)	0.580	0.579	0.29397

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	P.
2		46.114	1	46.114	533.599	.000(a)
		33.358	386	.086		
		79.472	387			

Coefficients(a)

		Unstandardized		S.zed		
Model		B	Std. Error	Beta	t	P.
2	(Constant)	.426	.141		3.017	.000***
	TQMP	.879	.038	.762	23.100	.000***

*** p <.001

Table 12: Simple linear regression analysis between Quality Culture as IV and competitiveness as DV

Model Summary					
Model	R	R^2	Adjusted R^2	Std. Error of the Estimate	
3	.353(a)	0.125	0.122	0.34384	
ANOVA(b)					
Model	Sum of Squares	df	Mean Square	F	P.
3	6.501	1	6.501	54.985	.000(a)
	45.635	386	.118		
	52.136	387			
Coefficients(a)					
	Unstandardized		S.zed		
Model	B	Std. Error	Beta	t	P.
3 (Constant)	2.728	.143		19.110	.000***
Quality Culture	.286	.039	.353	7.415	.000***

*** p <.001

Table 13: The results of hierarchical regression analysis using quality culture as a mediator in the relationship between total quality management practices and competitiveness

		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	p.
Step1 (Model 1)	(Constant)	2.356	.161		14.630	.000***
TQMP	.385	.043	.412	8.889	.000***	
Step2 (Model2)	(Constant)	2.324	.163		14.275	.000***
	TQMP	.319	.067	.341	4.772	.000***
	Quality Culture	.075	.058	.093	1.303	.193

R^2 = 0.170 in step 1; R^2 = 0.174 in step 2

For the purpose of making an assessment and validation of the independence of error assumptions, the Durbin-Watson statistics were utilized. Based on [20], 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 shows that the value declined among the acceptable values, indicating that auto-correlation problems are not found.

Hypothesis 1: The coefficient of determination (R^2) measures the proportion of the total variance of the dependent variable about its mean that is explained by the independent or predictor variables [17]. The higher the value of R^2, the greater the explanatory power of the regression model. It is found that the regression model R^2 value for the dependent variable total quality management practices is .170, meaning that 17% of the total variance in competitiveness are explained by the regression model. This value is considered good and thus the power of the regression model is good. This implies that the model is statistically significant (F=79.018, p<0.001). In short, referring to the data in Table 10, the regression model support hypothesis 1.

Hypothesis 2: The simple linear regression analysis was used in testing hypothesis 2 with quality culture as the dependent variable and together with total quality management practices as the independent variables. The results are exhibited in Table 11.

It is found in the table that the total quality management practices explain a significant percentage of variance in quality culture (R^2 = 0.580, F=533.599, P<0.001). Therefore, the total quality management practices factor explains 38.8% of the total variance in quality culture. In detail, Table 11 explains that the regression model support hypothesis 2.

Hypothesis 3: The simple linear regression analysis was used in testing hypothesis 3 with competitiveness as the dependent variable and together with quality culture as the independent variables. The results are exhibited in Table 12.

It is found in the table that the quality culture variable explain a significant percentage of variance in competitiveness (R^2 = 0.125, F=54.985, P<0.001). Therefore, quality culture variable explain 12.5% of the total variance in competitiveness. In short, hypothesis 3 is supported. In detail, Table 12 explains that the regression model supports hypothesis 3:

In summary, H1, H2 and H3 are supported. The next section explores the quality culture as a mediate variable between total quality management practices variable as IV and competitiveness variable as DV using hierarchical regression analysis technique.

The fourth null hypothesis states: Quality culture does not mediate the relationship between total quality management practices and competitiveness. To examine the hypothesized statement, Hierarchical regression was performed. The results in Table 13 demonstrate the results of the hierarchical regression analysis using Quality culture as a mediator in the relationship between total quality management practices and competitiveness.

As presented in Table 13, the results indicate that in the first model, total quality management practices significantly contributed to competitiveness, $R^2 = 0.170$, $F = 79.018$, $p<.001$. Model one shows that total quality management practices was positively related to competitiveness $\beta = .412$, $t = 8.889$, at the significant level of $p < .001$. In model two, the quality culture was added to the equation, the $R^2 = 0.174$ significantly changed with $F = 40.429$, $p<.001$. Model two shows that total quality management practices was still significant but it reduced $\beta = .341$, $t = 4.772$, at the significant level of $p < .001$ in testing the mediation effect of quality culture: In model 1, the relationship between total quality management practices (IV) and competitiveness (DV) was significant while in Model 2 the relationship between IV and DV was still significant but the magnitude of the relationship between them was reduced ($\beta = .412$ to $.341$, $t = 8.889$ to 4.772). Hence and based on the Baron and Kenny approach, the quality culture partially mediates the relationship between total quality management practices and competitiveness.

CONCLUSIONS

The chapter presented the study methodology, research design and the strategies used. For the purpose of hypotheses testing, the quantitative method is utilized for its appropriateness to the current study. The current study's population comprises of the classified contractors in Saudi Arabia that are listed by the Ministry of Municipal and Rural Affairsand located in the five main geographical locations; Mecca in the West, Najran area in the Southern zone, Riyadh in the Center, Eastern Province area in the eastern zones of Saudi and Al-Jouf area in the Northern zone. The list of contractor companies 'general managers were utilized to develop the framework from which the study sample is drawn. Pilot tests were then conducted prior to the actual distribution of the final questionnaire to ensure its effective design and reliability.

This study has provided specific inputs relative to contractor competitiveness in Saudi Arabia. The researcher used a sample population of 388 contractors' managers in carrying out an exploratory factor analysis to determine the factor structure of instruments that had 92 items. The factors examined in this context were total quality management practices, quality culture and competitiveness. A test of reliability was also run in the context of all the interval scale variables in order to ascertain the extent to which they are free from casual errors. Additionally, this research made an analysis of the assumptions made in regard to normality, linearity, homoscedasticity, independence of errors terms, multicollinearity and the outcomes showed that the assumptions proved to be correct. In addition to the above, the research conducted hierarchical regression to analyze the relationships amongst different total quality management practices, quality culture and practices of competitiveness. In view of the outcomes that emerged from the research, it can be said that the hypothesis was supported the mediating effect of quality culture on the relationship between total quality management practices and competitiveness. The independent variable also revealed a pattern whereby they sufficiently contributed to the competitiveness.

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