

Evaluating Critical Success Factors in Total Quality Management Implementation in Education Institutions

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Abstract. Facing a competitive global challenge, qualified products and services are necessarily needed. The decline of product or service quality may decrease customer satisfaction. Quality management is the most suitable approach to cope with current needs and demands on globalization. Education institutions need to apply the principles of quality management to improve quality and perform continuous improvement. This research aims to identify the critical success factors in Total Quality Management implementation in education institutions. Principle Component Analysis with Promax rotation is used for extracting such factors. The correlation within factors was identified using Pearson's correlation and Spearman's coefficient. The resulted factors consist of teaching staff and employee management, individual service quality, inter-departmental service quality, and departmental service quality. Correlation analysis using Pearson's correlation and Spearman's coefficient indicates positive values for all factors signifying a monotonic relationship. The strongest correlation occurred towards teaching staff and employee management and staff and student satisfaction.

Keywords: critical success factor, Total Quality Management, Principal Component Analysis, education institution, correlation analysis

1 Introduction

The environment becomes overly challenging and extremely intricate for education institution to be operated in. A downturn in economic and financial situation tend to dominate [1]. Furthermore, in order to deal with the fast-changing world resulted from internationalization, the education institutions are required to be relevant and quickly adapted to such circumstances. Consequently, the institutions need to maintain their quality with respect to results of applying curriculum, management of leadership, and systems of performance assessment [2]. Improving their efficiency in operational and enhancing communication between organization and community, the education institutions have been compelled to turn modernized. The quality service becomes necessarily needed and effectiveness tend to be improved simultaneously [3]. Considering this matter, total quality management (TQM) is an approach of strategic management which upholds

quality. In education institutions, applying TQM as principles are used in business process for achieving vision, mission, and their goals [2]. Quality management is the most suitable approach to be applied in resolving needs and demands with respect to education internationalization and globalization concurrently. Hence, education institutions are suggested to progressively implement the principles of quality management to seek alternatives for developments which are robust and organized [4].

The fundamental principles and process due to total quality management in resulting preferred effects on the institution's outcomes and accomplishments are defined as critical factors. Several aspects are affected by quality management implementation, such as commitment of top management and leadership, continuous improvement, strategic planning, data-based management, customer focus, and management of human resources, process, and also control and supplier [5]. Several dimensions are identified to assess quality management in education institutions. These dimensions are information and communication systems, management system, school climate, process of teaching-learning, education community satisfaction, and external relations and links to society [4]. Internal service quality gives certain impact for the effectivity of education institution, which consists of three levels, such as individual, departmental and organization. However, two distinct factors are identified to provide such impact in service quality, these factors are inter-departmental quality and human factor in providing quality service [3].

Implementation of management quality in education institution is applied with respect to provide improvements based on its evaluation result to achieve continuous improvement [4]. Not only internal service [3], but also information and communication system, management system, school climate, teaching-learning process, educational community satisfaction, external relation, and relationship towards society can provide the successful implementation of quality management [4]. Based on these considerations and previous studies, the main objective of this research was to identify the critical success factors (CSF) in Total Quality Management (TQM) implementation in education institutions and evaluate the correlation among factors. This research aims to assist education institutions in Indonesia in improving their quality advantage and refining their quality management strategy.

2 Materials and Methods

2.1 Design

In this research, the data collection utilized primary data obtained from distributing questionnaires to the participants who met the criteria for the research. The convenience sampling technique was applied for the data collection due to participant availability and willingness in providing information by virtue of experience and knowledge in a reflective manner.

2.2 Participants

The sample used on this research consisted of secondary education schools in the

capital city of Indonesia and its suburb regions (Jakarta, Bogor, Depok and Bekasi). Both national and private schools which must have been accredited were included to participate in the study. The schools were found to implement national or international curriculum, such as Cambridge International General Certificate of Secondary Education (IGCSE) and The International Baccalaureate (IB). The participants from the school community consisted of academic and non- academic staff. The academic staff were identified as teachers, head of department, vice principal and executive principal. The non-academic staff were found to be administration staff, human resources and supporting technician.

Among 60 participants acquired using convenience sampling, the respondent characteristics are illustrated in Table 1 and categorized into several demography variables, such as gender, age, length of employment, education background, type of school and curriculum.

Table 1. Demography characteristic of respondents.

Characteristics	n	%	Characteristics	n	%
Gender			Education background		
Male	14	31.8	Undergraduate	34	77.3
Female	30	68.2	Postgraduate	9	20.5
			Doctorate	1	2.27
Age (years)			Type of school		
20 – 30	15	34.1	National school	2	4.55
31 – 40	19	43.2	National plus	6	13.6
41 – 50	9	20.5	Private school	12	27.3
> 50	1	2.27	International school	24	54.5
Length of employment (years)			Curriculum		
< 10	20	45.4	National	14	31.8
10 – 20	22	50.0	Cambridge IGCSE	7	15.9
21 – 30	2	4.55	IB	23	52.3

2.3 Measurement Instrument

A measurement instrument was generated by considering the literature review from previous studies related to critical success factor in implementing TQM for education institutions. A questionnaire developed by [1, 3, 4, 5, 6, 7] was arranged to represent the dimensions of critical success factors related with education institution profile, elements of quality management applied and the results of applying quality management. Hence, 31 statements were generated for this questionnaire where these items are given in Table 2. Participants scored the statements given using a Likert-type scale of 1 to 5, where 1 represents strongly disagree and 5 represents strongly agree.

To determine validity of the questionnaire, correlation value for each item was evaluated and compared to the critical value (0.254 for n = 60 and 0.05 of significance level) [8]. The validity analysis was conducted to gain coherent and consistent results for this research. Meanwhile, the questionnaire reliability was assigned using Cronbach's alpha (Cronbach's $\alpha = 0.962$) to ensure its consistency, hence the instrument could provide excellent results based on the boundary set by [1].

2.4 Data Analysis

In processing statistical data for this research, software SPSS version 26 was used.

Subsequent to the data collection, the instrument validity and reliability analysis were assigned. The descriptive study was carried out for explaining demographic characteristic of participants. To identify the influence of TQM implementation, Principal Component Analysis (PCA) with promax rotation was performed towards thirteen factors given in the questionnaire. These factors were found to be reduced into principal factors. In addition, the interaction among variables obtained from principal factors was evaluated using correlation analysis by interpreting Pearson correlation value and Spearman coefficient for each principal factor.

Table 2. Dimensions of CSFs on implementing TQM.

CSF dimension	Measured variable	Mean	CSF dimension	Measured variable	Mean
Departmental service quality (Factor 1)	Item 1	4.25	Leadership (Factor 8)	Item 18	3.68
	Item 2	4.39		Item 19	3.70
	Item 3	4.27		[1, 5, 6, 7]	
	[3, 4]				
School service quality (Factor 2)	Item 4	4.43	School climate (Factor 9)	Item 20	3.84
	Item 5	4.16		Item 21	4.16
	[3, 4]			[3, 4]	
Individual service quality (Factor 3)	Item 6	3.80	Teaching-learning process (Factor 10)	Item 22	4.16
	Item 7	3.70		Item 23	3.98
	[3]			Item 24	4.20
				[4]	
Inter-departmental service quality (Factor 4)	Item 8	4.11	Teaching staff and employee management (Factor 11)	Item 4	3.61
	Item 9	4.00		Item 5	3.77
	Item 10	3.95		[1, 5, 6, 7]	
	Item 11	3.86			
	[3]				
Strategic quality planning (Factor 5)	Item 12	4.32	Satisfaction (Factor 12)	Item 27	3.36
	Item 13	3.89		Item 28	3.52
	[1, 5, 6]			[4]	
Communication (Factor 6)	Item 14	4.59	External relations (Factor 13)	Item 29	3.95
	Item 15	4.20		Item 30	4.18
	[3, 4]			Item 31	3.73
				[4]	
Management system (Factor 7)	Item 16	3.34			
	Item 17	3.30			
	[3, 4]				

3 Results and Discussion

3.1 Validity and reliability analysis

According to the result of validity analysis, all items in the questionnaire were found to be valid due to their correlation values greater than the critical value [8]. As shown in Table 3, the reliability analysis using Cronbach's alpha provided excellent result for all of 31 items in the questionnaire, based on criterion set by [1]. This indicated the questionnaire was likely to be consistent to be used repeatedly. The descriptive statistics,

given in Table 2, denoted the lowest mean value ($M = 3.30$) on management system. Otherwise, the highest mean value ($M = 4.59$) was represented by communication occurred at school. For all of 31 items in the questionnaire, the mean values were greater than the median value (Median = 3). This signified the quality implementation among schools generates good result in various aspects. However, certain factors such as management system, satisfaction, leadership, and teaching staff and employee management, are identified with the least mean values compared to other factors.

Table 3. The result of reliability test using Cronbach's alpha.

N	Number of items	Cronbach's alpha	Level of reliability
60	31	0.962	Excellent [8]

3.2 Principal component analysis

In this research, the data has multiple dimensions, hence PCA was used to evaluate the principle factors as the dependency of variables which represent the whole data to make it easier to trace, generate less dimensions, without losing any information. Before evaluating various factors using PCA method, validity and reliability were examined by considering the result of Bartlett's test of sphericity and the value of Kaiser-Meyer-Olkin. Both parameters indicated the feasibility of using PCA.

The Bartlett's test of sphericity denoted the value of $\chi^2 = 1550.611$ ($p < 0.001$) clarifying that the relationships existed among items and common variances occurred within correlation matrix which could be valid to apply factor analysis. The measurement of KMO was 0.853 indicating the data was suitable to be processed using PCA. The scree plot denoting the eigenvalues for each factor confirmed that there were six principal factors gained by PCA with promax rotation. The six-component model was obtained from the result of factor loadings after rotation by determining the least value of significant factor criterion to be 0.5. Table 4 shows the factor loading of six-factor model after promax rotation.

Reviewing the aspects which may be affected by TQM implementation in education institution, component one commonly relates with several factors which consist of management system, leadership, school climate, teaching staff and employee management, and also satisfaction of staff and student. With respect to the structural level of organization, these factors are related to the school internal condition [3]. Both academic and non-academic staff are actively involved in organization management system on the respective education institution. This condition signifies the main priority of school in improving quality by strengthening the role of top management, academic and non-academic staff and student involvement in quality management [1].

Meanwhile, component two are mostly classified into departmental service quality. This aspect is also included in internal services. The customer focus for departmental service is not only fulfilling service for external customer (parents, students and community), but also giving service to internal customer (academic and non-academic staff) to support their performance. Therefore, the whole activities in the institution can become efficient and effective.

At last, component five primarily reflects communication. In education institution, communication are classified into communication system, process sistematization and communication flow. Information can be passed both horizontally and vertically.

Horizontal communication occurs among academic or non-academic staff with the same position. Otherwise, vertical communication takes place within school community with different position at the organization. At this case, factor three, four and six are the remainder factors resulting no dominant critical success factors reflecting each of the principal components. Hence, seven critical success factors are identified where these factors represents important indicators which have to be achieved by institutions to meet customer satisfaction.

Table 4. Matrix structure of transforming items into principal components

No. Item	Factor	Component					
		1	2	3	4	5	6
27	F12	0.912					
17	F8	0.843					
18	F8	0.834					
26	F11	0.816					
29	F13	0.809					
15	F7	0.805					
25	F11	0.772					
3	F1	0.760					
19	F9	0.740					
16	F7	0.725					
28	F12	0.667					
21	F9	0.570					
8	F4		0.864				
7	F4		0.854				
5	F3		0.783				
2	F1		0.777				
6	F3		0.758				
23	F10		0.703				
20	F4		0.696				
12	F4		0.689				
31	F13		0.569				
22	F10			0.890			
10	F5			0.724			
4	F2				0.893		
30	F13				0.763		
1	F1				0.683		
13	F6					0.811	
9	F2					0.783	
14	F6					0.749	
11	F5						0.753
24	F10						0.666

The reliability of seven-factor model was evaluated using Cronbach's alpha with the result of 0.917. This value is greater than 0.7 which is found to be the limit value suggested by [1]. As a result, these factors obtain precise and consistent measure [1].

3.3 Correlation analysis

The factors were identified to be valid and reliable. Hence, the correlation analysis was carried out to signify relationships among the seven-factor model. Pearson's correlation and Spearman's coefficient using two-tailed test were examined. The results

exhibit positive correlation within all factors and significant condition at 0.01 level of significance. The positive correlation indicates increasing of each variable simultaneously towards another referred as monotonic relationship [8]. Table 6 shows evaluation result of Pearson's correlation and Spearman's coefficient for each seven-factor model. The strongest correlation was obtained due to both Pearson's correlation and Spearman's coefficient calculation. Among the seven-factor model, teaching staff and employee management and satisfaction of staff and student indicated the highest positive values (0.788 and 0.787 for Pearson's correlation and Spearman's, respectively). This condition clarifies the importance of school management in improving their employee becomes the main focus with regard to meet the customer satisfaction. In this case, both staff and students are defined to be customers.

Table 6. Coefficient of Pearson and Spearman correlation for each seven-factor model

	F7	F8	F9	F11	F12	F4	F6
F7							
Pearson correlation	1	0.786	0.752	0.711	0.741	0.555	0.458
Spearman coefficient ρ	1	0.770	0.749	0.643	0.743	0.527	0.376
F8							
Pearson correlation	0.786	1	0.675	0.749	0.765	0.660	0.414
Spearman coefficient ρ	0.770	1	0.704	0.695	0.781	0.703	0.303
F9							
Pearson correlation	0.752	0.675	1	0.701	0.725	0.625	0.573
Spearman coefficient ρ	0.749	0.704	1	0.628	0.751	0.577	0.377
F11							
Pearson correlation	0.711	0.749	0.701	1	0.788	0.704	0.480
Spearman coefficient ρ	0.643	0.695	0.628	1	0.787	0.676	0.329
F12							
Pearson correlation	0.741	0.765	0.725	0.788	1	0.564	0.365
Spearman coefficient ρ	0.743	0.781	0.751	0.787	1	0.589	0.276
F4							
Pearson correlation	0.555	0.660	0.652	0.704	0.564	1	0.489
Spearman coefficient ρ	0.527	0.703	0.577	0.676	0.589	1	0.344
F6							
Pearson correlation	0.458	0.414	0.573	0.480	0.365	0.489	1
Spearman coefficient ρ	0.376	0.303	0.377	0.329	0.276	0.344	1

4 Conclusions

This study aims to investigate the critical success factors in TQM implementation in education institution. With respect to PCA analysis, seven-model factor is obtained to signify the aspects which needs to be considered by implementing TQM to meet customer satisfaction. The seven-factor model consists of management system, leadership, school climate, teaching staff and employee management, staff and student satisfaction, departmental service quality, and communication. Correlation analysis using Pearson's correlation and Spearman's coefficient denotes positive values resulting from all factors that signifies monotonic relationship exist within factors. The strongest correlation

occurred towards teaching staff and employee management and satisfaction of staff and student, indicated with the score of 0.788 and 0.787 for Pearson's correlation and Spearman's coefficient, respectively. This clarifies the improvement in teaching staff and employee can increase student and employee satisfaction as well. Finally, the study is an attempt to suggest the influenced factors in implementing TQM in education institutions by considering the seven-factor model. On this study, the suggested factors to be evaluated consist of 13 dimensions. Further research may include additional factors considering the structural levels in schools or education institution. In addition, the attributes representing each factor can be described in detail. Hence, future research may be carried out to achieve the conceptual model reflecting relationships within factors.

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