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A model for total quality management in higher education

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Abstract Total quality management (TQM) is widely recognised as a management philosophy for improving customer satisfaction and organisational performance. However, there is no consensus over the critical success factors of TQM, in particular, in higher education (HE) and developing countries. Literature shows mixed results on the success and applicability of TQM principles in education, thus, underlining the need to revisit the application of TQM principles in HE. This paper identifies the critical success factors of TQM in Pakistani universities. Data was collected from faculty members of universities through questionnaires. The findings reveal that 'leadership', 'vision', 'measurement and analysis', 'process control and evaluation', 'programs design and resources allocation' and 'stakeholder focus' emerge as the critical success factors of TQM in HE. The findings have implications at macro, meso, and micro levels of HE.

Keywords Total quality management (TQM) · Higher education (HE) · Critical factors · Structural equation modelling

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1 Introduction

Total quality management (TQM) is a management philosophy aimed at improving customer satisfaction and organisational performance. TQM principles have been applied in the manufacturing sector since long but its application in services, and higher education (HE) in particular, is relatively new. TQM implementation in HE institutes (HEIs) is driven by increasing competition among institutes and intense expectations of the job market. The application of TQM in terms of implementation experiences and reasons of failures in North American and European HEIs has been discussed by a number of authors (Owlia and Aspinwall 1997; Engelkemeyer 1995; Coate 1993). However, TQM implementation in HEIs of developing countries remains least studied. The research shows that TQM principles are not universally applicable across all contexts but are contingent on contextual factors (Sousa and Voss 2001, 2008). This means that findings of TQM application studies carried out in developed countries and mostly in manufacturing sectors need to be revisited for their application in developing countries and in sectors other than manufacturing such as HE. The need of research on the application of TQM in HE in developing countries emerges as a potential area of research.

The findings of the literature on TQM usefulness in education are conflicting (Meirovich and Romar 2006). Some authors believe that values of TQM are equally applicable in HE (Sirvanci 2004) and TQM values are compatible with HE (Helms and Key 1994; Venkatraman 2007) whereas others argue that TQM values are only marginally useful in a dynamic and changing environment which is a characteristics of modern HE (Koch and Fisher 1998; Houston 2007). One plausible explanation is: The fitness of TQM in HE depends upon how TQM is applied—whether applied as a systematic collection of tools and techniques or systemic application of TQM principles throughout the HEI (Houston 2007). The tools and techniques of TQM do not match the nature of learning and teaching process. Systems thinking, on the other hand, has the potential to shift the focus from controlling means to consideration of the broader purpose of HE and how to achieve the preferred ends.

A number of authors have noted difficulties in the implementation of TQM in HE. These difficulties include lack of agreement on defining customer of HEIs, meaning of quality and academic freedom, and unique nature of academic processes (Owlia and Aspinwall 1997; Matthews 1993). According to Sallis (2002) TQM's emphasis on customer may cause conflict with those who traditionally have been considered the guardians of academic quality and academic standards. These difficulties underline the need to understand TQM implementation from perspectives different from those which have shaped conventional TQM research. In particular, how the TQM principles—having origin in manufacturing sector—apply in HE; and what determines TQM success in developing countries.

The main question addressed in this study is: *given the origin of TQM in manufacturing sector, what are the critical success factors of TQM implementation in higher education*. Critical factors are those which are essential for the success of TQM. TQM implementation may not be successful if any of the critical factors is missing. The purpose of this paper is to identify the critical success factors of TQM in universities of Pakistan—a country that has introduced extensive reforms in HE during the last decade. A part of these reforms was quality assurance initiatives and establishment of quality enhancement cells within the universities. These initiatives have led to increased awareness of TQM in the HEIs of Pakistan (HEC 2010).

The rest of the paper is structured as follows. The next section provides literature review focusing on the application of TQM in HE and the critical success factors of TQM. This is followed by the research methodology section and data analysis. Discussion of the research is, then, presented. The paper ends with conclusions.

2 Literature review

2.1 TQM and higher education

It would be hardly an exaggeration to say that TQ programs, due to their pervasive argument, have become a social movement (Hackman and Wageman 1995). TQM is aimed at organisation wide efforts to improve customer satisfaction and organisational performance through continual improvement. The implementation of TQM in HE is driven by increasing competition, to adapt to evolving educational environment, and to fulfil expectations of stakeholders (Bayraktar et al. 2008). The application of TQM principles in HEIs was pioneered by U.S and U.K universities during the late 1980s. The three potential areas to implement TQM in HEIs can be curriculum, non-academic functions, and academic administration (Vazzana et al. 1997). HEIs mostly use TQM in one or more of their various functions and only few employed complete TQM model throughout their organisation (Vazzana et al. 1997).

Existing literature on TQM implementation in HE has focused on different aspects such as customer focus and customer orientation, leadership, teamwork, process-oriented approach including process design and improvement, and use of TQM tools and techniques. A critical step in TQM implementation is customer identification and customer orientation (Flynn et al. 1994). The question arises who is the customer of HEIs. Literature on quality in HE regards students as customers (Houston 2007). The earlier efforts in establishing industry-academic partnership regarded industry as customer and graduates as product of HEIs. Based on this categorisation students may be referred as work-in-process. Problems in defining customers by HEIs have been reported in literature—see, for example Sirvanci (2004), Cruickshank (2003), and Quinn et al. (2009). Lack of consensus on defining customer of HEIs poses problems in TQM implementation. However such problems could be overcome by using systems thinking and taking into consideration the broader requirements of key stakeholders including graduates, employers, regulatory bodies, and funders. Systems approach requires taking into consideration the demands of customers as well as other stakeholders during the execution of business processes. One example of this approach is a definition of quality of education by Karapetrovic and Willborn (1997, p. 287) "the ability of student's knowledge to satisfy stated requirements"—the requirements set by accreditation bodies, professional societies, employers, etc.

The use of quality techniques and quality management programs has been a focus of several publications. Sirvanci (2004), for instance, noted the use of quality function deployment (QFD) which is used to incorporate the voice of customers and other stakeholders in a program design. Quinn et al. (2009) discussed the application of Six Sigma, Service Quality (SERVQUAL), ISO 9000, and TQM in HE. Houston (2007) discussed the application of TQM tools and techniques in HE and urged for the need to go beyond these methods. The core message of these publications is that the mentioned tools and techniques and performance management programs could be used to improve performance in HE.

Apart from these hard aspects of TQM, some authors have discussed the soft elements of TQM—such as role of leadership (Owlia and Aspinwall 1997; Sirvanci 2004), educational management (Venkatraman 2007), and people management (Bayraktar et al. 2008). Owlia and Aspinwall (1997) discussed the importance of leadership in HE and noted that the effectiveness of leadership can be adversely affected by individualism among academic staff. The same is also true for team working which is an essential element of TQM. Venkatraman (2007) discussed about process oriented approach as a means to increase productivity, decreasing costs, and improving quality of services. When considered mutually together, the aforementioned research provides enhanced understanding of the hard and soft elements of TQM.

The TQM initiatives taken by many universities represents a customer- and market-focused approach; although such applications of TQM are narrow in scope and have not advanced beyond a quality project application (Sirvanci 2004). Houston (2007, p. 13) urged for the need of systems thinking: "TQM is tied to a particular problem context, business, market performance and the functional language of business, and a clearly defined problem: quality for customers. Its specific language, concepts and tools, while superficially attractive, on closer examination do not match the substance of HE" and that "authentic quality theory is *essentially systemic*; attending to values, purpose, and optimising performance relative to the *aim of the system*" [emphasis added]. The systems approach suggests the need to develop locally appropriate systemic approaches to improve quality in HE and to use TQM tools and techniques as a means to an end rather than an end in themselves. A systems approach could accommodate the variability of students, adaptability and flexibility of processes, the interactions of components and expectations about the final outcome: learning (Houston 2007).

The aforementioned studies provide an enhanced understanding of the application of TQM in education and a broader view shows that the essential TQM elements have relevance in HE. This is further confirmed by Bayraktar et al. (2008) who found that in HE a number of TQM elements have critical role in process improvement including 'leadership', 'vision', 'measurement and evaluation', 'process control and improvement', 'program design', 'quality system improvement', 'employee involvement', 'recognition and reward', 'evaluation and training', 'student focus', and 'other stakeholder focus'. This shows that TQM elements are also relevant in HE context and that TQM could play an important role in processes improvement and improving customer satisfaction. Given the emergence of individual TQM constructs in studies carried out in different contexts, TQM element may have varying degree of relevance in different contexts. In other words, if some TQM elements are more relevant in one context, the same element could be least relevant in a different context such as different sectors of the economy. Although such an assumption is in accordance with contingency theory (Lawrence and Lorsch 1967; Scott and Cole 2000)—which states that no theory or method can be applied in all cases; in the perspective of HE this statement needs empirical testing. While the literature shows that TQM elements do have relevance in HE, the research on critical success factors of TQM in HE is still in infancy. To further highlight this point the next section provides an overview of literature of the critical success factors of TQM.

2.2 Critical factors in TQM implementation

Drawing largely on the ideas of Deming, Juran, Feigenbaum, and Crosby, TQM is recognised as an important means for improving process performance and customer satisfaction. TQM did not come into existence as a fully developed process improvement package rather TQM elements have evolved over time. As noted by Houston (2007): "[TQM] did not appear fully formed, but emerged in the 1980s as popular representation of 50 years of development of quality theory and practice in manufacturing industries" (p. 4); and by Ackoff (1999): "[in TQM] over time, additional procedures were added that contributed to the improvement of quality control … These developments were based primarily on experience; little theory was involved. As a result, the various components of TQM do not hang together as a cohesive whole" (pp. 265–266). The motivation to determine the critical factors is to isolate significantly influencing factors from a myriad of the rest reported in the literature. In this regard, a number of studies have focused on the critical factors of TQM implementation. Some representative examples follow:

I. Saraph et al. (1989) developed 78 items related to TQM and categorised them into eight critical success factors. These factors include role of top management and quality policy, role of the quality department, training, product and service design, supplier quality management, process management, quality data and reporting and employee relations.
II. Anderson et al. (1994) based on the Delphi method reduced 37 factors into seven factors which are visionary leadership, internal and external cooperation, learning, process management, continuous improvement, employee fulfilment and customer satisfaction.
III. Black and Porter (1996), Flynn et al. (1994), and Rao et al. (1999) identified critical success factors of TQM of different types (Table 1).
IV. Ahire et al. (1996) and Joseph et al. (1998) developed 12 and 10 constructs of TQM respectively (Table 1).
V. Bayraktar et al. (2008) measured the critical success factors of TQM in Turkish HE and found that TQM in HE is characterised by a unique set of critical success factors (Table 1).

Some other studies have also focused on the critical success factors of TQM—see for example, Abdi et al. (2008), Seetharaman et al. (2006), Sila (2007), and Sila and Ebrahimpour (2002). Sila and Ebrahimpour (2003) carried out a meta-analysis of the studies focusing on TQM critical factors and found that top management commitment and leadership, customer focus, information and analysis, training, supplier management, strategic planning, employee involvement, human resources management, process management, teamwork, product and service design, process control, benchmarking, continuous improvement, employee empowerment, quality assurance, social responsibility, and employee satisfaction were the most common factors in all these studies. Table 1 shows various TQM constructs from some illustrative examples.

The table shows that while there are some common elements in these studies—such as management commitment, customer focus, and process management—the critical success factors also differ across these studies. Consensus among TQM critical factors—as reported in different studies—does not exist. One possible reason for this lack of consensus is that these studies are carried out in different contexts. Existing studies on TQM implementation are carried out mainly in developed countries. A study of critical success factors is required to understand what determines the successful application of TQM in HE in developing countries. These critical success factors can be focus of management efforts during TQM implementation. There is a lack of information on the stages and critical success factor of TQM implementation in many regions of the world such as Asia, South America, Africa, and Middle East (Sila and Ebrahimpour 2003). Thiagarajan et al. (2001) noted that knowledge of TQM is totally lacking in developing countries and this knowledge scarcity is further complicated by scant attention on research and acknowledged limitation of transferring research findings across national boundaries. Since contextual factors differ broadly, it poses difficulties in generalising the research findings of developed-economies to less-developed. This underlines the need of creating specific TQM knowledge focusing on the requirements of developing countries. The application of general TQM principles—having origin in manufacturing sector—could partly explain TQM failures in HE. The need of research on TQM application in HE is, thus, highlighted. What are the critical factors of TQM in HE? Do the critical factors of TQM in HE differ from those reported in literature? This paper taps the unexplored area to determine the critical factors of TQM in Pakistani universities.

Table 1 A comparison of the critical factors of TQM in some illustrative studies

Saraph et al. (1989)	Anderson et al. (1994)	Flynn et al. (1994)	Black and Porter (1996)	Ahire et al. (1996)	Rao et al. (1999)	Joseph et al. (1998)	Bayraktar et al. (2008)
The role of top management leadership	Visionary leadership	Top-management support	Corporate quality culture	Top management commitment	Top management commitment	Quality policy	Leadership
						Organisational commitment	Vision of HEI
	Customer satisfaction	Customer involvement	Strategic quality management	Customer focus	Customer orientation		Student focus
							Other stakeholder focus
Process management	Process management	Process management	Customer satisfaction orientation	Design quality management			Process design and resources
Product and service design		Product design		Product quality	Product/process design	Product design	Process design and resources
Quality data and reporting		Quality information	Communication of improvement information	Internal quality information usage	Quality information availability	Quality information system	Measurement and evaluation
					Quality information usage	Operating procedures	
Employee relations	Employee fulfilment	Workforce management	People and customer management	Employee involvement		Human resources management	Employee involvement
				Employee empowerment			Recognition and reward
Supplier quality management		Supplier involvement	Supplier partnerships	Supplier quality management Supplier performance	Supplier quality	Supplier integration	

Table 1 continued

Saraph et al. (1989)	Anderson et al. (1994)	Flynn et al. (1994)	Black and Porter (1996)	Ahire et al. (1996)	Rao et al. (1999)	Joseph et al. (1998)	Bayraktar et al. (2008)
Training	Learning			Employee training	Employee training	Training	Education and training
The role of quality department			Operational quality planning		Strategic quality planning	Role of quality department	
			Quality improvement measurement systems		Quality citizenship		
					Internal/External quality results		
	Continuous improvement			Benchmarking	Benchmarking		Quality system improvement
	Internal and external cooperation		External interface management				
			Teamwork structures	Statistical process control usage		Technology utilisation	

3 Methodology

According to Bryman (1989) quantitative studies use previously developed research instruments with certain modifications. These modifications in the existing instruments can be done by some qualitative research (focus group discussion in this case) and are necessary for contextualization of the research. There have been few studies about critical success factors of TQM in HE institutions (Kanji et al. 1999; Bayraktar et al. 2008). The instrument developed by Bayraktar et al. (2008) was selected for this research. This instrument was preferred over the other instruments as this is the most recent research and the instrument developed was validated using Confirmatory Factor Analysis (CFA).

Morgan (1997) considers focus groups discussion as a first step to refine existing research instruments. As per contextual settings of the proposed research the research instrument developed by Bayraktar et al. (2008) was refined by the focus group discussion. Five senior faculty members from different universities having at least 5 years post graduate teaching/research experience participated in the focus group discussion. Three new items were added in the questionnaire on the basis of their relevance. Few existing items of Bayraktar et al. (2008) questionnaire were modified as per contextual requirements. This gave rise to the questionnaire having 11 constructs consisting of 64 items. Questions were asked on a 5 point Likert scale (Appendix A).

For the present study 30 HEIs in Pakistan where Quality Enhancement Cells were established by Higher Education Commission of Pakistan (HEC 2010) were selected for data collection. Questionnaires were sent by the postal mail to the directors of Quality Enhancement Cells. Directors then distributed and recollected these questionnaires so in total 450 questionnaires were distributed. Out of 450 distributed questionnaires, 272 (60%) completely filled questionnaires were received back.

3.1 Data Analysis

Critical success factors of TQM in Pakistani HEIs are identified using CFA. This method of identifying critical success factors is common in literature—see, for example, Seetharaman et al. (2006) and Chau (1997). Model purification approach was used for this purpose. Once uni-dimensionality of the model is established using CFA, reliability and validity of the model are evaluated (Anderson and Gerbing 1982). CFA was done by structural equation modelling (SEM) using AMOS 16.0. The theoretical model developed for the study is shown in Appendix B. 10 runs were carried out and the practice continued till satisfactory 'goodness of fit statistics' was achieved. In this practice, five constructs—quality system improvement, employee involvement, recognition and reward, education and training, and students focus—were deleted. Out of 64 items, 47 items were deleted. According to Beinstock et al. (1997) such extensive item deletion is not exceptional as even one fifth of the original items retention in the developed model is acceptable. Since each deleted item also affects other items, therefore items were deleted per CFA run. Those items were deleted which were found to be inadequate on model estimates examination after each CFA run. The lower the amount of explained variance for any item, the more poorly it was loaded in the model, thus making it a choice for deletion from the model.The model developed after CFA—shown in Fig. 1—was analysed, using goodness of fit measures.

According to Sila and Ebrahimpour (2005) pragmatic verification in CFA is normally appraised by the Comparative Fit Index (CFI), the Root Mean Square Error of Approximation (RMSEA), the significance of parameter estimates, and Amount of squared multiple correlations. *Comparative fit index* (*CFI*) makes the comparison of the suggested model with

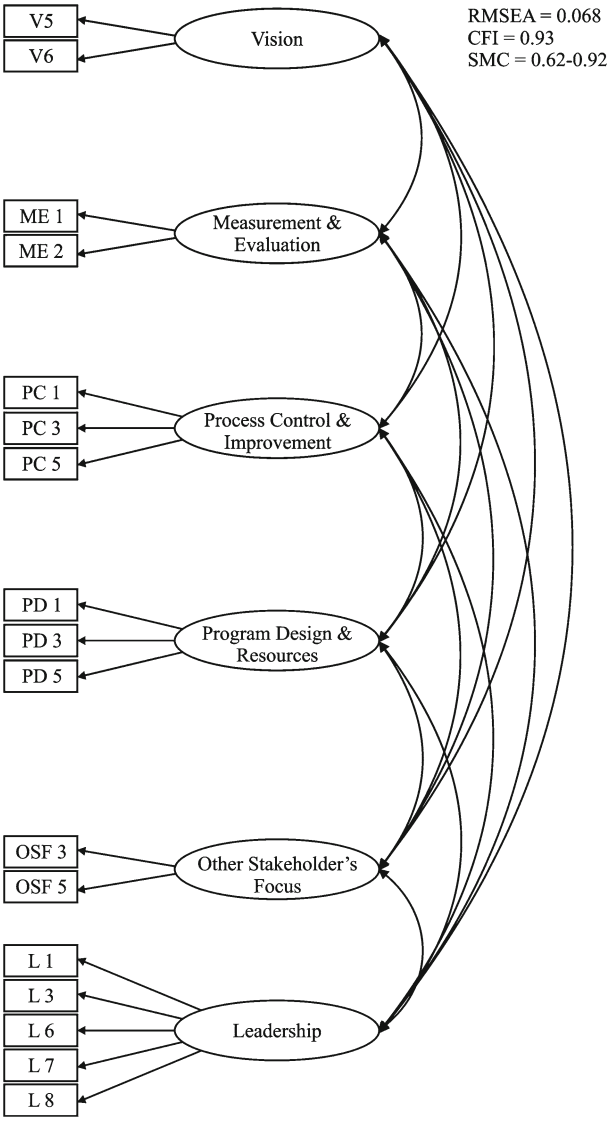


Fig. 1 The model showing critical factors of TQM in higher education. *V* vision, *ME* measurement and evaluation, *PC* process control and improvement, *PD* program design and resources, *OSF* other-stakeholder focus, *L* leadership

null model considering that there are no relationships between the measures. A CFI value range is from 0 to 1, with 0.90 or greater than 0.90 representing an acceptable fit to the data (Bentler 1992). CFA model constructed in this analysis shows CFI value (0.93) which suggests a very good model fit. *The Root Mean Square Error of Approximation* (*RMSEA*) is used to measure residuals and adjusts cautiousness in the model. Values run on a range from 0 to 1, with smaller values indicating better models. If the value is less than 0.08, it will be an adequate model fit (Hu and Bentler 1999). The RMSEA value is 0.068 in the CFA model

Table 2 Cronbach's reliability coefficient value

Construct/dimension	No. of items	Cronbach's alpha/ITC	Avg. correlation with other variables (x)	Discriminant validity (alpha − x)
Leadership	5	0.83	0.49	0.34
Vision	2	0.83	0.51	0.32
Measurement and evaluation	2	0.79	0.37	0.42
Process control and evaluation	3	0.76	0.50	0.26
Program design and resource	3	0.79	0.48	0.31
Other stakeholder focus	2	0.59	0.31	0.28

Table 3 Item to total correlation values

Construct	Item to total correlation for item 1	Item to total correlation for item 2
Vision	0.917**	0.931**
Measurement and evaluation	0.902**	0.915**
Other stakeholders	0.840**	0.845**

** Correlation is significant at 0.01 level

developed which indicates adequate model fit. Regarding *parameter estimates*all the factors are significant at 0.01 level of significance. The *Squared Multiple Correlations* (*SMC*) for all dimensions is from 0.62 to 0.92 which fall in acceptable squared loadings range.

Once the uni-dimensionality of the model was established, reliability of the developed model was determined by Cronbach alpha coefficient. Reliability coefficients 0.70 or more are considered adequate. The overall value of Cronbach coefficient alpha for the 17 items in the model developed after CFA is 0.86. This value is acceptable. Each subscale (except other stakeholders) also has Cronbach's coefficient value above 0.70 (Table 2).

For 'other stakeholder' construct Cronbach's coefficient value is 0.59. This value is still acceptable as according to Van de Ven and Ferry (1980) 0.35 is the acceptable limit for Cronbach alpha. However Cronbach alpha is a meaningless calculation with two or less items scale since its purpose is to compare each item to the remaining items in the scale as a group (Mentzer et al. 1999). So Item to Total Correlation (ITC) was evaluated for the sub-scales 'Vision', 'Measurement and evaluation', and 'Other Stakeholders' as these sub-scales have only two items. As Table 3 shows that all the values are above 0.70 so all ITC values are acceptable.

After establishing uni-dimensionality and reliability of the developed model, validity issues are discussed. *Content validity* is a kind of measurement which focuses on how well the researchers created measurement items using the relevant literature to cover the content domain of the variable being measured. The evaluation of content validity is a judgmental process. A valid instrument developed by Bayraktar et al. (2008) was used as the starting point in this research. The instrument was refined by focus group discussion comprising senior academicians from Pakistani Universities. Thus, the instrument has solid content validity.

The two sub-categories of construct validity are convergent validity and discriminant validity. *Convergent validity* measures the extent to which different approaches to measuring a construct produce the same results. A value of 0.60 or higher for all factor loadings in CFA

model developed demonstrates strong convergent validity (Chin et al. 1996). In the CFA model developed, all the factor loadings are above 0.60 so all items in the model developed have strong convergent validity. *Discriminant validity* is the degree to which measures of different concepts are distinct (Bagozzi et al. 1991). One method to determine the discriminant validity is by comparing the Cronbach's alpha of a construct to its correlations with other model variables (Sila and Ebrahimpour 2005). The correlation values are provided in Appendix C. According to Ghiselli et al. (1981), if the value of alpha is sufficiently larger than the average of its correlations with other variables, this is evidence of discriminant validity. The difference between the alpha value of each construct and the average correlation of each construct with the other constructs was adequately large (leadership = 0.34, vision = 0.32, measurement and evaluation = 0.42, process control and improvement = 0.26, process design and resources = 0.31, other stakeholder = 0.28). According to Sila and Ebrahimpour (2005) all these values are acceptable for discriminant validity.

Figure 1 shows the items retained after deletion upon CFA analysis. These items are shown in Table 4. Assessment of uni-dimensionality using goodness of fit statistics, reliability and validity (content validity, convergent validity and discriminant Validity) confirmed that the model (Fig. 1) emerged from CFA is a good model and the remaining factors in the model are, therefore, critical success factors of TQM implementation in HEIs of Pakistan.

4 Discussion

The six factors extracted in this study include 'leadership', 'vision', 'program design and resources allocation', 'measurement and evaluation', 'process control and improvement', and 'other stakeholders'. The findings reflect how TQM is perceived in Pakistani universities. In other words what elements of TQM are considered essential in their unique context.

The first factor that emerged as a critical factor of TQM is 'leadership'. The emergence of this factor is not unanticipated since leadership remains an essential element of TQM models such as Malcolm Baldrige National Quality Award (MBNQA) and European Quality Award. Leadership is also an important element of critical factors of TQM in all aforementioned studies. Sila and Ebrahimpour (2002) conducted a meta-analysis of studies focusing on the critical factors of TQM and found that the only factor common to all those studies is leadership. The findings reiterate the pivotal role of leadership and its continued relevance as an essential TQM element even in entirely different contexts in terms of sector of economy (such as HEIs) and economic conditions (such as developing countries). Items that emerged in this dimension included: (i) 'respondents assign high importance to the knowledge of top-management about quality management system and other quality related concepts'; (ii) 'respondents believe allocation of resources, by leadership, on education and training is an important requirement for TQM implementation'; and (iii) 'willingness of leadership to discuss quality related issues in their meetings and focusing on student performance improvement'.

'Vision' emerged as the second critical success factor of TQM. It reflects how the HEI positions itself in future. It is a public declaration of what type of organisation to be in future and is reflected from organisational values, beliefs, and business practices (Bayraktar et al. 2008). Respondents of this research perceived the HEI's vision as an important element of TQM. While 'vision' is not a critical success factor in many of the aforementioned studies and may be considered as a subset of 'leadership' category; its emergence in this research is not surprising. This is because a dynamic environment in which HEIs operate (Koch and Fisher 1998) requires developing a clear vision for the HEI or risk the failure. Further, given

Table 4 Critical success factors of TQM in Pakistani universities

Leadership
L1: University top management has knowledge about Quality Management System (QMS) and its implementation
L3: University top management is well aware of the quality related concepts, new work environment and new skills in the implementation of QMS
L6: University top management allocates adequate resources on education and training of academic and administrative employee
L7: University top management discusses many quality related issues on QMS in their management meetings
L8: University top management focus on how to improve the performance of students and employees apart from relying on financial criteria
Vision
V5: University has well defined academic and administrative processes and performance measures as well as policies
V6: Employees from different levels are involved in developing policies and plans
Program design and resources allocation
PD1: Students requirements are thoroughly considered in the design of curriculum
PD3: The needs and suggestions from the business world are thoroughly considered in the design of curriculum and new academic program
PD5: University facilities (e.g. laboratories and hardware) and resources (e.g. finance and human resources) are considered in the development and improvement of the curriculum and programs
Measurement and evaluation
ME1: University regularly audits practices according to policies and strategies
ME2: University benchmarks our academic and administrative processes with other institutions
Process control and improvement
PC1: University meets the expectations of our students and employees
PC3: Facilities of the university (e.g. classrooms, laboratories, computers, heating systems and air conditioners) are maintained in good condition according to periodic maintenance plans
PC5: University collect statistical data (e.g. error rates on student records, course attendance, employee turn our rates) and evaluates them to control ad improve the process
Other-stakeholders focus
OSF3: University regularly conducts surveys on job satisfaction of the employees
OSF5: University follows up the career path of our graduates

that universities are seats of highest academic learning, and academic freedom is an important requirement in intellectual work, an inability to formulate a clear vision may divert an organisation away from its objectives. HEIs work in a knowledge intensive environment where collective vision formulation through faculty input is more desirable than imposing a vision by the top-management. The vision formulation through a collective effort also explains why 'vision' should be considered as a distinct category from 'leadership' in HEIs. This is further reflected from the emerged item: 'respondents assign importance to the policy development and would value their participation in the policy making process'.

'Program design and resources' emerge as the third critical factor of TQM in this research. Program design in HEIs could be considered a counterpart of product/service design in manufacturing/services. The emergence of this factor underlines the need to design academic programs while keeping in consideration the requirements of students and other stakeholders. Academic programs are the main product of any HEI and are a means to satisfy the needs of

students and other stakeholders. Academic programs should be regularly reviewed to address the needs of different stakeholders (Bayraktar et al. 2008). Program design remains an essential feature of TQM in many universities. For instance, it was the most conspicuous element during TQM implementation at Aston University, UK (Clayton 1993). QFD offers one useful means to incorporate the voice of customers and other stakeholders into the program design. Respondents also perceived the need of proper allocation of resources as an important factor in TQM implementation. The findings, thus, show that like manufacturing sector, program design and resources allocation remain important elements of TQM implementation in HEIs.

The importance of 'measurement and evaluation'—a critical factor emerged in this research—is underpinned by the notion 'what gets measured gets managed'. Measurement and evaluation may be problematic in HE since employee involvement and customer satisfaction are difficult to be systematically measured. Measurement and analysis make the basis for continual improvement which lies at the core of TQM. In academia the motivation for individuals is usually to excel and engage in best possible scholarship (Owlia and Aspinwall 1997). The continuous improvement and, therefore, measurement and analysis provide the required channel for achieving academic excellence. Notwithstanding the challenges associated with systematic measurement and evaluation, it is quite intuitive that academicians would place strong emphasis on measurement and evaluation as a means of continuous improvement.

'Process control and improvement'—emerging as one of the critical factors—is the counterpart of process management in traditional TQM critical factors. In higher education TQM is considered as a process oriented approach. Tribus (1993) discussed this in terms of 'process over product principle' which means that in order to improve student learning the focus should be on the process rather than the examination. Process control and improvement reflects a quality assurance approach where focus is on preventing non-conformances rather than fixing the problems. Process control and improvement includes not only academic processes but also administrative processes. The examples of the former include curriculum design, teaching, and evaluation whereas examples of the latter include facility management, maintenance of classrooms, laboratories, student enrolment, etc. The Higher Education Commission (HEC) of Pakistan introduced some fundamental reforms over the last few years. An essential element of these reforms is the establishment of Quality Enhancement Cells with the mandate of quality assurance of academic processes (HEC 2010). The emergence of this factor could partly explain the resulting increased awareness and/or institutionalisation of process control and improvement in Pakistani universities.

'Other stakeholder focus' is the last critical factor of TQM emerging in this research. Stakeholders include students, industry, society, parents, funders, regulators, and employees of HEIs. The emergence of this factor reflects the importance of stakeholder-focus in program design. Focus on stakeholders is required for the survival of HEIs. There is, thus, a need to systematically collect feedback from stakeholders and then accordingly making improvement in academic and administrative processes. A focus on broader stakeholders is also an essential element of MBNQA and EFQM framework. It could include obtaining feedback from industry people about job performance of graduates and feedback from students about how the program design and the whole academic program helped them in learning and in meeting job requirements. While stakeholder focus is an essential element of TQM, 'student focus' did not emerge as a critical factor and was deleted from the original instrument during data analysis. This implies that student participation or obtaining their feedback is generally not considered a part of quality assurance in Pakistani universities. The possible explanation for this could be: (i) faculty—who is traditionally considered expert of subject-specific knowledge and guardian of curriculum quality—designs the curriculum using their academic expertise; (ii) The feedback of students—who are at the initial stages of

knowledge acquisition—may not be value adding during curriculum design. Students may be unaware of the knowledge and skills required for a useful career; and (iii) unreliable feedback from students since it comes from the dual role of students—as a customer and as a grade seeker (Meirovich and Romar 2006). Nevertheless this should not deter the input of other stakeholders including graduates. Students' feedback in aspects other than curriculum design would help to significantly improve the process.

The emergence of critical factors of TQM in HE has implications at macro, meso, and micro levels of HE. At the macro level, which mainly concerns the policy making by government, efforts need to be directed to encourage wide range of stakeholder consultation and active role of professional or accreditation bodies in quality assurance of HE. Since QA focuses on program design, measurement and evaluation, and process control aspects of HE, strengthening the professional and accreditation bodies could facilitate TQM implementation. At the meso level, which mainly concerns the individual universities/HEIs, the focus of efforts could be: (i) promoting awareness of quality assurance and its essentials such as program design, measurement and evaluation; (ii) measures to develop leadership skills of faculty and administrative staff; and (iii) development of control mechanisms including measures for performance evaluation. At the micro level, which mainly concerns with academic departments, the focus of efforts could be long term planning for each academic program, accreditation, process improvement, and faculty development. At the tactical and operational level it could include incorporation of the emerged factors in the day-to-day operations; training and development of faculty and support staff, obtaining feedback about program design from stakeholders, process control and improvement, and measurement and evaluation. The implications of the emerged critical factors are summarised in Table 5.

Table 5 Implications of this research at macro, meso, and micro levels of HE

Level of HE	Representative activities in HE at each level
Macro-level	Policies for TQM implementation in HE
	Setting direction for national HE and development of national educational quality goals
	Legislation for quality assurance in HE
	Strengthening of accreditation councils
	Alignment of accreditation bodies with universities to address the national requirements
Meso-level	Implementation of management systems such as ISO 9001 at the university level
	Development of quality assessment manuals
	University policies for new program design and revisions of existing one
	HEI's policies for enhanced coordination of universities with other stakeholders such as professional and accreditation bodies, industry and society
	Inter-university collaboration for quality assurance of academic programs
Micro-level	Professional accreditation of the programs offered by the HEI
	Implementation of management systems such as ISO 9001 at the departmental level or for a laboratory
	Faculty and staff training and development
	Program design as per quality assurance requirements
	Regular feedback and continual improvement of the academic program
	Quality assurance in the day-to-day operations
	Improvement in quality of services offered by the HEI

In past, research has focused on identifying the critical factors of TQM; research on critical factors of TQM in HEIs is scarce. The fact that HE is characterised by different set of processes, together with failure stories of TQM implementation in HE, highlights the need of determining what makes TQM different in HE, if it is. This research advances the existing knowledge one step ahead. The findings of this research are in line with the structural contingency theory (Melan 1998) which explains context–structure–performance relationship: organisations that establish a fit between organisational structures and environmental uncertainty would achieve higher performance than those which do not. This implies that organisations that design their structures and processes (e.g., program design and administrative processes) in accordance with their unique environment (e.g., regulator, customer, or market requirements) achieve higher performance than those who do not. The emergence of critical factors such as 'program design and resources', 'process control and improvement, and 'measurement and evaluation' could reflect the reaction to on-going educational reforms in Pakistani universities.

5 Conclusions

TQM had its origin in the manufacturing sector and its applicability in HE is questioned. Questions have been raised about whether the critical factors of TQM identified in the manufacturing sector in developed countries could be applied in entirely different contexts such as HEIs in developing countries. This research identified six critical success factors of TQM implementation in Pakistani universities including 'leadership', 'vision of HEI', 'program design', 'process control and improvement', 'measurement and evaluation', and 'stakeholder focused approach'. While the critical factors of HE share some commonalities, the complete set of critical factors in HE is different from the conventional critical factors reported in literature. This shows that unique processes of HE require different set of critical success factors during TQM implementation. Leadership of universities and policy makers could focus on these factors to facilitate TQM implementation. The notion that TQM elements do not fit in HEI (Koch and Fisher 1998) does not find support in this research.

Future research could focus on TQM critical factors in other developing countries to find whether there are some common critical TQM factors in HE. Future research could provide—through qualitative research—enhanced understanding of the critical factors emerged in this research. Research is also needed on the factors deleted from the original instrument.

Appendix A: The questionnaire used for the data collection

Quality Management System: An Implementation Assessment

Please mention your level of agreement on the following statements about implementation of Quality Management Systems in your Institute on five-point Likert scale (1 = strongly disagree; 2 = disagree; 3 = neutral; 4 = agree; 5 = strongly agree).

Leadership

L1. University top management has knowledge about Quality Management System (QMS) and its implementation.
L2. University top management actively participates in QMS and supports the improvement process.

L3. University top management is well aware of the quality related concepts, new work environment and new skills in the implementation of QMS.
L4. University top management strongly encourages employee involvement in QMS.
L5. University top management empowers employees to solve quality problems.
L6. University top management allocates adequate resources on education and training of academic and administrative employee.
L7. University top management discusses many quality-related issues on QMS in their management meetings.
L8. University top management focuses on how to improve the performance of students and employees apart from relying on financial criteria.
L9. University top management pursues long-term stable performance instead of short term temporary solutions.
L10. University top management properly designs and documents short term and long term planning.
L11. University top management has developed monitoring system for all the academic activities in the university.
L12. University top management provides all the necessary resources required to improve the quality of education in the University.
L13. University top management formally assesses the requirement of market and other stakeholders before launching any program.

Vision

V1. University has a clear written vision statement.
V2. University vision is widely known and shared by our staff.
V3. Our vision effectively encourages our staff to improve the performance of our students and our institution.
V4. Academic and administrative processes in university are well aligned with our vision.
V5. University has well defined academic and administrative processes and performance measures as well as policies.
V6. Employees from different levels are involved in developing our policies and plans.

Measurement and evaluation

ME1. University regularly audits practices according to policies and strategies.
ME2. University benchmarks our academic and administrative processes with other institutions.
ME3. University has standard performance measures (e.g. number of publications, course evaluations, absenteeism, job satisfaction) to evaluate the performance of the institution and QMS implementation.
ME4. Standard performance measures are used to evaluate the performance of university's top management.
ME5. Standard performance measures are used to evaluate the performance of academic units such as colleges, institutes and departments.
ME6. Standard performance measures are used to evaluate the performance of faculty members.
ME7. The aim of the evaluation is for improvement not for criticism.

Process control and improvement

PC1. University meets the expectations of our students and employees.
PC2. University has modern facilities (e.g. laboratories, library, computers, internet) to enhance the effectiveness of education.
PC3. Facilities of university (e.g. classrooms, laboratories, computers, heating systems and air conditioners) are maintained in good condition according to periodic maintenance plans.
PC4. Our processes are designed to be "fool proof" to minimize the source of error.
PC5. University collects statistical data (e.g. error rates on student records, course attendances, employee turnover rates) and evaluates them to control and improve the processes.

Program design and resources allocation

PD1. Students' requirements are thoroughly considered in the design of curriculum.
PD2. The experienced academicians' suggestions are thoroughly considered in the design of curriculum.
PD3. The needs and suggestions from the business world are thoroughly considered in the design of curriculum and new academic program.
PD4. Curriculum and academic programs are evaluated and updated every year.
PD5. University facilities (e.g. laboratories and hardware) and resources (e.g. Finance and human resources) are considered in the development and improvement of the curriculum and programs.

Quality system improvement

QSI1. QMS in university is continuously improved.
QSI2. University is committed to QMS to establish our quality system to a level to be certified by ISO 9000.
QSI3. University has a clear quality manual, quality system documents and working instructions.

Employee involvement

EI1. University has cross-functional team and supports team-work.
EI2. As a result of quality efforts in university, coordination and collaboration among our employees has been enhanced.
EI3. Our employees are actively involved in QMS-related activities.
EI4. University has an established suggestion system to improve the process by the employees.
EI5. Employees' suggestions are carefully evaluated and implemented if accepted.
EI6. Employees are very committed to the success of university and its quality.

Recognition and reward

RR1. University has a reward program to recognize employee QMS efforts and their participation to the activities related to the university's mission.
RR2. University has clear procedures for employees' rewards and applies them transparently.
RR3. Recognition and reward activities effectively stimulate employees' commitment to QMS efforts.
RR4. Appointments to the administrative and academic positions are based on the necessary skills required by the positions.

Education and training

ET1. University encourages education and training activities of our employees for academic excellence.
ET2. Special training for work-related skills is provided to all employees.
ET3. University organizes training on QMS for employees and encourages employees to participate.
ET4. Financial resources are available for employee's education and training in our university.
ET5. Employees, as the organizations most valuable and long-term resources, are worthy of receiving the necessary education and training in order to achieve the university's vision.

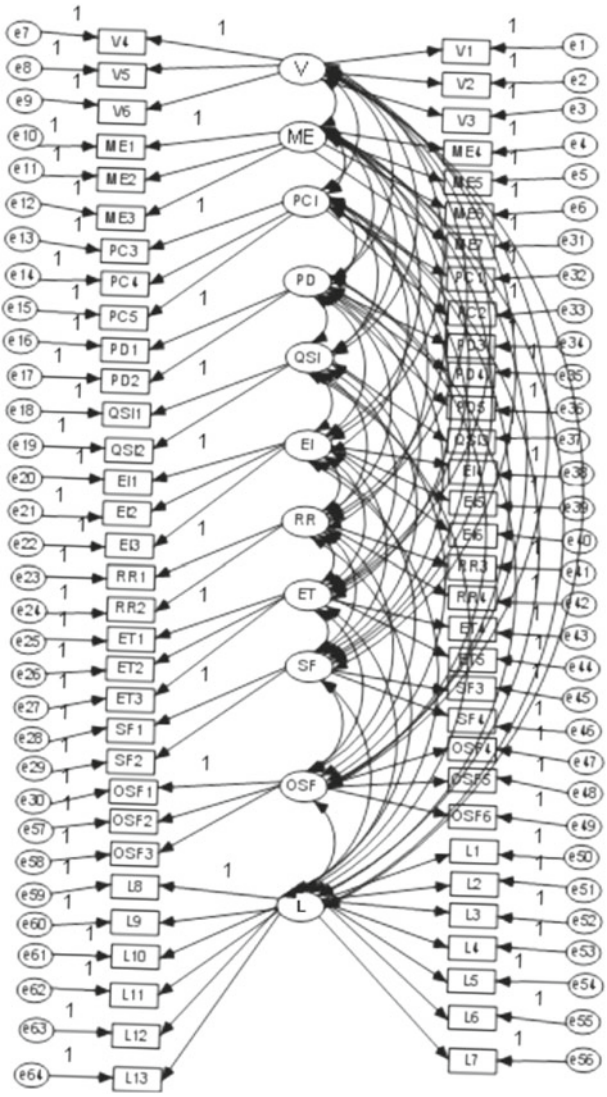
Student focus

SF1. University collects student complaints and evaluates them carefully.
SF2. University conducts a course-evaluation survey for every course taught in each semester regularly.
SF3. University supports the extra-curricular activities for students.
SF4. University has some organized efforts on continuous education of our students for their business-life and personal development after graduation.

Other-stakeholders focus

OSF1. University collects employee complaints and evaluates them carefully.
OSF2. University takes into consideration the changing needs of the business world.
OSF3. University regularly conducts surveys on job satisfaction of the employees.
OSF4. University has some organized efforts to understand the expectation of industry regarding our graduates.
OSF5. University follows up the career path of our graduates.
OSF6. University has some organized efforts to identify the academic and administrative needs of our employees.

Appendix B: The theoretical framework—showing all the constructs and the items in each construct—developed for the study



L Leadership, *V* vision, *ME* measurement and evaluation, *PC* process control and improvement, *PD* program design and resources, *QSI* quality system improvement, *E* employee involvement, *RR* recognition and reward, *ET* employee training, *SF* student focus, *OSF* other stakeholder-focus

Appendix C Correlation among emerged dimensions

Constructs	Leadership	Vision	Measurement and evaluation	Process control and improvement	Program design	Other stakeholder
Leadership						
r	1.000	0.610**	0.326**	0.645**	0.629**	0.260**
p		0.000	0.000	0.000	0.000	0.000
n	272	272	269	270	270	271
Vision						
r		1.000	0.433**	0.628**	0.585**	0.299**
p			0.000	0.000	0.000	0.000
n		272	269	270	270	271
Measurement and evaluation						
r			1.000	0.334**	0.283**	0.486**
p				0.000	0.000	0.000
n			269	269	269	268
Process control and improvement						
r				1.000	0.672**	0.235**
p					0.000	0.000
n				270	270	269
Program design and resources						
r					1.000	0.254**
p						0.000
n					270	269
Other stakeholders						
r						1.000
p						
n						271

Correlation among all dimensions emerged; *r* correlation, *p* probability, *n* number

** Correlation is significant at 0.01 level (2-tailed)

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