

# Leadership of Top Management in TQM: Mediator Between the Implementation of TQM in University and Performance of Employees

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**Abstract**—Improving the quality of teaching and learning in universities has always been the goal of universities. Especially for new universities, they need to use teaching quality to enhance their visibility and reputation. This is why TQM, which is widely used in commercial enterprises, is being practiced in universities. However, the implementation of TQM in universities has been criticized. Studying how to effectively implement TQM to improve staff performance has become a difficult problem for universities. Previous research has shown that the implementation of TQM has a positive impact on top management leadership. In turn, leadership has a promotional effect on employee performance. Therefore, this study uses the SEM approach to address the difficult problem of TQM implementation in universities in China's Henan Province, using a new university as an example. This provides constructive suggestions for universities to improve the quality of teaching and learning.

**Keywords**—Leadership; top management; TQM; university.

## I. INTRODUCTION

In order to solve the development problems and improve the quality of education, universities began to focus on the concept of total quality management (TQM) which was widely applied and deeply implemented in the business and service industry (Jabbarzare & Shafiqhi, 2019). Some scholars analyzed the enlightenment of TQM for educational management, and explored its significance to educational reform, and tried to introduce it into educational management. Yusuf (2023) pointed out that the advanced thought brought by TQM has profound and enlightening significance to the quality management of universities. It will affect the way people think and act, penetrate into the culture of universities, and exert a subtle influence on the internal management of universities. The most successful aspect of implementation of TQM in universities lies in defining the responsibilities, rights and interests of all kinds of personnel and effectively strengthening the cooperation between teaching staff and management. However, researchers and practitioners of TQM application in universities have also made a lot of reflection. Because many universities gave up after implementing TQM for several years. Hunt & Boliver (2020) point out that TQM has had positive experiences in business organizations, but limited success in educational management. How can we make TQM model as a management tool to pursue high quality standards and better serve the management of

universities is the breakthrough of our research. This study is limited to newly-established university. Because the lower ranking, the more need for standardized institutional constraints.

## II. DEVELOPMENT OF HYPOTHESIS

*The relationship between TQM implementation and Leadership of top management*

Many scholars have studied the relationship between top management leadership and TQM. Yadeta et al. (2022) surveyed 203 leaders and found that different leadership styles had different effects when implementing TQM. Chen (2022) analyses the soft factors in TQM practice through a multi-layered hierarchical decision-making test and evaluation laboratory approach. He identifies executive leadership as one of the soft factors for successful TQM implementation. TQM strongly influences the quality of teaching and learning in universities (Yusuf, 2023), and executive leadership plays an important role in the organization. Therefore, we hypothesize that:

H1: There is a significant positive impact of TQM implementation and top management leadership. Figures and Tables.

*The relationship between leadership of top management and employee performance*

American management guru Peter Senge (1990) believes that leadership is the ability of those who work together in an organization to create a good reality together. Therefore, leadership is the ability of a leader to inspire and motivate his or her subordinates and to be able to lead them to work together to achieve a common goal (Nindie, 2022). Ashiru et al. (2022) verified that organizational high performance work systems differ between leaders and employees and that different perceptions of high-performance work systems have different effects on employee performance. Purwanto (2022) used random sampling to verify that transformational leadership has a positive and significant effect on employee performance and performance. Universities are characterized by academic freedom, professor governance, flexible work and difficult teaching quality assessment. However, TQM requires to strengthen control and strictly implement the

management process. Using TQM to address teacher performance can better address the issues of the day. Therefore, we hypothesize that:

H2: There is a significant positive impact of employee performance and top management leadership.

*The relationship between leadership of top management, TQM implementation and employee performance*

The advanced thought brought by TQM has profound and enlightening significance to the quality management of universities. It will affect the way people think and act, penetrate into the culture of universities, and exert a subtle influence on the internal management of universities (Yusuf, 2023). The key factor to eliminate the obstacles of TQM implementation lies in people's understanding of TQM concept. This requires the leadership of top executives to make TQM a corporate culture that is ingrained in every employee. Wagimin et al. (2019) found that transformational leadership had a positive impact on total quality management and employee performance. Vihari (2022) discovered that TQM practices had a positive impact on employees' job role performance and that executive leadership played a positive role. Therefore, we hypothesize that:

H3: Leadership of top management has significant mediation effect between TQM implementation and employee performance.

In summary, the implementation of TQM in the education sector has had a significant impact on improving the quality and efficiency of teaching and management. However, the non-quantifiable nature of education and the flexible management model of teachers make the effective implementation of TQM difficult. To address this issue, the model proposed in this study (FIG 1) suggests that top management leadership contributes to the implementation of TQM in higher education. Universities are ultimately able to achieve the goal of improving employee performance.

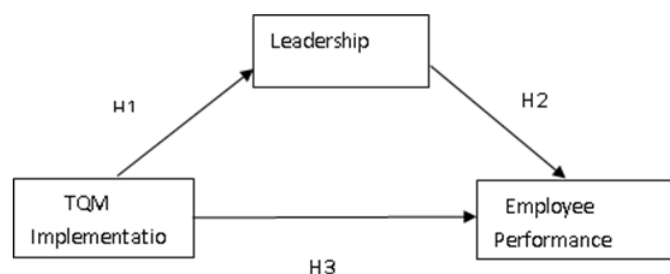


Fig. 1. The proposed theoretical model

III. RESEARCH METHODOLOGY

*Sample and procedure*

We take the example of newly established university in Henan Province, China. The data for the study comes from a survey on the implementation of TQM in the newly established university in Henan, China. We chose newly established university in Henan Province because of the relatively weak educational resources in the province. Respondents included teachers, students and university

administrators from the newly established universities in the area. We sent 700 questionnaires to all the newly established universities in Henan Province. Each participant received a questionnaire with an accompanying letter stating the purpose of the study and instructions on how to answer the questionnaire. Data were collected between January 2023 and February 2023, and a random sampling method was used to select the sample for this study. In the 29th February, we have received 463 questionnaires. The questionnaire recall rate was 66%. Since questionnaire response rates for social science research tend to be low, a response rate of 66% is acceptable (Sekaran and Bougie, 2013). Of these, 99.57% of questionnaires were collected through WeChat and 0.43% through link.

We used SPSS statistical software to clean 463 samples, and eliminated the short answer time, sample repetition, data problems, logical contradictions, and a large number of repeated answers, such as all the data selected "strongly agree". The questionnaires whose answer time was less than 15 seconds were treated as invalid questionnaires and marked as ERROR. 27 questionnaires are invalid due to short answer time. There is no repeated sample, outliers and missing value. Then sample with repeated answers are selected. We created a new variable, total, to calculate the score for each variable. Then we calculated the frequency of total to show the choices. According to the result, the answers to the questionnaire are not concentrated with a certain choice, so 436 questionnaires can be retained. Only 436 questionnaires were valid and could be used in this study.

*Questionnaire items*

The questionnaire was derived from relevant literature and previous research questionnaires. The content of the research questionnaire consists of three parts. The first part contains basic personal information, including gender, age, position or title, and education level. The second part is executive leadership, including school vision, quality improvement initiatives, cultural rendering, organizational structure optimization and motivation. The third part is the implementation of TQM, including training, process design, file specification, equipment security and supervision. The fourth part is staff performance,

Likert scales were used to measure these variables, namely, 1- strongly disagree, 2- disagree, 3- uncertain, 4- agree and 5- strongly agree. The questionnaire is in the appendix.

IV. FINDINGS

*Sample profile*

In this study, 62.2% of the sample are female and 37.8% are male. Of the respondents, 20.8% are between the ages of 18 and 25, 23.6% are between the ages of 26 and 35, 34.4% are between the ages of 36 and 45, 18.6% are between the ages of 45 and 50 and 2.6% are over 50. All the universities studied use different approaches to quality management. Of these, 56% were private universities and 44% were public universities

Reliability and validity tests

The variables are subjected to KMO and Bartlett's sphericity test. The results show that the KMO value is 0.966, which is greater than 0.7. And the Bartlett test chi-squared value of 9326 with a p-value of 0.000 reaches its level of significance. Both tests indicate that the sample is suitable for principal component analysis. The Commonality of all factors is greater than 0.7. The variance of the variables can be explained by the principal components at 70% or more. The cumulative variance is 79.964%, which exceeds the standard value by 50%. The factor loadings are all in the range of 0.83-0.93, which is greater than the standard value of 0.6. This indicates that the 3 dimensions can be effectively reflected by each measure. The Cronbach's alpha values for each dimension were greater than 0.9, which exceeded the standard value of 0.7. This indicates that the internal consistency of the measures within a single dimension is good. The values for CR and AVE are greater than the standard values of 0.7 and 0.5 respectively. This indicates that the convergent validity of the model is good (Table 1).

TABLE 1. Reliability and convergence validity examination

Constructs/ indicators	Unstandardized estimates	S.E.	Critical Ratio	P-value	Standardized estimates	Cronbach's $\alpha$	CR	AVE
Leadership	LS1	1			0.878	0.959	0.959	0.824
	LS2	1.012	0.034	30.045	0.917			
	LS3	1.021	0.033	30.805	0.927			
	LS4	0.979	0.034	28.992	0.903			
	LS5	0.99	0.033	29.738	0.913			
TQM Implementation	TQM1	1	0.026	37.909	0.932	0.969	0.969	0.863
	TQM2	0.965	0.025	39.044	0.939			
	TQM3	0.996	0.028	35.263	0.913			
	TQM4	0.97	0.026	37.873	0.932			
	TQM5	1			0.929			
Employee	EP1	1			0.905	0.958	0.958	0.851
	EP2	1.031	0.029	35.438	0.94			
	EP3	0.984	0.03	32.372	0.912			
	EP4	1.035	0.03	34.465	0.932			

Goodness-of-Fit Test

When the model is tested for goodness of fit using AMOS 24.0 software, the  $\chi^2/df$ , GFI, AGFI, TLI, CFI, RMSEA and SRMR of the model are found to meet the standard values of the indicators. The  $\chi^2/df = 2.875$ , GFI = 0.942, AGFI = 0.914, TLI = 0.982, CFI=0.986, RMSEA=0.064, SRMR=0.0118. It can be concluded that the sample model has a good fit (Table 2).

TABLE 2. Goodness of fit index of structural equation model

Fitted indicators	$\chi^2/df$	GFI	AGFI	TLI	CFI	RMSEA	SRMR
Reference values	<3	>0.900	>0.900	>0.900	>0.900	<0.08	<0.08
Test value	2.875	0.942	0.914	0.982	0.986	0.064	0.0118

V. MODEL HYPOTHESIS TESTING

Direct effects test

Based on Table 3, the standardized path coefficients for H 1, H 2 and H 3c are 0.861, 0.22 and 0.772, respectively. All P values are less than 0.05 and the hypothesis is valid.

TABLE 3. The test results of path relationship

Hypothesis	Path	Unstandardized		Z-value	P	standardized		Result
		Estimate	S.E.			Estimate		
H1	TQM Implementation $\rightarrow$ Leadership	0.846	0.038	22.421	***	0.861		approved
H2	Leadership $\rightarrow$ Employee Performance	0.218	0.036	5.987	***	0.22		approval
H3	TQM Implementation $\rightarrow$ Employee Performance	0.75	0.04	18.739	***	0.772		approval

Intermediary effects test

Bootstrapping was used to test the significance of the mediating effect of executive leadership with a confidence interval of 95% for a sample of 1,000 draws. Based on the results of Mackinnon et al. (2004), the non-parametric Bootstrap method of bias correction was found to be optimal. Therefore, only the confidence intervals for Bias-corrected are reported in this study. According to the results of the mediating effect test (Table 4), there is a significant mediating effect of executive leadership (confidence intervals do not contain 0,  $p < 0.05$ ).

TABLE 4. The mediating effect of Bootstrapping

Path	Point Estimate	SE	Z-value	Lower	Upper
TQM Performance @ Leadership	0.846	0.046	0.001	0.76	0.944
Leadership @ Employee Performance	0.218	0.066	0.001	0.104	0.384
TQM Performance @ Employee Performance	0.75	0.067	0.001	0.615	0.879

VI. CONCLUSION

Our research is to establish the mediator effect of Leadership of top management in TQM between the implementation of TQM in universities and performance of employees, especially in local newly established universities which have less education resources. Through analysis, we found that Leadership of top management in TQM as a mediator between the implementation of TQM in universities and performance of employees plays a significant role. This confirms H1. The analysis shows that the employees accept the concept of quality control and show a positive state of work in the process of the management from the definition of concept to the promotion of TQM implementation. This shows that TQM culture and university culture can be gradually integrated. Which changed the employee's initiative and execution. That's a good proof of H2. It can be seen from the table that the internal governance of universities has a positive impact on the implementation of TQM.

The management's clear concept of TQM and the promotion of its implementation promote the implementation effect of TQM, and then promote the improvement of internal governance. That's a good proof of H3.

Therefore, we should pay more attention to people's understanding and recognition of the TQM, and infiltrate the advanced ideas of TQM into the universities management, so as to enhance the strength of newly-established universities and optimize their management ability

APPENDIX: QUESTIONNAIRE

SECTION A: Respondents Profile

Please tick (✓) the most suitable answer in the box provided.

- 1. Gender  
 Male       Female
- 2. Highest level of education  
 Diploma/certificate     Undergraduate degree  
 Postgraduate degree
- 3. Age  
 18 and 25     26-35     36-45     46-50     50 and above
- 4. Form of ownership of your university  
 private university       public university

SECTION B: Items of variables

Please indicate your responses to the following statements by ticking (✓) for the best answer that reflects the relationship between leadership, TQM implication and employee performance, in one of the boxes which rates your level of agreement from number 1 to 5. Choose from the following questions, 1- strongly disagree, 2- disagree, 3- uncertain, 4- agree and 5- strongly agree.

Cod <sup>12</sup>	Items <sup>12</sup>	Strongly disagree <sup>12</sup>	Disagree <sup>12</sup>	Neutral <sup>12</sup>	Agree <sup>12</sup>	Strongly Agree <sup>12</sup>
LS <sup>12</sup>	<b>Leadership<sup>12</sup></b>	1 <sup>12</sup>	2 <sup>12</sup>	3 <sup>12</sup>	4 <sup>12</sup>	5 <sup>12</sup>
LS1 <sup>12</sup>	Top management develops a university vision that incorporates quality value, performance expectation and focus on student and other stockholders. <sup>12</sup>	1 <sup>12</sup>	2 <sup>12</sup>	3 <sup>12</sup>	4 <sup>12</sup>	5 <sup>12</sup>
LS2 <sup>12</sup>	Top management provides the guidance, means, and encouragement for all workers to follow for success. <sup>12</sup>	1 <sup>12</sup>	2 <sup>12</sup>	3 <sup>12</sup>	4 <sup>12</sup>	5 <sup>12</sup>
LS3 <sup>12</sup>	Top management has a process in place to develop their awareness of the concept of TQM. <sup>12</sup>	1 <sup>12</sup>	2 <sup>12</sup>	3 <sup>12</sup>	4 <sup>12</sup>	5 <sup>12</sup>
LS4 <sup>12</sup>	Top management reengineered and developed the organizational structure to suit the TQM concept. <sup>12</sup>	1 <sup>12</sup>	2 <sup>12</sup>	3 <sup>12</sup>	4 <sup>12</sup>	5 <sup>12</sup>
LS5 <sup>12</sup>	Top management provides appropriate awards for person who brings up the ideas and method of improving the quality	1 <sup>12</sup>	2 <sup>12</sup>	3 <sup>12</sup>	4 <sup>12</sup>	5 <sup>12</sup>
TQM <sup>12</sup>	<b>TQM Implementation <sup>12</sup></b>	1 <sup>12</sup>	2 <sup>12</sup>	3 <sup>12</sup>	4 <sup>12</sup>	5 <sup>12</sup>
TQM1 <sup>12</sup>	Occupational health and teaching ability training are excellent. <sup>12</sup>	1 <sup>12</sup>	2 <sup>12</sup>	3 <sup>12</sup>	4 <sup>12</sup>	5 <sup>12</sup>
TQM2 <sup>12</sup>	Our processes are effectively designed to reduce employee error. <sup>12</sup>	1 <sup>12</sup>	2 <sup>12</sup>	3 <sup>12</sup>	4 <sup>12</sup>	5 <sup>12</sup>
TQM3 <sup>12</sup>	Standardized and documented operating procedure. <sup>12</sup>	1 <sup>12</sup>	2 <sup>12</sup>	3 <sup>12</sup>	4 <sup>12</sup>	5 <sup>12</sup>
TQM4 <sup>12</sup>	Safety equipment and proactive devices have been provided by the organization. <sup>12</sup>	1 <sup>12</sup>	2 <sup>12</sup>	3 <sup>12</sup>	4 <sup>12</sup>	5 <sup>12</sup>

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