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INNOVATION PERFORMANCE MEDIATING RELATIONSHIP BETWEEN TQM PRACTICES AND ORGANISATIONAL PERFORMANCE IN THE ETHIOPIAN GARMENT INDUSTRY

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ABSTRACT

The purpose of this study is to analyze the relationship between total quality management (TQM) practices and innovation performance and their impact on organisational performance in the case of the Garment Industry (Adama, Ethiopia). The empirical data was collected using a five-point Likert scale questionnaire that was distributed to employees of different departments and factories in the case industry. A simple random sampling technique was used. 88.40% response rate was obtained. SPSS 28-version was used for statistical data analysis. Raw data were initially refined by various statistical processes and further analysed by descriptive statistics and inferential statistics by correlation and regression analysis to determine the relationship between TQM practices (independent variable) and organisational performance (dependent variable) and innovation performance as a mediating factor. The Hayes' Process Macro was used as a statistical analysis in SPSS to estimate the path coefficients using multiple regression. The tool provides insights into the direct and indirect effect of the independent variable on the dependent variable through the existence of moderating variables and mediation variables. Findings revealed that TQM practices were found to be correlated with organisational performance. Hayes' Process Macro output revealed the individual coefficient between the TQM index (TQMI) and innovation performance with beta=0.74, TQMI and organisational performance with beta=0.71. The total effect of TQMI on organisational performance with beta=0.71, the direct effect of TQMI on organisational performance with beta=0.49, and indirect effect(s) of TQMI on organisational performance with beta=0.22 with p=0.000 and all 95 percent confidence internal level. The variance accounted for the role of innovation performance as a mediating factor is partial with 30.97 percent and a positive relationship between TQMI and organisational performance. The study was limited by including only one big industry in Adama city, making this may not be adequate to generalize the results for the entire Ethiopian garment industry. This study helps practitioners to understand how TQM practices support innovation performance and the role of the latter in promoting the implementation of TQM practices and ensuring organisational performance.

Keywords: total quality management, organisational performance, innovation performance, garment industry.

INTRODUCTION

Innovation plays a very important role in providing unique products and services, creating more value for organizations, and defining barriers to entry for new competitors. For this reason, innovation has sparked the interest of many researchers to identify its push factors, and one of the issues that have been considered is whether the practices of Total Quality Management (TQM) may emerge as one of the requirements for the definition of innovation strategies [1].

Innovation can reflect a significant impact on the organization's performance by enabling a better position in the market, which, in turn, will promote competitive advantage and superior performance. Thus, it was intended in this research to analyze the relationship between TQM and innovation? This relationship has been the subject of study by several authors, including [2-5], as well as the analysis of the effects of innovation on organizational performance.

Several studies have empirically demonstrated that quality management practices are positively related to innovation [3, 6, 7]. Empirical studies have pointed out that these practices can train experts and specialists in research and development, creating opportunities to implement the principles and quality management techniques in their innovative activities to find new markets and new customers, promote the sharing of knowledge, and continuously improve their systems and work processes. Thus, the adoption of quality management in innovative activities helps the organization to upgrade itself concerning customer needs, to minimize the activities that do not create value and reduce time and costs in the development of new products [8].

Although several research studies have demonstrated that TQM implementation leads to better performance results for the companies, other research studies have revealed that TQM implementation does not always lead to better performance and that the outcomes may be insignificant [9, 10] or even negative [11-13]. In fact, TQM implemented alone can no longer ensure firm performance. This system is essential but insufficient to deal with an uncertain and turbulent environment [10]. In such environment, innovation has become a growing priority within firms. Therefore, to cope with the rapid technological development and competitive pressures, several organizations have adopted an innovation strategy. Innovating in process and products has become crucial to ensure companies' survival and success.

The current study focused mainly on the three following research questions:

a) How are total quality management and innovation interrelated?

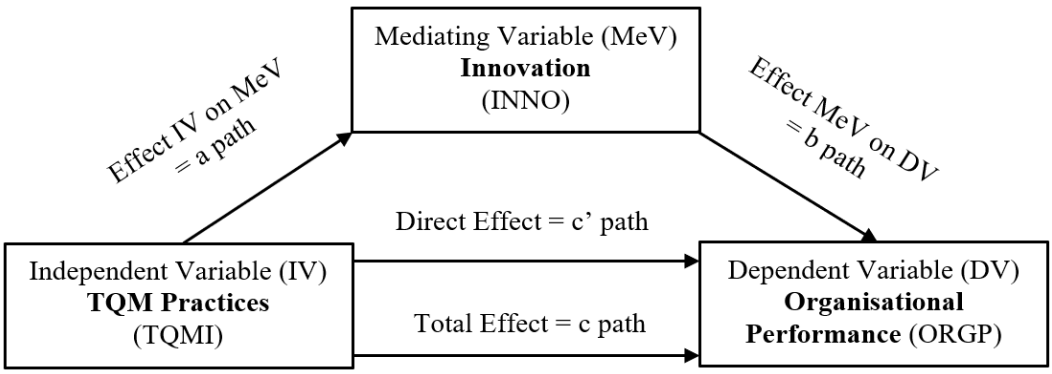
b) What is the nature of the relationship between total quality management and organisational performance?

c) What is the link between innovation and organisational performance?

This study attempts to propose and empirically test a conceptual model that links TQM, and innovation as mediating and operational performance in the case of a garment manufacturing company (Adama, Ethiopia).

LITERATURE REVIEW

It is widely recognized that TQM and innovation are considered strong contributors to improving the organizational performance. Several studies reveal that there is a relationship between TQM and innovation that may lead to different effects on organizational performance. Current researchers highlight the complexity of the relationship between TQM and innovation. The literature review suggests that there are conflicting arguments regarding the relationship between TQM and performance. TQM is considered a necessary system to ensure performance but insufficient to adapt continuously to an uncertain and turbulent environment. Some authors suggest that TQM should be implemented with other practices such as lean manufacturing practices (TPM, JIT) [14, 15] or agile manufacturing [10] or flexibility or innovation, and so on to ensure organizational performance. Likewise, a review of the literature discussing the relationship between innovation and performance argues that there are conflicting empirical findings [16]. Antunes *et al.* [1] state that firms that follow an innovation strategy can have a positive impact on their organizational performance, although they cannot benefit from innovation advantages if there is not an appropriate organization that supports this strategy. Some authors reveal that innovation and TQM are interconnected and should not be treated separately [1, 17] and consider the relationship between innovation and TQM as a platform that facilitates and enhances organizational performance. Therefore, the study of the relationship between TQM, innovation, and operational performance proves to be an interesting field of research since the previous research studies have shown contradictory results and have not clarified these relationships. The theoretical model is presented in Figure-1.



Source: Author's work, 2022.

Figure-1. Theoretical model.

Impact of TQM on Innovation

TQM is regarded as a requisite element to support innovation. Several studies have revealed that TQM is one of the enablers of innovation [18]. This perspective is based on the argument that TQM helps to provide an appropriate environment and culture to foster innovation [19, 20]. Indeed, TQM includes practices that are congruent with innovation [2].

The practice of continuous improvement is innovative in nature. This practice stimulates change and employees' creativity; it essentially requires an organizational culture that constantly encourages its members to innovate. It helps to develop and improve "the know-how" in the companies by identifying the necessary changes in processes [21, 22]. It often provides changes in companies, in terms of the introduction and development of new processes, methods, products, and services [19]. Numerous researchers have recognized positive interactions with continuous improvement as one of the success factors for process and product innovation [23, 24]. Likewise, employee empowerment and training contribute to promoting innovation. Several authors state that a high level of employee empowerment and involvement and teamwork may lead to increase product innovation [19, 21, 25].

Continuous education and training will help employees to accept and adapt more easily to environmental changes and innovation. Many researchers confirm that employees training and empowerment affect positively process and product innovation [26-29]. As for the other practices (leadership, information, and analysis (benchmarking), strategic quality planning, process

quality, etc.), they also contribute to promoting innovation [24, 30]. Added to that, it is the top management who makes the decisions concerning innovative projects (product and process innovations), which provide the necessary resources for innovation [31]. Several studies confirm that leadership influences positively innovation [24, 32]. The practice of information and analysis (benchmarking) is fundamentally innovative since its objective is to know if other firms use more efficient practices, tools, technology, and methods in order to adopt and develop them to achieve the efficiency levels of these firms [33]. A review of the literature supports the positive correlation between TQM and organizational innovation.

Several studies have found a statistically significant impact of TQM on innovation (product and process innovations) [1, 21, 24, 34-39]. The literature discussed above leads to the following hypotheses:

H1: TQM practices influence positively innovation.

Impact of Total Quality Management and Performance

The framework developed in this research proposes that TQM has a direct effect on organizational performance [40-42]. TQM is expected to improve operational and financial performance. The relationships between TQM and operational performance have been addressed in numerous studies. They show a positive link between TQM and performance.

The framework developed in this research proposes that TQM has a direct effect on organizational performance [40-47]. Samson and Terziovski [48] proposed to test a model linking TQM practices with organizational performance. Using data collected from industrial companies in Australia and New Zealand, they found that TQM practices, namely leadership, human resources management, and customer orientation, have the most significant link with operational performance.

The literature review defends the positive link between TQM practices and operational performance [49-53]. Tata *et al*. [49] have empirically found a positive effect of TQM practices on operational performance. Salaheldin's [47] finding reveals that TQM implementation has a positive impact on operational and organizational performance.

Similarly, there is a common assumption in the literature that TQM contributes heavily to the improvement of financial performance [37, 51, 54-57]. Hendricks and Singhal [58] in a study of American companies found that the implementation of quality management implies a significant improvement in financial performance. The study conducted by Najmi and Kehoe [55] on 221 companies showed that companies that have rigorously implemented quality management have obtained benefits in terms of operational and financial performance. Barker and Cagwin [56] conducted a study of 257 American companies. Their findings reveal a positive link between the use of TQM and the improvement in financial performance. Sila [57] has empirically found that implementing TQM positively influences financial and market performance. The above discussion has led to the following hypotheses:

H2: TQM practices influences positively organisational performance.

Impact of Innovation and Performance

In the current context of global and highly competitive markets, performance evaluation has become an element of great importance in the development of strategies for organizations. Performance evaluation can be defined as the process to quantify the efficiency and effectiveness of production systems [59]. There are several references to several authors in the literature about the organization's performance, standing out four main dimensions, namely, innovative performance, production performance, market performance and financial performance [60-62].

An innovation strategy may have positive effects on business performance; however, a company cannot benefit from the advantages of innovation if there isn't adequate organizational support for this strategy. This means that organizations must effectively manage the key elements in the innovation process in order to achieve success [63]. Innovation has a significant impact on the organization's performance by enabling a better position in the market, which in turn will give it a competitive advantage and a better performance [64]. Innovation is often considered a strategy, however, innovation can be assumed more as a necessity than as a competitive advantage, given the strong characterizing competition of markets, rapid technological change, and the scarcity of resources that companies have to confront in order to survive in the markets [65].

As mentioned previously, product innovation covers continuous improvement and reply to customers' need [1]. This type concerns the number of the new product, the pioneer to introduce a new product, and the effort to develop a new one. Process innovation concerns the doing ways and the use of resources in order to continuously improve firm competitiveness [16, 66]. Many research studies focus on the relationship between innovation and performance [1, 6, 67].

The literature review supports the positive relationship between innovation and organizational performance [1, 37, 68]. Anwar et al. [69] found a significant positive impact of process innovation on performance. Antunes et al. [1] empirically found that firms that strategies of process innovation get improvements in their operational and financial performance. The above discussion has led to the following hypotheses:

H3: Innovation influences positively operational performance.

RESEARCH METHODOLOGY

Population, Sample, and Survey Instrument

The target population of this study was all employees of case Ethiopian Garment Industry (Adama, Ethiopia). Questionnaires were distributed among 500 participants in the case industry. Finally, 442 useful questionnaires were filled and returned. 88.40% response rate was obtained.

This study was based on quantitative research and defined through a positivist paradigm [70], and a questionnaire was used as an information-gathering tool for the statistical processing of data. The questionnaire was designed with closed questions, using a Likert scale of five points (1=strongly disagree to 5=strongly agree) for the evaluation of the opinions of respondents about the considered dimensions. All items were positively worded.

Data Analysis and Data Collection Procedure

The statistical computer program used for the questionnaire data analysis was SPSS for Windows Version-28. Raw data were initially refined by various statistical processes *i.e.,* inter-item correlation, corrected inter-item correlation, and factor analysis.

The refined data was further analysed by using descriptive statistics by the mean and standard deviation (SD). Exploratory factor analysis was applied to refine the latent constructs of total quality management and organisational performance, and to assess the measurement model's reliability and validity. The hypotheses explaining the causal relationships between the total quality management practices, innovation, and organisational performance were tested using the Hayes' Process Macro developed by Hayes [71] was used as a statistical analysis in SPSS to estimate the path coefficients using multiple regression. The tool provides insights into the direct and indirect effect of the independent variable on the dependent variable through the existence of mediation variables.

The empirical data was collected using a five-point Likert scale questionnaire that was distributed to employees of different departments and factories in the case industry. A simple random sampling technique was used.

Measurement of Constructs

The constructs in this study were developed by using measurement scales adopted from prior studies. Total quality management practices (independent eight variables *viz.,* leadership, supplier quality management, employee involvement, customer focus and satisfaction, strategic quality planning, training and education, knowledge, continuous improvement, and information analysis (ninety items) and organisational performance factor with twelve items as a dependent variable and innovation with seven items as mediating factor measures were adopted from previous research papers published in the similar lines of this research study.

RESULTS AND ANALYSIS

Reliability of the Instrument

This section presents the reliability of the total quality management practices, innovation, and operational performance instruments. Reliability is tested using the Cronbach coefficient alpha. A coefficient alpha higher than 0.7 is considered to be good [72].

The reliability coefficient (alpha) of each dimension of TQM was as follows: supplier quality management=0.84, employee involvement=0.98, strategic quality planning=0.80, training and education=0.91, and knowledge, continuous improvement=0.78, and the reliability coefficients of innovation and organisational performance were 0.86 and 0.81. The results of the reliability are summarized in Table-1.

Factor Analysis

A principal component factor analysis was conducted to validate the underlying structure of the total quality management practices and organisational performance (Table-1). The Result of the factor analysis indicated the existence of five significant dimensions with Eigenvalues greater than one. The KMO measure of sampling adequacy value for the items listed below (Table-1) indicating sufficient intercorrelations the Bartlett's Test of Sphericity was also found to be significant (i.e., KMO and Bartlett's Test: Kaiser-Meyer-Olkin Measure of Sampling Adequacy=0.90; Bartlett's Test of Sphericity: Approx. Chi-Square=9327.90, Sig.=0.000).

Table-1. Factor analysis results-TQM practices, N=442.

Item Code	Factor					Communalities
	TE	SM	SQP	KC	EI	> 0.5
Training and Education (TE)						
TE5	0.80					0.70
TE7	0.79					0.70
TE4	0.75					0.69
TE8	0.74					0.63
TE6	0.70					0.64
TE3	0.70					0.65
TE1	0.64					0.61
TE10	0.61					0.54
TE11	0.59					0.53
Supplier Quality Management (SM)						
SM6		0.81				0.73
SM7		0.80				0.72
SM8		0.73				0.69
SM5		0.71				0.64
Strategic Quality Planning (SQP)						
SQP1			0.77			0.70
SQP2			0.71			0.71
SQP3			0.64			0.61
SQP4			0.61			0.60
Knowledge, Continuous Improvement (KC)						
KC5				0.78		0.68
KC7				0.77		0.69
KC6				0.74		0.64
Employee Involvement (EEI)						
EI12					0.77	0.73
EI13					0.72	0.71
EI1					0.60	0.67
Alpha	0.91	0.84	0.80	0.78	0.77	> 0.7
Eigenvalues	9.25	2.33	1.49	1.19	1.04	> 1
% Variance	40.25	10.15	6.48	5.20	4.52	
Cumulative %	40.25	50.40	56.88	62.08	66.61	> 60%

Source: Computation (using SPSS-28) based on data from author's field work.

These dimensions were five practices listed under TQM namely TE (9 items), SM (4 items), SQP (4 items), KC (3 items), and EI (3 items), respectively. And seven and twelve items are listed under INNO and ORGP. Five factors were extracted based on eigenvalues greater than 1 with a total explained variance of 60.01% which is above the threshold value of 60% [73].

Descriptive and Bivariate Correlation Analysis

Table-2 indicates that respondents of the case garment company perceived supplier quality management (SM) (with the highest mean (M) scores=3.15) to be the most dominant TQM practice, the second one as knowledge, and continuous improvement (M=3.00), and evident to a considerable extent, followed by strategic

quality planning (M=2.88), employee involvement (M=2.87), and training and education (M=2.58), which were all rated as little lowest practices by respondents of the case company. Regarding innovation (INNO) the mean score was 3.02 and organisational performance (ORGP) with a mean of 3.25.

Correlation is a measure of relationship between two variables. The correlation coefficient gives a mathematical value for measuring the strength of the linear the relationship between two variables. It can take values from -1 to 1 [74]. According to Kline [75], a correlation matrix is defined as a set of correlation coefficients between a number of variables. The SPSS-28 version was used to construct a correlation matrix using the variables in the questionnaire to show the strength of the relationship among the variables considered in the questionnaire.

As shown in Table-2, the correlation matrix indicates that TQM practices were positively and moderately/medium correlated with organisational performance (ORGP). The highest coefficient of correlation in this study between TQM practices and organisational performance (ORGP) is 0.64** and TQM practices and INNO is 0.64**, which is below the cut-off of 0.90 for the collinearity problem. Thus, the multicollinearity problem does not occur in this research [73]. These correlations are also further evidence of the validity and reliability of measurement scales used in this research [73].

There was a significant positive and large relationship between KC and ORGP (r=0.61**, p≤0.01) and EI and ORGP (r=0.51**, p≤0.01). It was followed by a positively and medium correlation for SQP and ORGP (r=0.47**, p≤0.01), and a positive and small correlation for SM and ORGP (r=0.43**, p≤0.01) [76]. In other words, the results indicate that the most important TQM practice on ORGP was KC (r=0.61**), and TQM practices on EI was (r=0.51**), which goes to prove that KC was perceived as a dominant TQM practice; improvements in INNO and ORGP levels were significant.

Table-2. Mean, Standard deviations, and correlations of the TQM practices and organisational performance.

Variable	M	SD	KC	EI	TE	SM	SQP	TQMI	INNO	ORGP
KC	3.00	0.94	*0.78*							
EI	2.87	0.96	0.57**	*0.77*						
TE	2.58	0.88	0.51**	0.64**	*0.91*					
SM	3.15	0.88	0.39**	0.35**	0.44**	*0.84*				
SQP	2.88	0.82	0.35**	0.42**	0.48**	0.38**	*0.80*			
TQMI	2.97	0.66	0.77**	0.79**	0.78**	0.63**	0.63**	*0.80*		
INNO	3.02	0.86	0.50**	0.41**	0.39**	0.34**	0.43**	0.57**	*0.86*	
ORGP	3.25	0.73	0.61**	0.51**	0.38**	0.43**	0.47**	0.65**	0.61**	*0.81*

Note. **. Correlation is significant at the 0.01 level (2-tailed), N=442, M=mean, SD=Standard deviation, KC=Knowledge and continuous improvement, EI=Employee involvement, TE=Training and education, SM=Supplier management, SQP=Strategic quality planning, TQMI=Total quality management index, INNO=Innovation, ORGP=Organisational performance; Diagonal bold and italic values are Cronbach coefficient alpha; Pearson Correlations Scale: small: ±0.1-0.3; medium: ±0.3-0.5; large: ±0.5-1.0 [76]

Source: Computation (using SPSS-28) based on data from author's field work.

Regression Analysis

Regression analysis is used to assess the relationship between one dependent variable (DV) and several independent variables (IVs) [73, 74]. It is employed to test the research hypotheses. There are three major types of multiple regression-standard multiple regression, hierarchical or sequential regression, and stepwise or statistical regression. In this study standard multiple regression is used and all the IVs are entered into the equation together to understand the relationships between TQM practices, innovation, and organisational performance.

Step 1: Checking the Assumptions for Multiple Regression

a) Sample Size: Tabachnick and Fidell [77] give a formula for calculating sample size requirements, taking into account the number of independent variables that you wish to use: N>50+8m (where m=number of independent variables). In this study there are five independent variables (five TQM practices), therefore 90 cases are needed. More cases are needed if the dependent variable is skewed. In this study 442 sample sizes/cases were considered, which satisfied the sample size condition for conducting multiple regression analysis.

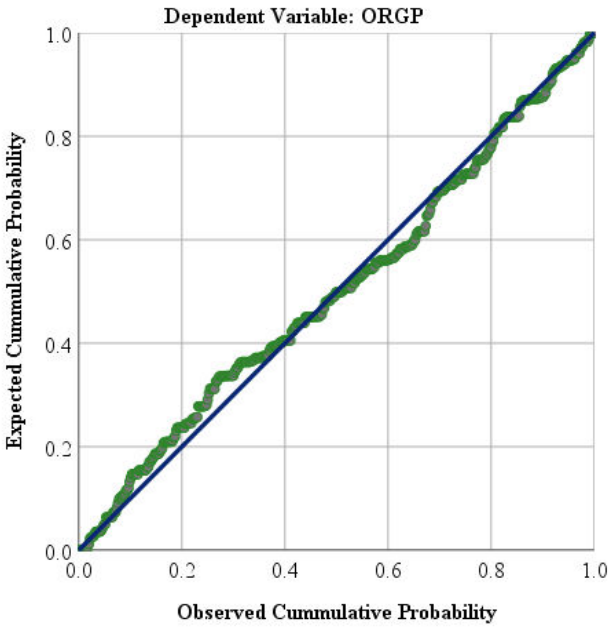
b) Multicollinearity: This refers to the relationship among the independent variables. Multicollinearity exists when the independent variables are highly correlated (r=0.9 and above). The highest coefficient of correlation in this research, however, is 0.79 which is below the cut-off of 0.90 for the collinearity

problem. Further, the correlation between every five independent variables is between 0.35-0.64. The correlation coefficient between the independent variables and dependent variable was less than 0.90, indicating that the data was not affected by a collinearity problem [73]. Hence, collinearity and multicollinearity do not represent data problems in this research study.

Tolerance is an indicator of how much of the variability of the specified independent is not explained by the other independent variables in the model and is calculated using the formula 1-R-square for each variable. If this value is very small (less than 0.10), it indicates that the multiple correlations with other variables is high, suggesting the possibility of multicollinearity. The other value given is the variance inflation factor (VIF), which is just the inverse of the tolerance value (1 divided by tolerance). VIF values above 10 would be a concern here, indicating multicollinearity [78].

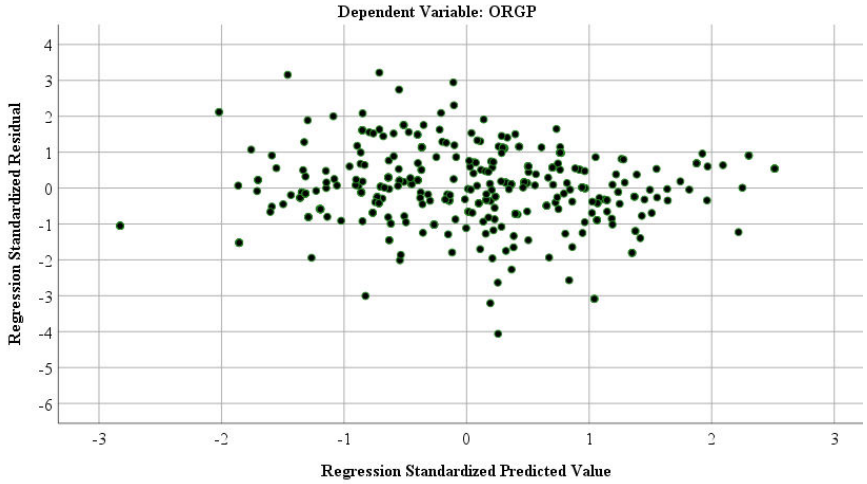
In this study the tolerance value for each independent variable is 0.675, which is not less than 0.10; therefore, not violated the multicollinearity assumption. This is also supported by the VIF value, which is 1.481, which is well below the cut-off of 10. The finding indicated that the model had no serious multicollinearity problem [73].

c) Outliers, normality, linearity, homoscedasticity, independence of residuals: These assumptions can be checked is by inspecting the residuals scatterplot and the normal probability plot of the regression standardised residuals. In the normal probability plot, points will lie in a reasonably straight diagonal line from the bottom left to the top right. This would suggest no major deviations from normality. In the scatterplot of the standardised residuals, the residuals will be roughly rectangular distributed, with most of the scores concentrated in the centre (along the 0 points). The presence of outliers can also be detected from the scatterplot. Tabachnick and Fidell [77] define outliers as cases that have a standardised residual (as displayed in the scatterplot) of more than 3.3 or less than -3.3. Figures 2 and 3 showed that there is no clear relationship between the residual and the predicted values which is consistent with the assumption of linearity. Further, because no univariate outliers were found, case-wise plots were not necessary. If they had been produced, then these plots would have identified outlying cases with standard deviations greater than 3.



Source: Computation (using SPSS-28) based on data from author's field work.

Figure-2. Normal P-P plot of regression standardized residual.



Source: Computation (using SPSS-28) based on data from author's field work.

Figure-3. Scatter plot.

Step 2: Evaluating the multiple regression model

The details of the overall model summary and multiple regression output are shown in Table 3. From Table 3, the Durbin-Watson index lies within the range of 1.50-2.50, suggesting that there was no autocorrelation problem in the data [79]. Also, from Table-3, each of the variables had a tolerance value of more than 0.10 and a variation inflation factor (VIF) of less than 10. The finding indicated that the model had no serious multicollinearity problem [73] as also found in Pearson's correlation analysis in the previous section. This indicated that there is a statistically significant relationship between TQM practices, innovation, and organisational performance. From these analyses, it can be concluded that the multiple regression model of this study meets all the assumptions (See Step-1) required to ensure the validity of its significance test.

The hypotheses in this study test the practices of TQM (named as TQM index-TQMI): KC, EI, TE, SM, and SQP as the independent variables to determine if there is an impact on INNO and ORGP. Multiple regression analysis was employed to test the impact of TQMI on INNO, INNO on ORGP, TQMI on ORGP, and TQMI and INNO on ORGP (Table-3).

Table-3. Regression analysis of TQM practices, innovation, and organisational performance.

Model - 1 TQMI-INNO	**R**	**R-Square**	**Adj. R-Sq.**	**F-value**	**SE**	**Sig.**	**D-W**	**Result**
	0.570	**0.325**	**0.323**	**211.671**	**0.7145**	**0.000**	**1.255**	H1: Accepted
IV(s)	Unstd. Coeff.		Std. Coeff.	t-value	Sig.	Collinearity Statistics		
	B	*SE*	*β*			*Tol.*	*VIF*	
(Constant)	0.809	0.156		5.194	0.000			
TQMI	0.744	0.051	0.570	14.549	0.000	1.000	1.000	
Model - 2 TQMI-ORGP	R	R-Square	Adj. R-Sq.	F-value	SE	Sig.	D-W	Result
	0.852	0.425	0.423	324.728	0.5570	0.000	1.163	H2: Accepted
IV(s)	Unstd. Coeff.		Std. Coeff.	t-value	Sig.	Collinearity Statistics		
	B	*SE*	*β*			*Tol.*	*VIF*	
(Constant)	1.120	0.121		9.223	0.000			
TQMI	0.718	0.040	0.652	18.020	0.000	1.000	1.000	
Model - 3 INNO-ORGP	R	R-Square	Adj. R-Sq.	F-value	SE	Sig.	D-W	Result
	0.611	0.373	0.371	261.458	0.5816	0.000	1.058	H3: Accepted
IV(s)	Unstd. Coeff.		Std. Coeff.	t-value	Sig.	Collinearity Statistics		
	B	*SE*	*β*			*Tol.*	*VIF*	
(Constant)	1.698	0.100			0.000	0.000		
INNO	0.516	0.032	0.611	16.170	0.000	1.000	1.000	
Model - 4 TQMI, INNO-ORGP	R	R-Square	Adj. R-Sq.	F-value	SE	Sig.	D-W	Result
	0.714	0.509	0.507	227.846	0.5150	0.000	1.162	Innovation mediated partially accounted for 30.97 %
IV(s)	Unstd. Coeff.		Std. Coeff.	t-value	Sig.	Collinearity Statistics		
	B	*SE*	*β*			*Tol.*	*VIF*	
(Constant)	0.878	0.116		7.592	0.000			
TQMI	0.299	0.034	0.354	8.705	0.000	0.675	1.481	
INNO	0.496	0.045	0.450	11.055	0.000	0.675	1.481	

Note. Dependent Variable (DV): Organisational performance (ORGP); IVs=Independent Variable(s); Unstd. Coeff.=Unstandardized Coefficients; Std. Coeff.=Standardized Coefficients; SE=Standard Error; Sig.=Significance; D-W=Durbin-Watson Significant at: $p<0.01$ ($t\geq1.96$), $p<0.05$ ($t\geq2.58$), and $p<0.001$ ($t\geq3.29$) levels; H=Hypothesis; Adj.R-Sq.=Adjusted R-Square

Source: Computation (using SPSS-28) based on data from author's field work.

The proposed models for TQMI and INNO, INNO and ORGP, TQMI and ORGP, and TQMI, INNO, and ORGP (Table-3) were adequate as the F-statistics (p-value=0.000) was significant at the 1 percent level ($p \leq 0.01$). This indicated that overall models were a statistically significant relationship between TQMI and INNO, INNO, and ORGP, TQMI and ORGP, and TQMI, INNO and ORGP. From Table-3, it can be observed that the coefficient of determination (R-square) was 0.325, representing that 32.5 percent of INNO can be explained by the TQMI (*i.e.,* four practices of TQM), 37.3 percent of ORGP can be explained by the INNO, 42.5 percent of ORGP can be explained by the TQMI, 50.9 percent of ORGP can be explained by the TQMI and INNO.

This indicated that the overall model(s) was a statistically significant and positive relationship between TQM practices and ORGP (Table 3). To judge the magnitude of effects in this study, Cohen's rules for effect sizes can be used. According to Cohen [80] R-square between 1.0 and 5.9 percent is considered small, between 5.9 and 13.8 percent is medium, and above 13.8 percent is large. Thus, the effect size for this study is large and H1, H2, and H3 were fully supported.

Mediation Analysis by Hayes Process Macro

Several statistical methods have been used to examine the effect of a third (fourth, etc.) variable on the relationship between the independent and dependent variables. These include multiple regression analysis [80], structural equation models [75, 82], Sobel test [83], and Hayes SPSS Process Macro [71].

In this study, the sample size is 442, which meets the criterion for conducting structural equation modeling (SEM) analysis by Analysis of Moment Structures (AMOS) and path least square (SmartPLS) software, but due to time constraints, Hayes PROCESS macro [71] in IBM SPSS version-28 was used to validate the findings in the study. Furthermore, the Hayes PROCESS macro can be used to test a serial mediation hypothesis (Models-90 plus available in Hayes PROCESS macro) [71].

The Hayes [71] method is applied and discussed here. The PROCESS macro tests the indirect effects using the normal theory-based product of the coefficient approach [83]. A mediation analysis was conducted using Hayes' Process Macro (Model-2) (Table 4). Innovation (INNO) as the mediator has been input as a covariate into Hayes' Process Macro (Model-4 PROCESS macro). A bootstrapping method was performed using SPSS Process Macro to examine if innovation mediated the relationship between TQM practices and ORGP (Tables 3 and 4). In total, 5000 biased bootstrap samples were done to find the approximate standard errors; the finding reflects a 95% confidence interval.

Table-4. Mediation analysis.

Variable	**B**	**SE**	**t**	**p**	**95% CI**	
Effect					**LLCI**	**ULCI**
TQMI→INNO	0.744	0.051	14.549	0.0000	0.6436	0.8446
TQMI → ORGP	0.496	0.045	11.055	0.0000	0.4077	0.5841
TQMI→ INNO→ORGP	0.299	0.034	8.705	0.0000	0.2316	0.3666
Effect	B	SE	t	p	*LLCI*	*ULCI*
Direct	0.496	0.044	11.054	0.0000	0.4077	0.5841
Indirect	0.222	0.029			0.1671	0.2822
Total	0.718	0.039	18.020	0.0000	0.6401	0.7968
Note. LL=Lower level, UL=Upper level; CI = Confidence interval; Based on 5000 bootstrap samples						

Source: Computation (using Hayes SPSS Process Macro, SPSS-28) based on data from author's field work.

First, the results of the regression analysis show that the TQM practices (independent variable) were a significant predictor of innovation (B=0.570, t=14.549, p=0.0000<0.001). Next, while controlling for innovation (mediator), the results of the second regression analysis show that TQM practices are a significant predictor of organisational performance (ORGP) (dependent variable (B=0.652, t=18.020, p=0.0000<0.001). The results of the indirect effect based on 5000 bootstrap samples show a significant indirect positive relationship between TQM practices and ORGP mediated by innovation (a=0.744 x b=0.299=0.2224, Bootstrap confidence interval (CI) at 95, LLCI=0.15, ULCI=0.34). The mediator, innovation, accounted for approximately 30.97% of the total effect on ORGP. On the other hand, there was no statistically significant direct effect between TQM practices and ORGP (B=0.496, t=11.054, p=0.0000<0.001).

As per Table-4, the variance accounted for (VAF) was calculated using the following formula:

VAF=Indirect effect ÷ Total effect
VAF = 0.224 ÷ 0.718 = 0.3097 = 30.97%

The result produced a VAF value of 0.4532, based on the rule of thumb given by Hair et al. [84], which stated that if VAF>80%, it is full mediation-

20%≤VAF≤80%; partial mediation and there is no mediation if VAF<20%. Hence, it suffices to say that innovation partially mediates the relationship between TQM practices and operational performance.

CONCLUSIONS

The current research provides empirical justification for a framework that describes the relationship between TQM, innovation, and organisational performance. It examines three research questions: (i) Does TQM practices support innovation strategy? (ii) Does TQM practices support organizational performance? (iii) Do companies with a high level of innovation have a high level of organisational performance?

This paper provides empirical evidence to support conceptual and prescriptive statements in the literature regarding the effect of TQM and innovation on organisational performance and the interdependency between TQM and innovation.

Indeed, this study provides empirical evidence that TQM is indirectly related to organisational performance, while innovation is directly related to organisational performance. The results also show that innovation can lead to improved organisational performance.

Furthermore, this provides empirical evidence to support the mediating role played by the innovation process and production in the explanation of the relationship between TQM and organisational performance.

From a managerial point of view, this work has given rise to results that are likely to interest practitioners looking for enhancing their innovation strategy and their organisational performance. First, it shows the importance of implementing the TQM practices system in supporting innovation strategy. It helps practitioners to understand how TQM practices could enhance and support innovation strategy. Accordingly, it is pertinent to suggest an effective implementation of TQM practices. Second, it shows the importance of adopting an innovation strategy in order to improve the organisational performance and also to create an appropriate environment to support the TQM strategy. This study clearly reveals that TQM practices are essential but insufficient to ensure and enhance organisational performance. Therefore, it is essential to recommend for practitioners an efficient set up of innovation strategy.

This research can also provide teaching implications. It may be useful for teachers, students, and researchers seeking to understand the notion of TQM and innovation (definition and utility) and the relationship that may exist between TQM practices and innovation types on the one hand and the relationship that may exist between aforementioned variables and organisational performance on the other. An Innovation system may also play a part in the development of an innovation culture based on generating new ideas, problem-solving, failure tolerance, and a participative style of management.

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