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### Emerald Article: Investigation of Malaysian higher education quality culture and workforce performance

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# Investigation of Malaysian higher education quality culture and workforce performance

Malaysian  
higher education  
quality culture

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## Abstract

**Purpose** – The purpose of this study is to examine the relationship between the quality culture and workforce performance in the Malaysian higher education sector. The study also aims to test and validate the psychometric properties of the quality culture and workforce performance instruments used in the study.

**Design/methodology/approach** – A total of 267 academic staff from the International Islamic University Malaysia completed the survey questionnaires. A principal component analysis (PCA) technique was performed to extract the underlying factors, followed by the application of confirmatory factor analysis (CFA) to test factorial validity of the constructs.

**Findings** – The analysis yielded a nine-factor-indexed quality culture construct, while the workforce construct constituted two factors. The findings of the study postulate statistically significant correlation between quality culture and workforce performance.

**Practical implications** – The findings of the study suggest that a quality culture initiative can be used effectively in the context of the Malaysian higher education sector to enhance academic staff performance.

**Originality/value** – The results are important since there have been few published studies on quality culture that examine its effects on academic staff performance in the Malaysian higher education sector.

**Keywords** Quality culture, Malaysia, Workforce performance, Higher education, Psychometric properties

**Paper type** Research paper

## Introduction

Attaining quality is a major goal of any organisation, be it an educational institution, manufacturing or other business enterprise. Quality culture, among other quality paradigms, was initiated to attain educational internal quality goals. The concept of quality management, in general terms, can be traced back many decades, including to the ancient civilisations. However, it did not receive much attention in the academia until more recently. Over the years, particularly in the 1980s, practitioners and academicians such as Deming (1986), Crosby (1979) and Juran (1988) among others have shown specific interest in quality management. Thereafter, the quality management movement evolved through five major different complementary paradigms, namely; quality circles, quality control, quality assurance, total quality management and quantum quality (Miller, 1993). Each of these paradigms has its own dimensions where quality management is looked on from a dichotomous perspective. However, these quality paradigms were subject to failure (Sinclair and Collins, 1994) to a certain extent in some



areas due to uncertainty about the prevailing quality management practices (Harvey, 2009). Consequently, quality culture was introduced to provide a comprehensive approach to quality sustainability with special reference to institutions of higher education (European Universities Association [EUA], 2002-2006).

### **Quality culture**

Quality culture as a paradigm in the education context covers those elements of organisational culture that have the strongest impact on the quality of teaching. It establishes an on-going process of improvement, in which it holds all of the organisational community accountable for sustaining a favourable work environment that leads to organisational excellence (Trewin, 2003). It is unique in quality culture perspective, that quality is held as a process that can be operated through evaluation and measurement.

Quality culture is defined as the overall attitude of an institution, which focuses on the concept of quality and applies it to all aspects of its activities. In other words, an institution as a whole has embraced quality in every element of functionality that enhances continuous improvement. It is a learning culture in which all members of an institution are involved in a self-critical assessment and improving culture in which all of the workforce of the institution is fully engaged in all activities carried out by the institution (Rose as cited in Muresan, 2008; Trewin, 2003).

Various factors contribute to the development of a quality culture. The findings of an early study on quality culture in the industry found seven factors (senior management leadership, employee involvement and empowerment, customer focus, supplier partnership, teamwork, effect of chief executive officer (CEO) and open corporate culture) affecting the development of a quality culture (Adebanjo and Kehoe, 1999). Recently, a study of the factors influencing the strategic development of a quality culture at Eastern Schools of the Office of Vocational Education Commission in Thailand found nine factors (manager leadership, management by fact, strategic plan, decentralisation, continuous self-development, organisational commitment, teamwork, customer care and continuous improvement) affecting the development of quality culture. These factors of quality culture accounted for 72.413 per cent of the variance explained (Tungkunan et al., 2008). Similarly, Johnson (2000) found nine factors including top management support for quality, strategic planning for quality, customer focus, quality training, recognition, empowerment and involvement, quality improvement teamwork, measurement and analysis and quality assurance influencing the development of a quality culture. This establishes a workplace where all employees are clearly aware of the importance of quality and continuous improvement, and that their role in quality activities is indispensable. A study that was conducted to assess the vitality of a quality culture concluded that there is enormous need for quality culture in organisations (Bowen, 1996).

Quality culture has a significant influence on the institutional settings where it is being implemented. Empirically, a strong influence of quality culture on quality of teaching has been established (EUA, 2002–2006; Kowalkiewicz, 2006). Furthermore, quality culture largely determines the quality of teaching exercised by the faculty members of institutions of higher learning (Harvey, 2009). A comparative study, which investigates companies implementing total quality programmes and non-total quality programmes, found that companies, which had developed a quality culture, noticed

significant levels of improvement in their total quality programmes. On the other hand, companies that had experienced difficulties with quality culture change were unable to generate ideas that could propel continuous improvement and long-term development (Adebanjo and Kehoe, 1999).

However, according to Ehlers (2009), there is a dearth of fundamental research and conceptual understanding of the phenomenon, though understanding of quality as part of organisational culture seems to have attained some importance recently. Newton (2006) and Vettori *et al.* (2006) found that the traditionalism of quality in spheres of academic activities and the factors calling for new approach are both clearly evident in today's higher learning institutional settings. This change, according to Diana (1994), is due to the shift from an elite educational system to a mass educational system. Taking these arguments highlighted above into account, this study hypothesises that:

- H1. Quality culture positively influences faculty's motivation in the Malaysian higher education sector.
- H2. Quality culture positively influences faculty's work performance in the Malaysian higher education sector.
- H3. Quality culture positively influences faculty's job satisfaction in the Malaysian higher education sector.
- H4. The responses to quality culture can be explained by nine first-order factors and three second-order factors.
- H5. The constructs of quality culture are valid and reliable.

Quality culture practices in educational institutions can be enhanced through various means among which faculty members are the most influential. Achieving quality in faculty members' performance requires institutions of higher learning to have advanced and dynamic staff training programmes and a quality culture in place. This is done in order to respond quickly and appropriately to rapid changes in the field of education and staff needs.

### **Workforce performance**

An important component of human resource management is the development and retention of an efficient and qualified workforce. An effective workforce leads to effectiveness of the organisation and high productivity. According to Horn and Fichtner (2003), a qualified workforce together with other organisational variables not only contribute to an organisation's success *per se*, but also contribute to the national tax base, keeping the company's ability to remain effective in a highly competitive business world.

In fact, the workforce is extremely important if efficient performance is to be accomplished. Meanwhile, a simple miscommunication between managers and employees may lead to unexpected frustration or consequences for workforce performance, labour turnover and intention to leave among others. As such, Papis (2006) posits that the significance of understanding the workforce is very important if organisational objectives are to be realised. A study that surveyed Scottish hostel assistants pertaining to the importance of understanding the workforce suggests that a balanced environment, coupled with mutual understanding of the workforce is

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imperative if the task, organisational objectives and business achievements are to be accomplished efficiently (Papis, 2006).

The Malaysian workforce, as in other progressing countries, is considered to be young compared to developed nations such as Japan, USA, the UK and others. The statistics for 1999 revealed that over 68 per cent of the Malay workforce and 58 per cent of the Chinese workforce were under the age of 34. The literature revealed that workforce performance is influenced by motivation, work performance and job satisfaction. As such, this study hypothesises that:

- H6. Workforce performance in the Malaysian higher education sector is explained by these three factors.
- H7. The constructs of workforce performance are valid and reliable.

## Method

### *Participants*

A sample of 267 (13.86 per cent) respondents was selected from the total population (1926) of the International Islamic University of Malaysia academic staff. The sample size (267) was determined by considering the confidence interval of 95 per cent and margin of error at  $\pm 6$  per cent as suggested by Vockell and Asher (1998) and Yamane (1967). The respondents were randomly selected and participated voluntarily in answering the survey questionnaires, which were distributed to the respondents during their free time. They were asked to express their level of agreement or disagreement with the propositions in the survey instrument.

### *Instrument*

The study used the survey questionnaire in the process of investigating the relationship between quality culture and workforce performance. Excluding the demographic information of the respondents, the questionnaire consisted of 83 items (Adebanjo and Kehoe, 1999) of which, 61 items constituted the quality culture construct and 22 items comprised the workforce performance construct. The researcher constructed the items of workforce performance through extensive analysis of the related literature on workforce performance at institutions of higher learning. Due to the unavailability of an appropriate questionnaire on workforce performance, the researcher developed the propositions of this construct guided by the available literature.

The questionnaire is composed of close-ended statements used to determine the phenomenon that the research aimed to investigate. Furthermore, it comprised two major sections. Section one, formed of eight items, which requested respondents to provide general demographic information such as gender, age group, race group, marital status, religion, academic position, teaching experience and monthly income. Section two, comprised two major constructs the first construct, consisting of 61 items, investigated quality culture in the Malaysian higher education sector. The second construct, consisting of 22 items, examined academic staff performance in the Malaysian higher education sector. A five-point Likert type scale was employed for data collection. The scale is interpreted as: 1 = very strongly disagree, 2 = strongly disagree, 3 = disagree, 4 = not sure, 5 = agree, 6 = strongly agree and 7 = very strongly agree.

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Prior to data analysis, the quality of the data collected needed to be examined (Meyers *et al.*, 2006; Kline, 2011; Tabachnick and Fidell, 2007). This enabled the data accuracy, missing data issues, outliers, and statistical assumptions among others to be assessed.

### Data analysis and findings

The data collected were analysed following three-step procedure. First, principal component analysis (PCA) using SPSS version 17.0 software was used to test the factors that underlie the constructs under study. This was then followed by application of structural equation modelling (SEM) using AMOS version 17.0 software to test the structural models of the constructs (Arbuckle, 2008). Finally, assessment of construct validity through average variance extracted (AVE) and construct reliability through composite reliability index (CRI) were performed.

#### *Respondents' demographic information*

The accuracy of the dataset is often assessed through code and value cleaning using descriptive frequencies. The results of the frequencies indicated that ( $n = 109$ , 56.2 per cent) of the respondents were male academic staff, while ( $n = 85$ , 43.8 per cent) were female academic staff.

With reference to respondents' age group, the analysis showed that the majority of respondents were aged between 36-45 years ( $n = 107$ , 55.2 per cent). This was followed by the age group of 46-55 years, ( $n = 35$ , 18.0 per cent) then respondents aged between 25-35 years ( $n = 32$ , 16.5 per cent). In addition, respondents who were 56 years and above were the smallest number in terms of academic staff participation ( $n = 20$ , 10.3 per cent).

Regarding respondents' race group, the analysis showed that the majority of the participants ( $n = 99$ , 51.0 per cent) were Malay academic staff. Followed by foreign academic staff ( $n = 78$ , 40.2 per cent). Indian academic staff ( $n = 10$ , 5.2 per cent) participated in the study as well as Chinese academic staff ( $n = 7$ , 3.6 per cent) who responded.

Regarding respondents' marital status, the data yielded that majority ( $n = 172$ , 88.7 per cent) of academic staff surveyed were married. This was followed by academic staff who were classified as unmarried ( $n = 18$ , 9.3 per cent). Some ( $n = 3$ , 1.5 per cent) of the participants were classified as widowed and only ( $n = 1$ , 0.5 per cent) of them was identified as a divorcee.

The analysis demonstrated that the majority ( $n = 187$ , 96.4 per cent) of the respondents, who participated in the study were Muslims. Followed by participants, who identified themselves as Buddhists ( $n = 4$ , 2.1 per cent). Both Hindu ( $n = 2$ , 1.0 per cent) and Christian ( $n = 1$ , 0.5 per cent) respondents were the smallest denominations represented in this study.

Table I shows that the majority ( $n = 66$ , 34.0 per cent) of the respondents were assistant professors. Followed by the category of lecturers ( $n = 61$ , 31.4 per cent). Associate professors ( $n = 29$ , 14.9 per cent) and professors ( $n = 23$ , 11.9 per cent) were the next largest groups of respondents. Senior lecturers were the least prominent among the respondents ( $n = 15$ , 7.7 per cent).

In addition, Table I shows the majority of the respondents ( $n = 40$ , 20.6 per cent) were teaching staff with teaching experience, which ranged between 11 to 15 years.

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Variable	Frequency	Per cent
<i>Gender</i>		
Male	109	56.2
Female	85	43.8
Total	194	100
<i>Age group (years)</i>		
25-35	32	16.5
36-45	107	55.2
46-55	35	18.0
56 and above	20	10.0
Total	194	100
<i>Race group</i>		
Malay	99	51.0
Chinese	7	3.6
Indian	10	5.2
Others	78	40.2
Total	194	100
<i>Marital status</i>		
Unmarried	18	9.3
Married	172	88.7
Divorcee	1	0.5
Widowed	3	1.5
Total	194	100
<i>Religion</i>		
Islam	187	96.4
Christianity	1	0.5
Hinduism	2	1.0
Buddhism	4	2.1
Total	194	100
<i>Academic position</i>		
Lecturer	61	31.4
Senior Lecturer	15	7.7
Assistant Professor	66	34.0
Associate Professor	29	14.9
Professor	23	11.9
Total	194	100
<i>Working experience (years)</i>		
1-5	37	19.1
6-10	31	16.0
11-15	40	20.6
16-20	36	18.6
21-25	19	9.8
26-30	18	9.3
31-35	5	2.6
Above 36	8	4.1
Total	194	100
<i>Monthly income (RM)</i>		
2,500-3,000	37	19.1
3,001-7,500	96	49.5
7,501-10,000	37	19.1
Above 10,000	24	12.5
Total	194	100

**Table I.**  
Frequency and percentages of respondents' demographic variables

Respondents with teaching experience ranging between 1 to 5 years ( $n = 37$ , 19.1 per cent) were next most frequent. Respondents with teaching experience, which ranged between 16 to 20 years ( $n = 36$ , 18.6 per cent) and those with 6 to 10 years' experience ( $n = 31$ , 16.0 per cent) were next most frequent. Staff with 21 to 25 years' experience ( $n = 19$ , 9.8 per cent) participated in this study. Very experienced respondents with teaching experience of 26 to 30 years ( $n = 18$ , 9.3 per cent), above 36 years ( $n = 8$ , 4.1 per cent) and 31 to 35 years ( $n = 5$ , 2.6 per cent) made up the participants in this study.

Finally, the results in Table I showed that the majority ( $n = 96$ , 49.5 per cent) of the respondents surveyed were earning a monthly income in the range of RM 3,001 to 7,500. Followed by respondents with monthly income of both RM 2,500 to 3,000 ( $n = 37$ , 19.1 per cent) and RM 7,501 to 10,000 ( $n = 37$ , 19.1 per cent). Furthermore, respondents who earn above RM 10,000 monthly were the smallest group in the teaching staff surveyed ( $n = 24$ , 12.5 per cent).

#### *Principal components analysis (PCA)*

Reliability analysis was conducted to assess the internal consistency of the instruments. The results of reliability analysis revealed the overall coefficient alpha of 0.97. This indicated a substantial internal consistency between individual items, thus the items have positive covariance and the alpha is very close to 1 (Abdullah, 2005; Leech *et al.*, 2005; Abdullah, 2006; Abdullah *et al.*, 2008). Furthermore, this finding indicated that the instruments were suitable and therefore their results would be reliable in association with internal consistency build up.

#### *Principal component analysis for quality culture*

PCA with varimax rotation was conducted for the construct of quality culture. The analyses involved an iterative process to reach the final solution, whereby the items that did not contribute significantly and practically to the factors extracted were automatically discarded. Furthermore, the factors with eigenvalues of 1 or greater were considered as good factors, and therefore retained. Given such a rule of thumb, a number of factors were extracted from the pool of items. The correlation matrix yielded more than two correlations greater than 0.30. The measures of sampling adequacy (MSA) requirement of (0.50 or greater) were also satisfied. Thus, the anti-image correlation ranged between 0.78 and 0.93. Furthermore, all communalities were greater than 0.50 (ranged between 0.58 to 0.86), which indicates fulfilment of this requirement.

Moreover, the analysis revealed ten interpretable factors: quality improvement, teamwork, customer focus, strategic planning for quality, recognition, top management support for quality, measurement and analysis, empowerment and involvement, quality training and quality assurance that underlie the quality culture with eigenvalues greater than one. The extracted factors accounted for 75.7 per cent of variance explained in the constructs analysed. Interestingly, the degree of inter-correlation among the items also reached satisfactory level. Bartlett's test of Sphericity was statistically significant  $\chi^2(1830) = 6350.440$ ,  $\rho \leq .001$ , KMO = 0.862.

#### *Principal component analysis for workforce performance*

Another PCA analysis with varimax rotation was performed on the workforce performance construct to determine the inter-relatedness of items of the factors



constituting the construct. Three factors were initially hypothesised on this construct. The analysis generated four factors with eigenvalues greater than one. However, only two factors were retained. The omission of the other two factors was due to the factorial complexity or failure to meet fundamental practical significance of inclusion criteria (loading of 0.50 or greater). This finding resulted in *H6* of the study being rejected.

As a result, the observation showed that the two factors extracted accounted for 68.9 per cent of the variance in workforce performance. Interestingly, the degree of inter-correlation among the items also reached an acceptable level, Bartlett's Test of Sphericity was statistically significant,  $\chi^2(230) = 1339.734$ ,  $\rho \leq 0.001$ , KMO = 0.85. The MSA, which does not determine the correlations between the items *per se*, but also structural patterns of the variables also ranged from 0.52 to 0.83. In addition, all communalities were greater than 0.50 (ranged from 0.50 to 0.76), which indicates the fulfilment of the requirements of the rule of thumb.

#### *Instrument validation*

Given the fact that instrument validation was one of the objectives of this study, factors extracted through PCA were further rigorously validated through average variance extracted (AVE) and composite reliability index (CRI) for construct, convergent and discriminant validity.

#### *Quality culture subscales*

The alpha coefficient of quality culture subscales yielded substantial levels of internal consistency; meanwhile the scores of all factors have exhibited the recommended benchmark of coefficient alpha (0.70). The results show that alpha coefficient of nine factors extracted ranged from 0.83 to 0.94. This finding affirmed that the subscales of quality culture are internally consistent and reliable.

Having established the internal consistency of quality culture subscales, the convergent validity was evaluated through the AVE method recommended by (Fornell and Larcker, 1981). The results show that the estimation of AVE for factors (quality improvement teamwork 0.53, customer focus 0.51, strategic planning for quality 0.50, recognition 0.41, top management support for quality 0.40, measurement and analysis 0.46, empowerment and involvement 0.43, quality training 0.50 and quality assurance 0.40 respectively). The estimates (0.50 through 0.53) fulfilled the recommended value of AVE (Fornell and Larcker, 1981). Though the estimates (0.40 through 0.46) fell a little below the threshold value, they were very close to the recommended cut-off. These findings demonstrate the evidence of convergent validity for the quality culture subscales.

The construct validity of the scales was further assessed using the CRI method. According to Fornell and Larcker (1981), the evidence of construct validity is established if the CRI of each factor is 0.70 or greater. The results of CRI revealed substantial evidence of construct validity (0.71 through 0.84). Table II provides the details.

The correlations among the quality culture constructs validated are presented in Table III. The constructs included in the analysis revealed reasonably high significant correlation among the variables under study. More specifically, the correlations ranged from ( $r = 0.34$  to  $r = 0.69$ ,  $\rho \leq 0.001$ ), with the relationship between top management

support for quality correlated with empowerment and involvement ( $r = 0.69$ ,  $\rho \leq 0.001$ ), recognition with top management support for quality ( $r = 0.66$ ,  $\rho \leq 0.001$ ), strategic planning for quality with empowerment and involvement ( $r = 0.63$ ,  $\rho \leq 0.001$ ), quality improvement teamwork with strategic planning for quality ( $r = 0.62$ ,  $\rho \leq 0.001$ ), recognition with empowerment and involvement ( $r = 0.61$ ,  $\rho \leq 0.001$ ) and quality improvement teamwork with quality assurance ( $r = 0.60$ ,  $\rho \leq 0.001$ ) exhibiting substantial significant and practical correlation values. Interestingly, all correlations were found to be positive and significant. Table III presents the details.

*Workforce performance subscales*

The internal consistency of workforce performance subscales was evaluated through coefficient alpha and was found to be substantial across the factors extracted based on Nunnally's (1978) recommended value of 0.70 or greater. The results indicated high internal consistencies for work performance ( $\alpha = 0.86$ ) and job satisfaction ( $\alpha = 0.86$ ) respectively. These findings showed that workforce performance subscales are internally consistent and reliable.

Construct	$\alpha$	AVE	CRI
Quality improvement teamwork (QIT)	0.88	0.53	0.81
Customer focus (CF)	0.89	0.51	0.80
Strategic planning for quality (SPQ)	0.94	0.50	0.84
Recognition (REC)	0.87	0.41	0.80
Top management support for quality (TMSQ)	0.88	0.40	0.77
Measurement and analysis (MA)	0.87	0.46	0.81
Empowerment and involvement EI	0.89	0.43	0.73
Quality training (QT)	0.83	0.50	0.75
Quality assurance (QA)	0.84	0.40	0.71

**Table II.**  
Construct reliability and  
validity of quality culture  
subscales

Construct	QIT	CF	SPQ	REC	TMSQ	MA	EI	QT	QA
QIT	1.00								
CF	0.510 *	1.00							
SPQ	0.625 *	0.514 *	1.00						
REC	0.392 *	0.487 *	0.572 *	1.00					
TMSQ	0.438 *	0.494 *	0.579 *	0.662 *	1.00				
MA	0.291 *	0.532 *	0.546 *	0.472 *	0.478 *	1.00			
EI	0.489 *	0.579 *	0.636 *	0.610 *	0.690 *	0.570 *	1.00		
QT	0.345 *	0.425 *	0.438 *	0.539 *	0.579 *	0.451 *	0.529 *	1.00	
QA	0.602 *	0.369 *	0.521 *	0.405 *	0.513 *	0.484 *	0.508 *	0.407 *	1.00

**Notes:** \*Correlation is significant at the 0.01 level (two-tailed); QIT = quality improvement teamwork, CF = customer focus, SPQ = strategic planning for quality, REC = recognition, TMSQ = top management support for quality, MA = measurement and analysis, EI = empowerment and involvement, QT = quality training, QA = quality assurance

**Table III.**  
Correlations among  
quality culture subscales

The construct validity was then evaluated using the AVE method. The estimates (work performance 0.59 and job satisfaction 0.51 respectively) were greater than the recommended level 0.50 as proposed by (Fornell and Larcker, 1981). These results established the evidence that the convergent validity of workforce performance subscales prevailed. In addition, the CRI also produced substantial scores with the work performance construct returning a CRI of 0.87 and job satisfaction 0.87 values respectively. These results further confirm the construct validity of workforce performance subscales. Table IV illustrates the details.

The correlations among workforce performance constructs were then explored. Table V shows that the variables included were correlated. The degree of correlation between the variables work performance and job satisfaction was high.

*Measurement model*

The measurement model was assessed using AMOS prior to employing structural equation modelling or SEM (Arbuckle, 2008). A confirmatory factor analysis (CFA) with maximum likelihood was used to assess the nine-factor model of the quality culture construct. It allows an overall assessment of within and between the validity of indicators of the 9-factor model of quality culture. The following measures; Chi-square ( $\chi^2$ ), Relative non-Centrality Index (RNI), Comparative Fit Index (CFI), Turker-Lewin Index, and Root Mean Square Error of Approximation (RMSEA) with its point estimate and associated confidence (CI) interval using the method of lower and upper bound of the CIs in combination with 0.05 and 0.10 as the cut-off values being used to validate the extent to which the hypothesised 9-factor model fits the data. When the RMSEA with its CIs are used, a given model is rejected if the lower bound of the CI is greater than the value of 0.05. Similarly, a given model is rejected if the upper bound of the CI is greater than the value of 0.10 (Chen *et al.*, 2008).

The initial results of the measurement model of the 9-latent exogenous variables demonstrated poor fit statistics;  $\chi^2(370) = 603.818$ , CFI = 0.90, TLI = 0.88, NNF = 0.78, RMSEA = 0.07 and CMIN/DF = 1.63. Although, the values of RMSEA, CMIN/DF and CFI fell within an acceptable range, the overall estimation of the model showed inadequate model fit. However, when the model was revised and three inter-correlations among six error terms were freed based on the suggestions of the parameters of modification indices (MIs), the model showed better fit. Given the

**Table IV.**  
Construct reliability and validity of workforce performance subscales

Construct	$\alpha$	AVE	CRI
Work performance (WP)	0.86	0.59	0.87
Job satisfaction (JS)	0.86	0.51	0.87

**Table V.**  
Correlations between workforce performance subscales

	WP	JS
Work performance	1.00	
Job satisfaction	0.551 *	1.00

**Note:** \*Correlation is significant at the 0.01 level (two-tailed)

suggestions of the MIs, the following connections were made: errors 35 (Item EI 17) and 36 (Item EI 15), 5 (Item CF 32) and 43 (Item QA 44) and 9 (Item SPQ 60) 35 and (Item EI 17) respectively. As a result, the discrepancies declined and better model fit to the sample data was established.  $\chi^2(376) = 565.2$ , NFI = 0.90, CFI = 0.92, TLI = 0.91 and RMSEA = 0.072 with 90 per cent confidence interval of 0.060-0.084. Moreover, CMIN/DF revealed a value of 1.5, which according to Schermellah-Engel *et al.* (2003), is indicative of better goodness-of-fit.

Furthermore, the factor loadings of indicator variables to factors are presented in Figure A1 (Appendix). All items of quality culture subscales show excellent factor loadings (> 0.70) (Comrey and Lee, 1992. Moreover, Table VI shows that all factor loadings were statistically significant. The standardised factor loadings are reported in the upper column, whereas fit indices are reported in lower columns.

The results of the 9-factor quality culture measurement model validated demonstrated a satisfactory factorial validity, suggesting that the core of the quality culture model could be best represented by three general factors (corporate characteristics of quality culture, quality culture improvement and quality culture development). In other words, the first-order factors could be indexed by most correlated factorial structures.

*Corporate characteristics of quality culture measurement model evaluation*

CFA was applied to test the adequacy of the measurement model. The adequacy of the measurement models was evaluated according to the criteria of model fit, convergent validity, and discriminant validity. The results of fit indices indicate that the measurement model of corporate characteristics of quality culture fit the sample data. The  $\chi^2(30) = 31.6$ , NFI = 1.0, CFI = 1.0, TLI = 1.0 and RMSEA = 0.023 with its associated lower bound of CI reaching 0.001 and higher bound of CI reaching 0.079, suggesting excellent satisfaction of the criteria (see Figure 1). Furthermore, the results of the discriminant validity also show that the structure factors are distinctive, except the squared inter-correlation between top management support for quality and empowerment and involvement factors, yet they hold discriminant validity since AVE of the factor is greater than 0.50 and CRI is greater than 0.70 (Kline, 2011). Table VII contains the details.

Item	QIT	CF	SPQ	REC	TMSQ	MA	EI	QT	QA
1	0.86	0.86	0.81	0.74	0.81	0.76	0.81	0.82	0.75
2	0.81	0.87	0.84	0.80	0.81	0.80	0.73	0.88	0.92
3	0.78	0.81	0.84	0.83	0.71	0.85	0.63	0.77	0.77
4		0.77	0.90	0.80					

**Notes:** Goodness of fit criteria:  $\chi^2 = 565.194$ ;  $df = 367$ ; NFI = 0.90; TLI = 0.91; CFI = 0.92; RMSEA = 0.072; 90%CI = 0.060 – 0.084; QIT = quality improvement teamwork, CF = customer focus, SPQ = strategic planning for quality, REC = recognition, TMSQ = top management support for quality, MA = measurement and analysis, EI = empowerment and involvement, QT = quality training, QA = quality assurance

**Table VI.**  
9-Quality culture subscale factor loadings and goodness of fit criteria for the sample data

Normed Chi-square 31.62330  
CFI .998  
TLI .996  
RMSEA .023  
RMSEA .079  
RMSEA .000

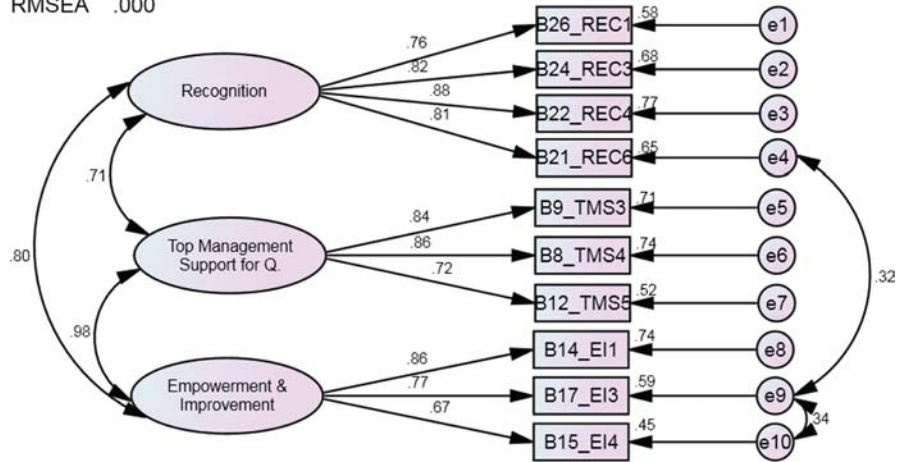


Figure 1. Corporate characteristics of quality culture

*Quality culture improvement measurement model evaluation*

Similarly, a CFA was performed to confirm the factor structure of the second model, which included the CF, MA and QT correlated to a single factor model of quality culture improvement. Interestingly, the fit indices indicated a very good fit to the sample data: NFI = 0.98 and CFI = 1.0, TLI = 1.0 and CMIN/DF = 1.3. The RMSEA also showed an excellent fit: RMSEA = 0.050 with 90 per cent confidence interval 0.001-0.094 (see Figure A2 (Appendix)). The results of discriminant validity also show that the structures of the factors are distinctive, and squared inter-correlation between all factors yielded lower values compared to the AVE. Table VIII shows the details of the results.

*Quality culture development measurement model evaluation*

Finally the CFA of quality culture exogenous variable has also shown a good fit for the measurement model fit indices ( $\chi^2 = 48.64$ , CFI = 0.97, TLI = 0.96, CMIN/DF = 1.6

Construct	AVE, Squared inter-factor correlation and CRI			CRI
	Rec	TMSQ	EI	
Rec	(0.67)			0.89
TMSQ	0.50	(0.65)		0.85
EI	0.64	0.96	(0.64)	0.84

Table VII. Discriminant validity, composite reliability of corporate characteristic of quality culture construct

Notes: Fit indices criteria:  $\chi^2 = 31.6$ ;  $df = 30$ ; NFI = 1.0; TLI = 1.0; CFI = 1.0; RMSEA = 0.023; 90%CI = 0.001 – 0.079; Diagonals in parentheses are square roots of the average variance extracted from observed variables (items), whereas off-diagonals are squared correlations between the constructs. REC = recognition, TMSQ = top management support for quality, EI = empowerment and involvement

and RMSEA = 0.077 with 90 per cent confidence interval 0.033-0.077 (see Figure A3 in Appendix), providing support pertaining to factorial construct validity of the assessed model. The results show the substantial evidence of discriminant validity pertaining to all constructs. This finding supported *H5* of the study. Table IX displays the details.

*Testing for factorial validity of second-order CFA*

A CFA was performed to test the factorial validity of the quality culture second-order model. The results showed moderately acceptable model fit. The analysis revealed fit statistics in which  $\chi^2(395) = 597.8$ , CFI = 0.91, TLI = 0.90, NFI = 0.89, CMIN/DF = 1.5 and RMSEA = 0.070 with its associated 90 per cent confidence interval that the lower bound = 0.059, higher bound = 0.081 yielded satisfactory values. Although, the lower bound of RMSEA related CI in model rejection was close to the threshold value, it did not exceed the threshold value (0.05).

However, the model was re-estimated for better fit. As such, two inter-correlations among four error terms were freed based on the suggestions of the parameters of the MIs. Errors 5 (Item TMS3) and 19 (Item QT2) and 11 (Item CF 1) and 30 (Item QA 4) were correlated. As a result, the model demonstrated a better model fit to the sample data. The  $\chi^2(393) = 568.933$ , NFI = 0.89, CFI = 0.92, TLI = 0.91 and RMSEA = 0.066 with 90 per cent confidence interval of 0.053-0.077 showed better improvement pertinent to goodness-of-fit. Furthermore, CMIN/DF had a value of 1.4, which according to Schermellah-Engel *et al.* (2003), is indicative of a good fit. Figure 2 displays the details. This finding supported *H4* of the study.

Construct	AVE, Squared inter-factor correlation and CRI			CRI
	CF	MA	QT	
CF	(0.50)			0.91
MA	0.30	(0.67)		0.86
QT	0.26	0.25	(0.71)	0.88

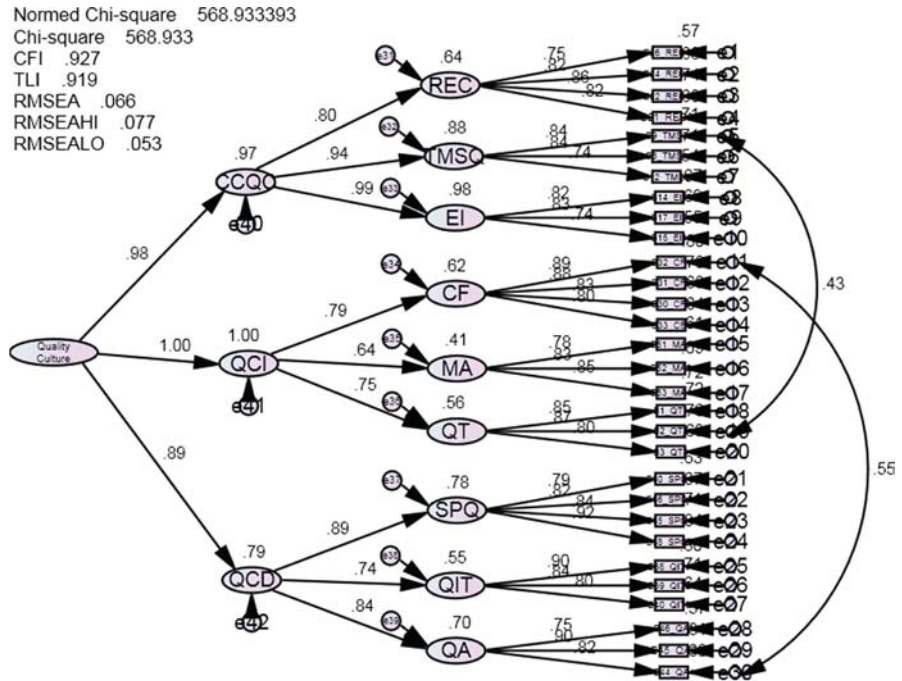
**Notes:** Fit indices criteria:  $\chi^2 = 39.1$ ;  $df = 31$ ; NFI = 0.98; TLI = 1.0; CFI = 1.0; RMSEA = 0.050; 90%CI = 0.001 – 0.094; Diagonals in parentheses are square roots of the average variance extracted from observed variables (items), whereas off-diagonals are squared correlations between the constructs. CF = customer focus, MA = management and analysis, QT = quality training

**Table VIII.**  
Discriminant validity,  
composite reliability of  
quality culture  
improvement construct

Construct	AVE, Squared inter-factor correlation and CRI			CRI
	SPQ	QIT	QA	
SPQ	(0.72)			0.91
QIT	0.46	(0.79)		0.92
QA	0.49	0.44	(0.67)	0.86

**Notes:** Fit indices criteria:  $\chi^2 = 48.64$ ;  $df = 30$ ; NFI = 0.96; TLI = 0.96; CFI = 0.97; RMSEA = 0.077; 90%CI = 0.033 – 0.116; Diagonals in parentheses are square roots of the average variance extracted from observed variables (items), whereas off-diagonals are squared correlations between the constructs. SPQ = strategic planning for quality, QIT = quality improvement teamwork, QA = quality assurance

**Table IX.**  
Discriminant validity,  
composite reliability of  
quality culture  
development construct



**Figure 2.**  
 Fit indices of the  
 hypothesised model of  
 quality culture  
 second-order CFA

**Notes:** CCQC = corporate characteristics of quality culture, QCI = quality culture improvement, QCD = quality culture development, REC= recognition, TMSQ = top management support for quality, EI = empowerment and involvement, CF = customer focus, MA = management and analysis, QT = quality training, SPQ = strategic management for quality, QIT = quality improvement teamwork and QA = quality assurance

*Workforce performance measurement model evaluation*

Another CFA was performed to assess the workforce performance measurement model. The items were subjected to a CFA with a four-factor (job satisfaction and work performance) measurement model using maximum likelihood estimation. The fit statistics showed a poor fit model to the sample data;  $\chi^2(395) = 192.696$ , CFI = 0.88, TLI = 0.85, NFI = 0.86, CMIN/DF = 2.4 and RMSEA = 0.118 with 90 per cent confidence interval of 0.092-0.144 portrayed less goodness-of-fit. However, when the model was re-estimated with two items (Item JS3, “I am satisfied with benefits offered to me through this work culture”, and Item JS6, “I have ample opportunities for advancement in this position”) from job satisfaction construct and one item (WP4, “I always feel like spending extra effort in carrying out my job”) from the work performance construct were omitted, and one error connection between e6 (Item, WP 1) and e11 (Item, WP 4) was made, the results showed excellent model fit. The analysis revealed fit statistics in which  $\chi^2(25) = 33.006$ , CFI = 0.98, TLI = 0.97, NFI = 0.98, CMIN/DF = 1.3 and RMSEA = 0.055 with its associated 90 per cent confidence interval that the lower bound = 0.001, upper bound = 0.102 yielded satisfactory values. Although, the higher bound of RMSEA related CI in model rejection slightly

exceeded the threshold, it was supported by other fit indices that exhibited excellent values. Furthermore, the factor loadings ranged from 0.54 to 0.90 indicating the evidence of statistical significance (see Figure 2 in Appendix).

Next, CRI for each construct was calculated. The constructs had shown substantial levels of CRI, ranging from 0.84 to 0.86. Moreover, the convergent validity of the construct was evaluated through the AVE method. The two constructs provided evidence of convergent validity, in which job satisfaction construct exhibited an AVE value of 0.51, and work performance construct demonstrated an AVE value of 0.50. These values (0.50 or greater) according to Fornell and Larcker (1981), provide evidence of convergent validity. In addition, discriminant validity was finally assessed through comparing AVE values with squared inter-factor correlation. The results revealed that the AVE values greater than squared values of inter-factor correlations, indicating evidence of discriminant validity (Fornell and Larcker, 1981). These results revealed that *H7* is accepted with the finding that constructs of job satisfaction and work performance are distinct, valid and reliable. Table X displays the results.

*Determinants of workforce performance*

Model estimation with structural equation modelling (SEM) test was performed to validate the hypothesised model as well as investigating the relationship between quality culture and workforce performance with special reference to the Malaysian higher education sector. According to the hypothesised model, quality culture determines academic staff's work performance and job satisfaction. Nine exogenous variables included in the model were measured using summated indicator variables ranged from 3 to 4 items. Similarly, two endogenous variables included in the hypothesised model were also measured by summated indicator variables ranged from 4 to 5 items per construct. This summation was done to reduce the complications of the model especially when the model contains many variables. It is also equally done to represent multiple aspects of a concept in a single measured variable.

The results of the overall model estimation showed a good fit of the hypothesised model to the sample data. The analysis revealed excellent fit statistics;  $\chi^2(43) = 49.91$ , CFI = 0.98, TLI = 0.97, NFI = 0.98, CMIN/DF = 1.16 and RMSEA = 0.053. Moreover, the  $p \leq 0.218$  was found to be insignificant, which is indicative of goodness of model fit. In addition, the model also exhibited the standardised solution coefficients through the use of Maximum Likelihood command which were found to be substantial. Interestingly, all summated coefficient scores were found to be statistically significant, ranging from 0.60 (quality assurance factor) to 0.93 (empowerment and

Construct	AVE, Squared inter-factor correlation and CRI		CRI
	Job satisfaction	Work performance	
Job satisfaction	(0.51)		0.84
Work performance	0.43	(0.50)	0.86

**Notes:** Fit indices criteria:  $\chi^2 = 33.006$ ;  $df = 25$ ; NFI = 0.98; TLI = 0.96; CFI = 0.98; RMSEA = 0.055; 90%CI = 0.001 – 0.102; Diagonals in parentheses are square roots of the average variance extracted from observed variables (items), whereas off-diagonal is squared correlations between the constructs

**Table X.**  
Discriminant validity,  
composite reliability of  
workforce performance  
construct



improvement factor) for exogenous variables and from 0.57 to 0.96 for endogenous variables. These findings supported the goodness of the model fit. It is also worth noting that all path coefficients in the hypothesised model were positive and statistically significant. The model explains relatively moderate percentage of the dependent variable; 0.26 per cent of workforce performance. The model also revealed correlation coefficient value greater than 0.50 between quality culture construct and workforce performance construct ( $r = 0.51$ ). This clearly provides evidence that the causal relationship between the exogenous and endogenous variables exists, and Figure 3 presented the detailed results. These results indicate acceptance of *H2* and *H3* with the findings that quality culture has positive causal influence on both job satisfaction and work performance in the Malaysian higher education sector. The results however, indicate rejection of *H1* with the finding that workforce performance construct in Malaysian higher education context is indexed by two factor components rather than three.

**Discussion and conclusion**

Ultimately, this study aimed at investigating the psychometric properties and causal relationship between quality culture (QC) and workforce performance (WFP). The dimensionality of the QC construct in the context of the Malaysian higher education sector was examined. More importantly, the study shows evidence of psychometric properties validity of the scales and extended the limited research on QC

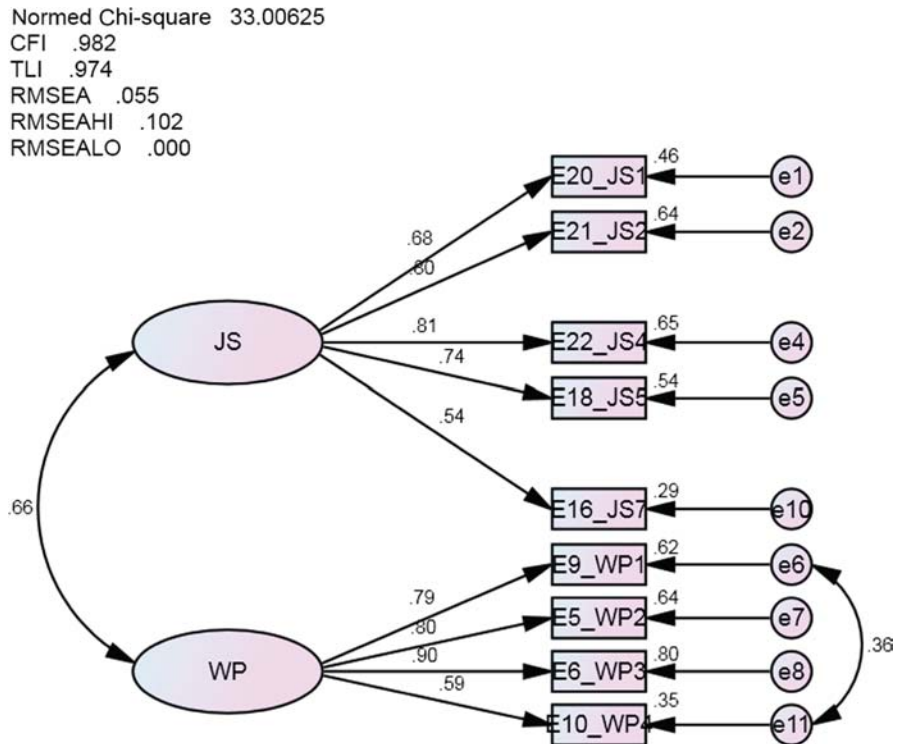


Figure 3.  
Workforce performance  
measurement model

subscales, especially in the context of the higher education sector. The overall model for QC subscales suggested by Johnson (2000) and Tungkunanan *et al.* (2008) demonstrated a general goodness-of-fit for the sample from the Malaysian higher education sector.

The first-order 9-factor CFA model of QC construct supported the hypothesis that QC is indexed by nine measured factors. The findings revealed that the data for the International Islamic University Malaysia faculty members were best represented by nine structured observed factors and high second-order 4-factor model. The findings also revealed that the validity of the psychometric properties, structural and measurement model were established. Thus, the analysis supported the conceptual design of the scales since reliability, convergent, construct and discriminant validity of scales were maintained.

Furthermore, by employing structural equation modelling, the causal relationship between QC and WFP was found to be substantial, suggesting that QC leads to high job satisfaction and work performance among the academic staff surveyed. The findings were in keeping with Adebajo and Kehoe (1999) who found companies that practiced and implemented a quality culture experienced high workforce performance and organisational excellence compared to companies which are not QC oriented. Moreover, the findings were also congruent with Harvey (2009) who reached the conclusion that QC strongly determines quality of teaching experienced by faculty members of the institution of higher learning investigated. The pattern discovered was that when the university establishes a QC oriented workplace the academic staff are more likely to be satisfied with the nature of their academic professional life, therefore work constructively for the cause of organisational success.

In addition, the findings of the study have some practical implications for quality related initiatives pertaining to the nature and structure of QC in the context of the higher education sector. More specifically, the findings suggested that QC could enrich instructional effectiveness and improved workforce performance with special reference to quality management practices at the case university in particular and perhaps other institutions of higher learning more generally. It could be used as an effective instrument (through occasional quality training workshops) to stimulate the workforce at institutions of higher learning to engage in effective and creative instructional activities that are associated with their professional background. Finally, the findings provide psychometric validity and reliability of the instruments pertaining to quality improvement in the context of the Malaysian higher education sector.

### **Limitation and future research**

A major limitation of this study may be the use of convenience sampling. Although it is appropriate for an exploratory study, one must regard the results obtained in this study as preliminary research findings. A replication of the study with a more systematic, probability-based sample would provide greater empirical support for the findings described above, and is strongly advised. More effort is needed to examine and replicate the study using larger samples and more institutions of higher learning.

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**References**

- Abdullah, F. (2005), "HEdPERF versus SERVPERF: the quest for measuring instrument of service quality in higher education sector", *Quality Assurance in Education*, Vol. 13 No. 4, pp. 305-28.
- Abdullah, F. (2006), "Measuring service quality in higher education: HEdPERF versus SERFPERF", *Marketing Intelligence and Planning*, Vol. 24 No. 1, pp. 31-47.
- Abdullah, F., Alwi, M.R., Lee, N. and Ho, V.B. (2008), "Measuring and managing franchisee satisfaction: a study of academic franchising", *Journal of Modelling in management*, Vol. 3 No. 2, pp. 182-99.
- Adebanjo, D. and Kehoe, D. (1999), "An investigation of quality culture development in UK industry", *International Journal of Operations & Production Management*, Vol. 19 No. 7, pp. 633-49.
- Arbuckle, J.L. (2008), *AMOS 17.0 User's Guide*, AMOS Development Corporation, Crawfordville, FL.
- Bowen, P.W. (1996), "The need for quality cultures", *Training for Quality*, Vol. 4 No. 2, pp. 14-18.
- Chen, F., Curran, P.J., Bollen, K.A., Kirby, J. and Paxton, P. (2008), "An empirical evaluation of the use of fixed cut-off points in RMSEA tests statistic in structural equation models", *Sociological Methods and Research*, Vol. 36 No. 4, pp. 462-94.
- Comrey, A.L. and Lee, H.B. (1992), *A First Course In Factor Analysis*, 2nd ed., Erlbaum, Hillsdale, NJ.
- Crosby, P.B. (1979), *Quality is Free*, New American Library, New York, NY.
- Deming, W.E. (1986), *Out of the Crisis*, Massachusetts Institute of Technology, Cambridge, MA.
- Diana, G. (1994), *What is Quality in Higher Education?*, Society for Research into Higher Education, London.
- Ehlers, U.D. (2009), "Understanding quality culture", *Quality Assurance in Education*, Vol. 17 No. 4, pp. 343-63.
- European University Association (2002-2006), *Quality Culture in European Universities. Report on the Three Rounds of the Quality Culture Project 2002-2006*, European University Association (EUA), Brussels, available at: [www.eua.be/eua/jsp/en/upload/Quality\\_Culture\\_2002\\_2003.1150459570109.pdf](http://www.eua.be/eua/jsp/en/upload/Quality_Culture_2002_2003.1150459570109.pdf) (accessed May 12, 2009).
- Fornell, C. and Larcker, D.F. (1981), "Evaluating structural equation models with unobservable variables and measurement error", *Journal of Marketing Research*, Vol. 18 No. 1, pp. 39-50.
- Harvey, L. (2009), "A critical analysis of quality culture", *International Network for Quality*, available at: [www.inqahe.org/admin/files/assets/subsites/1/documenten/1241773373\\_16-harvey-a-critical-analysis-of-quality-culture.pdf](http://www.inqahe.org/admin/files/assets/subsites/1/documenten/1241773373_16-harvey-a-critical-analysis-of-quality-culture.pdf) (accessed March 23, 2010).
- Horn, C.E.V. and Fichtner, A.R. (2003), "An evaluation of state-subsidised, firm-based training: the workforce development partnership programme", *International Journal of Manpower*, Vol. 24 No. 1, pp. 97-110.
- Johnson, J.J. (2000), "Differences in supervisor and non-supervisor perceptions of quality culture and organisational climate", *Public Personnel Management*, Vol. 29 No. 1, ProQuest Education Journals, 199.
- Juran, J. (1988), *Juran on Planning for Quality*, Free Press, New York, NY.
- Kline, R.B. (2011), *Principles and Practices of Structural Equation Modelling*, 3rd ed., Guilford Press, New York, NY.
- Kowalkiewicz, A. (2006), "The impact of quality culture on quality of teaching: a case study of business higher education in Poland", paper presented at the Conference of European

- University Association on Embedding Quality Culture in Higher Education, Technische Universität München, Munich, 23-25 November.
- Leech, N.L., Barrett, K.C. and Morgan, G.A. (2005), *SPSS for Intermediate Statistics Use and Interpretation*, Lawrence Erlbaum Associates, Mahwah, NJ.
- Meyers, L.S., Gamst, G. and Guarino, A.J. (2006), *Applied Multivariate Research: Design And Interpretation*, Sage Publications, London.
- Miller, W.C. (1993), *Quantum Quality: Quality Improvement through Innovation, Learning And Creativity*, Quality Resources, White Plains, NY.
- Muresan, L. (2008), "Promoting a quality culture at grassroots levels in higher education", *Journal of Theoretical and Applied Economics*, Vol. 12 No. 4.
- Newton, J. (2006), "What is quality?", paper presented at the Conference of European University Association on Embedding Quality Culture in Higher Education, Technische Universität München, Munich, Germany, 23-25 November.
- Nunnally, J.C. (1978), *Psychometric Theory*, McGraw-Hill, New York, NY.
- Papis, J. (2006), "Understanding the workforce: the key to success in a youth hostel in Scotland", *International Journal of Contemporary Hospitality Management*, Vol. 18 No. 7, pp. 593-600.
- Schermellah-Engel, K., Moosbrugger, H. and Müller, H. (2003), "Evaluating the fit of structural equation models: test of significance and descriptive goodness-of-fit measures", *Methods of Psychological Research*, Vol. 8 No. 2, pp. 23-74, available at: [www.uni-frankfurt.de/~kscherm/schermelleh/mpr\\_Schermelleh.pdf](http://www.uni-frankfurt.de/~kscherm/schermelleh/mpr_Schermelleh.pdf) (accessed May 28, 2011).
- Sinclair, J. and Collins, D. (1994), "Towards a quality culture?", *International Journal of Quality and Reliability Management*, Vol. 11 No. 5, pp. 19-29.
- Tabachnick, B.G. and Fidell, L.S. (2007), *Using Multivariate Statistics*, Allyn and Bacon, Needham Heights, MA.
- Trewin, D. (2003), "The importance of a quality culture", *Quality Control and Applied Statistics*, Vol. 48 No. 6, pp. 633-4.
- Tungkunanun, P., Leekichwatana, P., Pimsarn, N. and Chumnun, S. (2008), "Strategic plan for developing quality culture at Eastern School of the Office of Vocational Education Commission, Thailand", *ABAC Journal*, Vol. 28 No. 2, pp. 52-63.
- Vettori, J., Lueger, M. and Knassmuller, M. (2006), "Dealing with ambivalences – strategic options for nurturing a quality culture in teaching and learning". paper presented at the Conference of European University Association on Embedding Quality Culture in Higher Education, Technische Universität München, Munich, 23-25 November.
- Vockell, E.L. and Asher, J.W. (1998), *Educational Research*, 2nd ed., Prentice Hall, Englewood Cliffs, NJ.
- Yamane, T. (1967), *Statistics: An Introductory Analysis*, 2nd ed., Harper & Row, New York, NY.

### Further reading

- Ferguson, G.A. (1981), *Statistical Analysis in PhD Education*, 5th ed., McGraw-Hill, New York, NY.

Normed Chi-square 541.822368  
CFI .915  
TLI .900  
RMSEA .076  
RMSEAHI .089  
RMSEALO .062

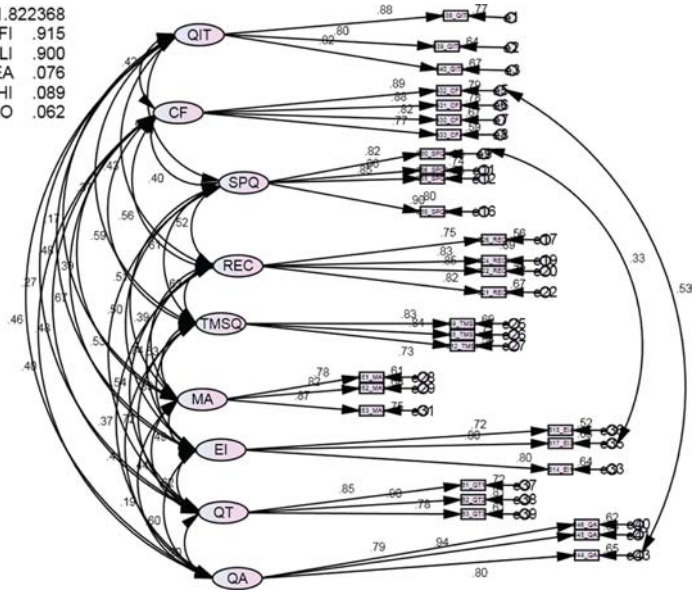


Figure A1.  
General CFA of quality culture 9-factor model

Normed Chi-square 39.14731  
CFI .987  
TLI .982  
RMSEA .050  
RMSEAHI .094  
RMSEALO .000

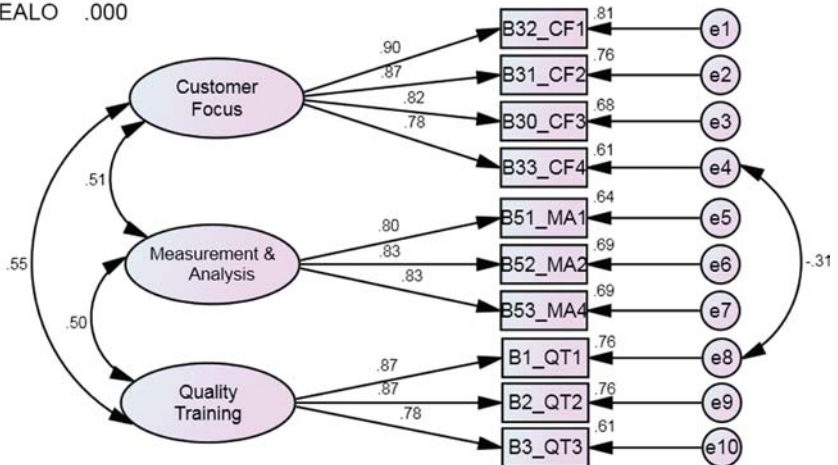
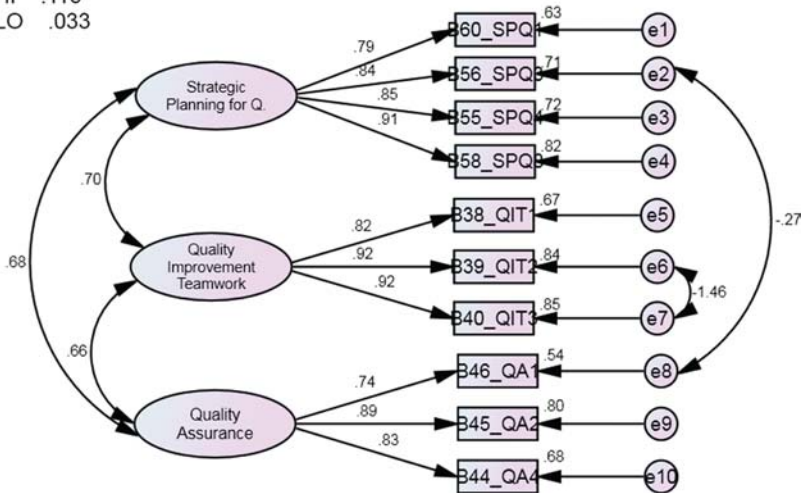


Figure A2.  
Quality culture improvement model

Normed Chi-square 48.64730  
CFI .975  
TLI .962  
RMSEA .077  
RMSEAHI .116  
RMSEALO .033



**Figure A3.**  
Quality development  
measurement model

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