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Total quality management: a critical literature review using Pareto analysis

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Abstract

Purpose – Due to its impact on business performance total quality management (TQM) has gained a lot of importance by businessmen, managers, practitioners, and research scholars over the last 20 years. Therefore, the purpose of this paper is to critically assess the literature on TQM and find out the areas where future research is required.

Design/methodology/approach – To achieve this purpose the articles published in the last 20 years were studied in a systematic way and a snapshot of the same was prepared in the tabular format with points such as year and journal of publication, application and country, statistical method used, and findings of the study such as practices and impact of TQM. After identifying the practices and impact of TQM a quality tool "Pareto Analysis" was applied on them for development of the model.

Findings – The findings provide the practices of TQM and its impact on the performance of a business. The gaps from the literature have been identified and areas for future research have been suggested. On the basis of the findings a generalized framework of TQM has been suggested which can be applicable irrespective of the sector.

Practical implications – The research will help academicians and future researchers to have a clear understanding of TQM in different rosters.

Originality/value – Ample literature is available on TQM but in the best knowledge of authors no study has taken place to integrate the reviews and findings of 102 research papers of the last two decades.

Keywords Total quality management, Organizational performance, Pareto analysis

Paper type Literature review

Introduction

Organizations take up various methods to enhance the performance of their business. Total quality management (TQM) has been an important tool which is widely accepted by both manufacturing and service organizations as an attempt to improve the performance of their business. In the scenario of globalization it has become very tough to survive unless organizations maintain a good quality in their business. TQM is modern management thinking and an expedition, not a destination. It is an orderly management approach to meet competitive and technological challenges which has been established by both service and manufacturing organizations globally (Kumar *et al.*, 2009). TQM being a business management approach also improves the quality of organizational management, boosts competitiveness, and adds worth to the customer as well as provides a competitive edge for the organizations (Lee *et al.*, 2010).

In order to develop a generalized framework of TQM practices and impact, the first step will be to identify the following:

- What are the practices of TQM?

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- What are the impacts of these practices on organization performance?
- How can the impact of TQM be assessed/evaluated?

The paper is divided into four parts: the first part represents the methodology applied in the study; second, the results of the literature review are presented; third a quality tool Pareto analysis is applied on identified TQM practices and impacts; and fourth is identification of gaps from the literature and an agenda for future research is suggested.

Motivation for the present research

Thiagarajan and Zairi (1997) in their study realized the need for a systematic literature review on TQM. The researcher, before taking up this research work, has made an attempt to review the studies that have been published in the last two decades in the field of TQM literature. Besides the fact that there are other literature reviews of TQM available, the author also realized the need for a systematic literature review on TQM.

In the last two decades, researchers focused literature reviews of TQM in relation to innovation (Prajogo and Sohal, 2001; Bon and Mustafa, 2013), improved business performance to obtain competitive advantage (Powell, 1995), TQM, and knowledge management (Ooi, 2009). The other researchers focused on sector-specific studies such as TQM in the IT sector, TQM in the service sector, TQM in higher education sector (Owlia and Aspinwall, 1997; Cruickshank, 2003), TQM in the health sector (Kaplan *et al.*, 2010), etc. Through this study the author is trying to understand the positioning of TQM research done in the last two decades in general and identify the areas where future research is required.

It has also been noticed that the available literature reviews are mostly theoretical and only a few of them are empirical in nature (Karuppusami and Gandhinathan, 2006).

Research methodology

A huge amount of literature is available on TQM. The review on literature was done in a systematic manner. In order to select the articles of TQM the following database of online journals were searched, these are as follows:

- EBSCO Business Source Complete.
- Emerald Management Extra.
- Elsevier's Science Direct.
- Proquest ABI/Inform Complete.
- Scopus.
- Taylor & Francis.

As it was not possible to read all the articles available in these databases, criteria were set for including the articles in this study. These criteria were as mentioned below:

(1) Only those articles which were published in a journal within time period 1995 to December 2015 were considered for the study. Dissertation, nonpublished papers, and conference papers were not considered for the study.

(2) Only those papers which have covered the below mentioned areas of TQM in the above mentioned tenure were considered for the study:
   - critical dimensions of TQM;
   - identification and implementation of TQM practices;
   - impact of TQM on business performance;

- development of TQM Framework; and
- relationship of TQM with employee satisfaction, customer satisfaction, business performance, and knowledge sharing.

(3) Finally the findings were categorized into two components, namely, practices of TQM and impact of TQM and for this study only those articles were considered which had mentioned the variables in at least one of the subheads as mentioned above.

Once the criteria of selection of an article to be included were finalized, a search on the articles was made in the above mentioned databases. A total of 100 articles were selected for the study.

Results

The papers reviewed were analyzed on the following terms:

- type and period of publication;
- sector and period wise;
- journal wise;
- on the basis of data collection method used period wise;
- on the basis of sampling technique used;
- on the basis of statistical method used period wise; and
- selection of practices and impact of TQM.

Distribution of data on the basis of type and period of publication

The papers studied were divided on the basis of type, i.e. conceptual vs empirical and all the 100 papers were also classified on the basis of time period. The complete time span of 20 years was subdivided into four phases:

- Phase 1: 1995-1999 (7 research papers).
- Phase 2: 2000-2004 (10 research papers).
- Phase 3: 2005-2009 (28 research papers).
- Phase 4: 2010-2015 (57 research papers).

Based on the above analysis, it is clear that both organizations and researchers are focusing upon TQM as an important tool for growth of an organization. Also it is clear that the number of empirical research in the area has increased almost threefold in the last decade (Figure 1).

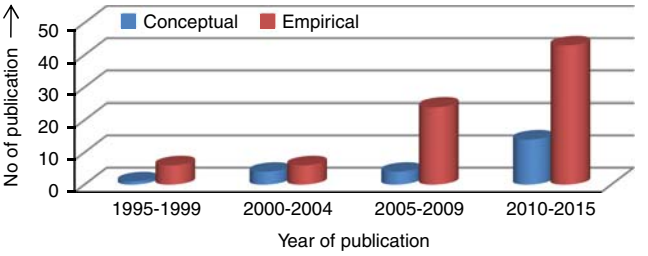

Figure 1.
Distribution of data on the basis of type and period of publication

Distribution of data on the basis of sector and period of publication

The distribution of all the studies on the basis of sector and period of publication is given in Table I. After the analysis it was found that out of 102 papers, 20 (19.61 percent) papers were not related to any particular sector thus were termed as "General." The remaining papers were classified into 20 sectors. The sectors which contribute appreciably are the manufacturing sector (20.59 percent), SMEs (8.82 percent), and the service sector (6.86 percent). Some papers have specified the sector more specifically such as the IT sector (3.92 percent), automotive sector (4.90 percent), banking sector (3.92 percent), educational sector (5.88 percent), food companies (3.92 percent), and oil and gas companies (3.92 percent). This shows that a common study on manufacturing and service sector has taken place, while subsectors such as airline, telecom, textile, housing, pharmaceutical, fast moving consumer goods (FMCG), cotton, etc., which are equally important, have not yet had much attention by researchers to studies in quality practices in these organizations.

Distribution of articles in terms of journals

Journal-wise distribution of articles is shown in Table II. The results of the table show that there are few journals specifically related to TQM. The 102 articles considered for the study are published in 62 journals. Out of 62 journals, 4 journals have published more than 5 articles. These are, namely, *International Journal of Quality & Reliability Management* (15 articles), *Total Quality Management* (7 articles), *The TQM Magazine* (5 articles), and *The TQM Journal* (6 articles). There are six journals which have published more than two articles. The details are mentioned in Table III.

Period of distribution of articles in terms of data collection method used

Period-wise distribution of the data collection method used by researcher is shown in Table III. The analysis reveals that out of 102 studies, 73.56 percent have conducted

Sector	1995-1999	2000-2004	2005-2009	2010-2015	Total	Contribution (%)
General	2	4	5	9	20	19.61
Manufacturing industries	4	3	8	6	21	20.59
SMEs	0	1	3	5	9	8.82
Cotton industry	1				1	0.98
Banking		1		3	4	3.92
IT		1	1	2	4	3.92
Manufacturing and service sector (combined)			1	1	2	1.96
Service sector			2	5	7	6.86
Automotive sector			1	4	5	4.90
Pharmaceutical			1	1	2	1.96
Educational sector			3	3	6	5.88
Plastic transforming sector			1		1	0.98
Semiconductor packaging orgs			2		2	1.96
Food companies				4	4	3.92
Oil and gas industry				4	4	3.92
Airline industry				2	2	1.96
FMCG sector				1	1	0.98
Telecom sector				2	2	1.96
Textile sector				2	2	1.96
Housing sector				2	2	1.96
Steel industry				1	1	0.98
Total	7	10	28	57	102	100

Table I. Distribution of period-wise application area

Name of journal	No. of articles
Advances in Aerospace Science and Applications (AASA)	1
Advances in Decision Sciences (ADS)	1
Benchmarking: An International Journal (BIJ)	2
Business Management Dynamics (BMD)	1
Decision Sciences (DS)	1
European Online Journal of Natural and Social Sciences (EOJNSS)	1
Food Control (FC)	1
Gadjah Mada International Journal of Business (GMIJB)	1
Industrial and Commercial Training (ICT)	1
Information Resources Management Journal (IRMJ)	1
International Journal of Modeling in Operations Management (IJMOM)	1
International Journal Quality and Innovation (IJQI)	1
International Journal of Business Science and Applied Management (IJBSAM)	1
International Journal of Advanced Research in Computer Engineering &Technology (IJARCET)	1
International Journal of Business and Management (IJBM)	1
International Journal of Business, Management and Social Sciences (IJBMSS)	1
International Journal of Emerging Technology and Advanced Engineering (IJETAE)	1
International Journal of Engineering and Innovative Technology (IJEIT)	2
International Journal of Engineering and Management Research (IJEMR)	1
International Journal of Engineering Development and Research (IJEDR)	1
International Journal of Engineering Science and Technology (IJEST)	1
International Journal of Ethics in Social Sciences (IJESS)	1
International Journal of Housing Markets and Analysis (IJHMA)	1
International Journal of Innovation and Technology Management (IJITM)	1
International Journal of Operations & Production Management (IJOPM)	4
International Journal of Pharmaceutical and Healthcare Marketing (IJPHM)	1
International Journal of Production Economics (IJPE)	2
International Journal of Production Research (IJPR)	3
International Journal of Productivity and Performance Management (IJPPM)	3
International Journal of Quality & Reliability Management (IJQRM)	15
International Journal of Reviews in Computing (IJRC)	1
International Journal of Science and Research (IJSR)	1
International Journal of Scientific and Technological Research (IJSTR)	1
International Journal of Scientific and Research Publications (IJSRP)	1
International Journal of Service Industry Management (IJSIM)	1
International Journal of Social Sciences and Entrepreneurship (IJSSE)	1
Jordan Journal of Mechanical and Industrial Engineering (JJMIE)	1
Journal - The Institution of Engineers, Malaysia (JIEM)	1
Journal of Business Research (JBR)	1
Journal of Manufacturing Technology Management (JMTM)	1
Journal of Process Management – New Technologies, International (JPMNTI)	1
Journal of Services Marketing (JSM)	1
Journal Telecommunications System & Management (JTSM)	1
Managing Business Excellence (MBE)	1
Managing science letters (MSL)	1
Mediterranean Journal of Social Sciences (MJSS)	1
METABK (M)	1
Pakistan Journal of Commerce and Social Sciences (PJCSS)	1
Pakistan Journal of Statistics & Operations Research (PJSOR)	1
Production and Operation Management (POM)	1
Quality Assurance in Education (QAE)	1
Review of Management Innovation & Creativity (RMIC)	1
ST-7: Best Practices in Construction & Manufacturing (ST-7BPCM)	2
The Electronic Library (EL)	1

Table II.
Distribution of articles journal wise

(*continued*)

Name of journal	No. of articles
The ICFAIAN Journal of Management Research (IJMR)	1
The International Journal Of Business & Management (IJBM)	1
The IUP Journal of Operations Management (IUPJOM)	1
The Quality Management Journal (QMJ)	1
The TQM Journal (TQMJ)	6
The TQM Magazine (TQMM)	5
Total Quality Management (TQM)	7
World Applied Sciences Journal (WASJ)	1
Total	102

Table II.

Data collection method	1995-1999	2000-2004	2005-2009	2010-2015	Total	Contribution
Questionnaire method	1	4	17	31	53	70.67
Interview technique		1			1	1.33
Web-based questionnaire	3	1	6	9	19	25.33
Case study	1	1			2	2.67
Total	5	7	23	38	75	100.00

Table III. Period-wise distribution of articles in terms of data collection method used

their research on the basis of primary data. The most commonly used method identified for collection of data is questionnaire survey method. It is found to be the most consistent method of data collection. The questionnaire method is considered to be the most reliable and valid method of data collection.

Distribution of articles in terms of sampling technique used

The analysis based on sampling technique used is shown in Table IV. Out of 102 articles, only 28 articles have specified the sampling technique applied in their studies; simple random sampling is preferred more by the researchers.

Period-wise distribution of articles in terms of method

The detailed analysis of the distribution of articles in terms of method is shown in Table V. Out of 102 papers, 79 papers were empirical in nature and have applied one or more than one method in their study. The results shown in Table V reveal that most commonly used techniques while working with TQM are factor analysis (15.63 percent), exploratory factor analysis (8.33 percent), confirmatory factor analysis (13.54 percent), structural equation modeling (12.50 percent), correlation (18.75 percent), and regression analysis (16.67 percent). A few researchers have used more than one method in their paper; therefore, the total number of methods used is 96 in 77 empirical papers.

Sampling technique	No. of articles	Contribution (%)
Convenience sampling	4	14.29
Simple random sampling	18	64.29
Purposive sampling	2	7.14
Stratified sampling	4	14.29
Total	28	100.00

Table IV. Distribution of articles in terms of sampling technique used

Method applied	1995-1999	2000-2004	2005-2009	2010-2015	Total	Contribution
Factor analysis	2	2	6	5	15	15.31
Confirmatory factor analysis (CFA)		1	6	7	14	14.29
Exploratory factor analysis (EFA)	1		2	5	8	8.16
ANOVA	1	1		5	7	7.14
Structural equation modeling (SEM)	1		5	7	13	13.27
Regression analysis		1	5	10	16	16.33
Correlation analysis		0	7	11	18	18.37
Analytic hierarchy process (AHP)				1	1	1.02
Analytical network process			1		1	1.02
t-Test	1		1	2	4	4.08
Interpretive structural modeling				1	1	1.02
Total	6	5	33	54	98	100.00

Table V.
Period-wise distribution of articles in terms of method

Period-wise distribution of articles in terms of country

Out of 102 papers, 90 of them have specified the country of the study. Country-wise analysis of research papers is given in Table VI. In total, 90 studies have taken place in 28 countries as mentioned. These studies have drawn their sample from 15 developed countries and 13 developing countries. The results reveal that the contribution of research work done in the field of TQM in these 90 studies is 52 percent for developed countries and

Country	1995-1999	2000-2004	2005-2009	2010-2015	Total	Contribution
Australia	2		2	1	5	5.56
Bangladesh				1	1	1.11
Belgium				1	1	1.11
China		4		1	5	5.56
Egypt				1	1	1.11
Europe	1				1	1.11
Greek			1	4	5	5.56
India	1	2	3	13	19	21.11
Indonesia				1	1	1.11
Iran				5	5	5.56
Italy				1	1	1.11
Ireland				1	1	1.11
Jordan				2	2	2.22
Japan				1	1	1.11
Kenya				1	1	1.11
Libya				1	1	1.11
Malaysia			4	4	8	8.89
New Zealand	2				2	2.22
Pakistan			1	6	7	7.78
Poland				1	1	1.11
Qatar			1		1	1.11
Russia		1			1	1.11
Spain		1	1	3	5	5.56
Thailand			1		1	1.11
Tunisian					0	0.00
Turkey			4	1	5	5.56
UK		1	1	1	3	3.33
USA			4	1	5	5.56
Total	6	9	23	52	90	100.00

Table VI.
Period-wise distribution of articles in terms of country

48 percent for developing countries. This clearly indicates that along with developed countries, developing countries have also started giving emphasis on quality practices to sustain organizations globally.

Selection of variables

In view of studying the variables of TQM, the findings of the study have been divided into two categories, namely, practices of TQM and impact of TQM. As the practices of TQM differ from sector to sector, sector-specific practices are not considered as they are applicable to that specific sector only. Also different researchers have named and defined practices in their own way. The practices having the same meaning/synonyms or subset of one practice are considered as one practice. We have taken those practices into consideration only whose frequency is at least twice. The practices having a frequency less than 2 are not included in Table VII.

Practices of TQM. The details of practices identified by different researchers in their papers have been given in detail in Table VII. Out of the 102 papers, 91 have specified the TQM practices in respective sectors. Therefore, a criterion for selecting the practices was set up and a quality tool Pareto analysis was applied to the practices of TQM. Named after the Italian economist – Vilferdo Pareto, Pareto analysis is one among the seven quality tools. It is a simple and effective statistical method which ranks the items in decreasing order of their frequency. The total frequency is summed up to 100. The practices of TQM are divided into two categories, with the vital few (having 80 percent of cumulative percentage) represented in Table VIII and the remaining useful many (having 20 percent of the cumulative percentage) represented in Table IX, as per the 80/20 rule developed by Vilfredo Pareto (Karuppusami and Gandhinathan, 2006). The results of the analysis are presented in the form of a graph as Figure 2. The graph represents the various factors in descending order and a clear pointer which overlays the line graph which separates 80 percent cumulative percent and also helps in finding out the remaining 20 percent which are least important. The practices under vital few are reported in Table VIII. The details of the same are mentioned in Table VII.

Impact of TQM. The impact of TQM as stated by various researchers is as shown in Table X. From 102 papers studied, 53 authors have reported impact of TQM in their research. TQM has improved different areas of business in different ways. Pareto analysis was applied to the different impacts of TQM as reported by the literature. The list of vital few and useful many are shown in Tables XI and XII. Among various impacts of TQM under the vital few category, customer satisfaction and improved business performance were found to have maximum frequency (Figure 3).

Conclusion and agenda for future research

To meet the objective of the present research, the researcher has reviewed 102 articles available in online databases from 1994 to 2015. The results of the study are subdivided into many parts such as period and type of studies, sector, country, journal of publication, and research methodologies used.

As portrayed by Table I, TQM has been studied in general for manufacturing industries and service industries to cover the broader area by many researchers. Then, the need to focus the specific sectors under manufacturing such as automotive sector, oil and gas industry, textile sector, plastic transforming sector, and cotton sector has been realized to understand whether general studies hold same for all the sectors, or they vary from subsector to subsector as per the nature of business. Similarly in the service sector, the studies have taken place in subsectors such as ITC, healthcare, education, banking, etc. It is clear from Table I that although many subsectors of manufacturing and service industries

Practices / References	Customers focus	Process management/efficiency	Education and training	Employee involvement and empowerment	Top management commitment	Information and analysis	Leadership	Continuous improvement	HRM and development	Supplier relationship/management	Strategic planning	Quality assurance/role of quality department	Communication	Benchmarking	Quality system	Teams/team work	Product and service design	Quality culture	Supplier quality	Performance measurement system	Innovation	Reward and recognition	Equipment management/tools and technique	Vision and plan statement	Technology	Employee encouragement	Organization system	Advance quality planning	Quality and operational results	Workforce management	Customer feedback	Public responsibility	Material management	Organizational trust	Product quality	Coordination
Black and Porter (1995)	1					1				1		1	1		1																					
Patel (1995)	1				1								1												1			1								
Black and Porter (1996)	1				1					1			1																							
Terziovski and Samson (1999)	1			1															1		1															
Joseph, Rajendran and Kamalanabhan (1999) and Joseph, Rajendran, Kamalanabhan and Ananthanaman (1999)													1					1																		
Joseph, Rajendran and Kamalanabhan (1999) and Joseph, Rajendran, Kamalanabhan and Ananthanaman (1999)		1	1	1	1	1	1			1		1					1																		1
Dow *et al.* (1999)	1		1											1		1	1		1									1							
Zhang *et al.* (2000)	1	1	1	1		1	1										1		1																
Yusof and Aspinwall (2000a)	1	1	1			1			1			1							1																
Motwani, (2001)	1	1	1		1							1		1			1																		
Sureshchandar *et al.* (2001)	1			1	1	1		1	1					1			1				1														
Khoo and Tan (2002)		1		1			1								1					1															
Chin and Pun (2002)			1	1			1											1						1											
Li *et al.* (2003)	1	1					1					1					1		1		1														
Miyagawa and Yoshida (2005)	1		1			1	1		1		1	1					1		1									1							
Lorente and Costa (2004)		1	1		1	1			1	1						1	1													1					
Issac *et al.* (2004)	1	1		1	1			1	1			1	1	1				1		1															
Seth and Tripathi (2005)	1	1	1	1			1			1	1									1	1					1							1		
Sila and Ebrahimpour (2005)	1	1				1	1			1	1																		1						
Prajogo and McDermott (2005)	1	1				1	1				1									1										1					
Demirbag *et al.* (2006)		1	1	1	1	1						1							1															
Lakhal *et al.* (2006)	1		1	1	1	1		1							1				1			1												
Ooi *et al.* (2006)	1			1										1																				1

Table VII.
Practices of total quality management

(continued)

References	Customers focus	Process management/efficiency	Education and training	Employee involvement and empowerment	Top management commitment	Information and analysis	Leadership	Continuous improvement	HRM and development	Supplier relationship/management	Strategic planning	Quality assurance/role of quality department	Communication	Benchmarking	Quality system	Teams/team work	Product and service design	Quality culture	Supplier quality	Performance measurement system	Innovation	Reward and recognition	Equipment management/tools and technique	Vision and plan statement	Technology	Employee encouragement	Organization system	Advance quality planning	Quality and operational results	Workforce management	Customer feedback	Public responsibility	Material management	Organizational trust	Product quality	Coordination
Das *et al.* (2006)	1		1	1	1			1						1																					
Kakkar and Narag (2007)	1	1	1	1	1											1																			
Mehra and Ranganathan (2007)	1		1						1																										
Moghaddam and Moballeghi (2008)	1			1	1	1	1	1										1																	
Vijande and Gonzalez (2007)		1			1		1		1		1				1																				
Bayazit and Karpak (2007)			1	1	1					1					1																				
Khamala and Lingaraj (2007)	1		1		1			1		1					1						1														
Ooi *et al.* (2007)	1														1			1			1														
Sharma and Kodali (2008)	1	1					1	1	1	1										1															
Arumugam *et al.* (2008)	1	1		1		1	1	1		1		1											1												
Vithurama and Mone (2008)	1	1	1			1		1										1																	
Lenka and Suar (2008)	1				1			1	1									1											1						
Bayraktar *et al.* (2008)	1	1	1	1			1			1		1					1			1		1													
Salaheldin (2009)		1	1	1	1		1	1		1				1	1	1	1	1	1		1														
Deros *et al.* (2009)	1		1													1	1																		
Kumar *et al.* (2009)	1			1							1		1						1			1					1								
Fotopoulos and Psomas (2009)	1	1	1	1	1	1		1		1	1		1		1							1	1												
Awan *et al.* (2009)	1	1	1		1	1			1	1		1	1			1										1									
Fotopoulos and Psomas (2010)	1	1		1	1	1									1																				
Zakuan *et al.* (2010)	1						1		1		1	1								1					1										
Sayeda *et al.* (2010)				1	1	1	1	1			1			1							1		1												
Zakuan *et al.* (2010)	1					1	1		1		1	1	1						1																

(continued)

Table VII.

Practices		Customers focus	Process management/efficiency	Education and training	Employee involvement and empowerment	Top management commitment	Information and analysis	Leadership	Continuous improvement	HRM and development	Supplier relationship/management	Strategic planning	Quality assurance/role of quality department	Communication	Benchmarking	Quality system	Teams/team work	Product and service design	Quality culture	Supplier quality	Performance measurement system	Innovation	Reward and recognition	Equipment management/tools and technique	Vision and plan statement	Technology	Employee encouragement	Organization system	Advance quality planning	Quality and operational results	Workforce management	Customer feedback	Public responsibility	Material management	Organizational trust	Product quality	Coordination
References																																					
Talib *et al.* (2010)		1	1	1	1	1	1		1	1	1	1		1	1	1	1	1	1	1		1					1										
Srinivasu *et al.* (2010)		1	1	1	1	1	1		1		1	1			1	1	1																				
Al-Shobaki *et al.* (2010)				1		1	1		1	1				1	1																						
Psomas and Fotopoulos (2010)		1	1		1	1	1					1				1																					
Baird *et al.* (2011)			1				1				1							1																			
Valmohammadi (2011)		1	1				1	1		1	1			1		1																					
Ooi *et al.* (2011)		1	1				1	1		1		1																									
Mittal *et al.* (2011)		1			1	1			1					1		1							1														
Oakland (2011)			1							1				1					1			1															
Ciptono *et al.* (2011)					1			1			1		1					1																			
Talib *et al.* (2011a)		1		1	1	1					1																									
Talib *et al.* (2011b)		1	1	1	1	1	1		1	1	1	1		1	1	1	1	1	1			1														
Sajjad and Amjad (2011)		1				1	1	1		1		1	1		1																	1				
Pumakitikashem *et al.* (2011)		1	1				1	1		1	1	1																								
Mallur *et al.* (2012)		1	1	1	1	1		1	1		1			1				1	1	1			1													
Shukla and Agrawal (2012)		1	1	1		1	1		1					1																						
Gulbarga *et al.* (2012)			1				1	1				1																								
Sajjad and Amjad (2012)		1			1	1	1			1		1	1		1																	1				
Ooi (2012)		1	1				1	1		1		1																								
Talib *et al.* (2012)		1	1	1	1	1	1		1	1	1	1		1	1	1	1	1	1			1					1									
Anil and K P (2013)		1	1	1	1	1	1	1	1			1			1	1				1		1	1													
Lazar *et al.* (2013)				1	1				1			1																								
Khanam *et al.* (2013)		1		1	1	1			1								1		1																	

Table VII.

(continued)

Practices / References	Customers focus	Process management/efficiency	Education and training	Employee involvement and empowerment	Top management commitment	Information and analysis	Leadership	Continuous improvement	HRM and development	Supplier relationship/management	Strategic planning	Quality assurance/role of quality department	Communication	Benchmarking	Quality system	Teams/team work	Product and service design	Quality culture	Supplier quality	Performance measurement system	Innovation	Reward and recognition	Equipment management/tools and technique	Vision and plan statement	Technology	Employee encouragement	Organization system	Advance quality planning	Quality and operational results	Workforce management	Customer feedback	Public responsibility	Material management	Organizational trust	Product quality	Coordination
Wiengarten *et al.* (2013)	1	1		1			1	1																											
Nwabueze (2013)	1			1																1															
Talib *et al.* (2013a, b)	1		1					1					1					1			1														
Gupta and Belokar (2014)	1	1		1						1					1					1						1									
Kaur and Sharma (2014)	1	1					1		1	1		1																							
Bani *et al.* (2014)	1			1	1	1	1							1		1											1								
Mitreva and Tashkov (2014)			1	1		1		1							1																				
Magd. (2014)	1	1	1	1	1	1	1		1	1	1																								
Mehmood *et al.* (2014)	1			1	1			1					1		1	1																			
Mora *et al.* (2014)		1				1	1	1	1	1						1		1																	
Latif *et al.* (2014)			1	1			1																												
Haque *et al.* (2014)	1							1																											
Kafetzopoulos and Gotzamani (2014)				1																			1			1									
Mbithi and Shale (2014)			1		1	1									1																				
Ahmad and Elhuni (2014)	1	1	1	1	1	1	1	1		1				1				1				1		1											
Sengar *et al.* (2014)	1	1	1	1	1									1	1				1				1												
Gajdzik and Sitko (2014)		1					1	1				1	1	1			1															1			
Hassan *et al.* (2014)	1	1	1	1			1	1																											
Sweis *et al.* (2014)	1		1	1				1	1					1	1	1	1	1					1		1										
Yazdani *et al.* (2014)	1						1				1									1						1									
Sadikoglu and Olcay (2014)	1	1	1				1				1								1																
Mosadeghrad (2015)	1	1	1			1		1	1	1	1							1														1			
Valmohammadi and Roshanzamir (2015)	1	1		1	1		1				1																								
Total	69	49	45	45	41	39	38	34	30	28	24	21	21	20	20	20	20	19	18	12	11	10	10	8	7	6	5	5	5	3	3	3	2	2	1

Table VII.

S. no.	TQM practice	Symbol	Frequency of occurrence	Percentage of frequency of occurrence	Cumulative percentage
1	Customers focus	CF	69	9.80	9.8
2	Process management/ Efficiency	PM	49	6.96	16.76
3	Education and training	ET	45	6.39	23.15
4	Employee involvement and empowerment	EIE	45	6.39	29.54
5	Top management commitment	TMC	41	5.82	35.36
6	Information and analysis	IA	39	5.54	40.9
7	Leadership	LS	38	5.40	46.3
8	Continuous improvement	CI	34	4.83	51.13
9	HRM and development	HRM	30	4.26	55.39
10	Supplier relationship/ Management	SR	28	3.98	59.37
11	Strategic planning	SP	24	3.41	62.78
12	Quality assurance/Role of quality department	QA	21	2.98	65.76
13	Communication	COM	21	2.98	68.74
14	Benchmarking	BM	20	2.84	71.58
15	Quality system	QS	20	2.84	74.42
16	Teams/Team work	TW	20	2.84	77.26
17	Product and service design	PD	20	2.84	80.1

Table VIII.
List of TQM practices "Vital Few" (80 percent)

S. no.	TQM Practice	Symbol	Frequency of occurrence	Percentage of frequency of occurrence	Cumulative percentage
1	Culture	CUL	18	2.56	82.66
2	Supplier quality	SQ	18	2.56	85.22
3	Performance measurement system	PMS	12	1.70	86.92
4	Innovation	INO	11	1.56	88.48
5	Reward and recognition	RR	11	1.56	90.04
6	Equipment management/ Tools and technique	TT	10	1.42	91.46
7	Vision and plan statement	VPS	10	1.42	92.88
8	Technology	TECH	8	1.14	94.02
9	Employee encouragement	EE	7	0.99	95.01
10	Organization system	OS	6	0.85	95.86
11	Advance quality planning	AQP	5	0.71	96.57
12	Quality and operational results	QOR	5	0.71	97.28
13	Workforce management	WM	5	0.71	97.99
14	Customer feedback	CF	3	0.43	98.42
15	Public responsibility	PR	3	0.43	98.85
16	Material management	MM	3	0.43	99.28
17	Organizational trust	OT	2	0.28	99.56
18	Product quality	PQ	2	0.28	99.84
19	Coordination	COR	1	0.14	99.98

Table IX.
List of TQM practices "Useful Many" (20 percent)

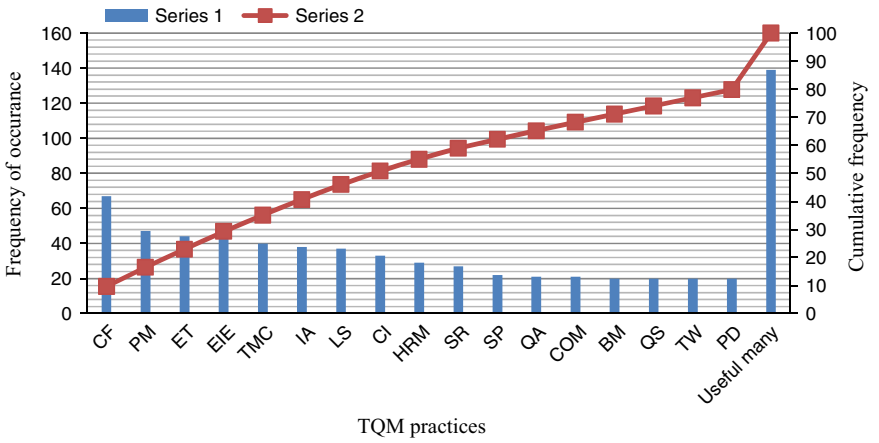

Figure 2.
Pareto analysis of TQM practices

have been considered for studies, there are still subsectors in which future studies can be carried out such as airline industries, steel industries, pharmaceutical, FMCG sector, telecom sector, etc. Future research on TQM and its impact on these industries can be considered.

It is evident from Table V that although a few studies have used different modeling techniques such as interpretative structural modeling, analytical hierarchy process, analytical network process, MICMAC analysis, etc., these have still not gained attention from the researchers in TQM. Future research can apply different techniques to the variables identified in this study. The variables in this study will form a pedestal for the application of different modeling techniques in the field of TQM.

Table VI suggests that most of the studies published during the last two decades have been carried out in developed countries. The results of the same need validation for the emerging markets as well as the factors affecting the performance of any business varying from market to market.

To select the TQM practices for model development, Pareto analysis has been applied. The results of the Pareto analysis suggest 17 TQM practices which fall under the category of "vital few" and have gained a lot of importance by researchers in last two decades. These practices are customers focus and satisfaction, process management/efficiency, education and training, employee involvement and empowerment, top management commitment, information and analysis, leadership, continuous improvement, human resource management and development, supplier relationship/management, strategic planning, quality assurance/role of quality department, communication, benchmarking, quality system, teams/team work, and product and service design.

A study done by Karuppusami and Gandhinathan (2006) states that although there have been many conceptual studies for the identification of practices of TQM, there are very few which have used empirical analysis for the same. The study has identified 14 practices of TQM using Pareto analysis by reviewing 37 research papers published during 1989-2003. The present research has reviewed 102 research papers published from 1995 to 2015 in order to understand whether there is any difference in the practices of TQM in the changed time frame with changing market scenario. It has been observed that a few new practices such as continuous improvement, communication, and strategic planning have gained importance from the researchers and have made their position in "vital few."

The researcher has suggested that models can be developed by future researchers using this technique. In order to do the same, Pareto analysis was also applied to study the impact of TQM as reported by previous studies. It is observed that customer satisfaction, improved

Table X.
Impact of total quality management

References	Impact							
	Customer satisfaction	Improved business performance	Competitive advantage	Employee satisfaction	Improved service/Product quality	Improved financial performance	Operational effectiveness	cost reduction
Patel (1995)			1					
Terziovski and Samson (1999)	1	1					1	
Yusof and Aspinwall (2000b)	1	1	1					
Sureshchandar *et al.* (2001)				1				
Khoo and Tan (2002)	1							
Miyagawa and Yoshida (2005)		1						
Martínez-Lorente and Martínez-Costa (2004)		1						
Sila and Ebrahimpour (2005)		1						
Prajogo and McDermott (2005)								
Demirbag *et al.* (2006)						1		
Lakhal *et al.* (2006)					1	1	1	
Ooi *et al.* (2006)				1				
Das *et al.* (2006)					1			
Mehra and Ranganathan (2007)	1	1						
Joiner (2007)		1						
Santos-Vijande and Alvarez-Gonzalez (2007)			1					
Ooi *et al.* (2007)				1				
Arumugam *et al.* (2008)					1			
Lenka and Suar (2008)			1					
Kumar *et al.* (2009)	1							
Vanichchinchai and Igel (2009)	1							
Ho (2009)			1					
Fotopoulos and Psomas (2009)	1							
Fotopoulos and Psomas (2009)	1	1		1				
Zakuan *et al.* (2010)	1	1		1				
Sayeda *et al.* (2010)	1		1	1				
Talib *et al.* (2010)					1			

(*continued*)

Table X.

References	Impact								
Al-Shobaki *et al.* (2010)	1		1						
Psomas and Fotopoulos (2010)	1		1		1				
Baird *et al.* (2011)					1				
Valmohammadi (2011)		1							
Ooi *et al.* (2011)	1				1				
Ciptono *et al.* (2011)		1					1		
Talib *et al.* (2011a)	1	1	1						1
Sajjad and Amjad (2011)	1		1						1
Rashmi and Swamy (2012)		1		1					1
Shukla and Agrawal (2012)	1	1	1						
Talib *et al.* (2012)/TSM	1		1				1		
Gupta and Belokar (2012)	1			1				1	
Shaikh (2012)		1					1		1
Sajjad and Amjad (2012)	1	1	1						1
Talib *et al.* (2012)					1				
Wiengarten *et al.* (2013)									
Nwabueze (2013)			1						
Das (2014)			1						
Kaur and Sharma (2014)	1			1					
Psomas *et al.* (2014)	1	1		1	1				
Mehmood *et al.* (2014)		1							
Mora *et al.* (2014)	1	1		1					
Kafetzopoulos and Gotzamani (2014)					1		1	1	
Hassan *et al.* (2014)	1			1	1		1	1	
Sadikoglu and Olcay (2014)	1			1			1	1	
Mosadeghrad (2015)	1			1				1	
Valmohammadi and Roshanzamir (2015)		1							
Total	25	20	15	14	11	8		7	5

(*continued*)

Table X.

References	Impact							
	Improved market share	Social environment	Improved productivity	Improved innovativeness	Employee relations	Improved leadership	Improved communication	Improved external and internal relation
Patel (1995)								
Terziovski and Samson (1999)								
Yusof and Aspinwall (2000b)					1			
Sureshchandar *et al.* (2001)								
Khoo and Tan (2002)								
Miyagawa and Yoshida (2005)								
Martínez-Lorente and Martínez-Costa (2004)								
Sila and Ebrahimpour (2005)								
Prajogo and McDermott (2005)								
Demirbag *et al.* (2006)					1			
Lakhal *et al.* (2006)								
Ooi *et al.* (2006)								
Das *et al.* (2006)								
Mehra and Ranganathan (2007)								
Joiner (2007)								
Santos-Vijande and Alvarez-Gonzalez (2007)								
Ooi *et al.* (2007)								
Arumugam *et al.* (2008)								
Lenka and Suar (2008)								
Kumar *et al.* (2009)								
Vanichchinchai and Igel (2009)								
Ho (2009)								
Fotopoulos and Psomas (2009)								
Fotopoulos and Psomas (2009)	1	1						
Zakuan *et al.* (2010)		1						
Sayeda *et al.* (2010)								
Talib *et al.* (2010)								

(*continued*)

Table X.

References	Impact							
Al-Shobaki *et al.* (2010)								
Psomas and Fotopoulos (2010)			1					
Baird *et al.* (2011)								
Valmohammadi (2011)								
Ooi *et al.* (2011)								
Ciptono *et al.* (2011)								
Talib *et al.* (2011a, b)								
Sajjad and Amjad (2011)	1					1	1	1
Rashmi and Swamy (2012)	1		1					
Shukla and Agrawal (2012)			1					
Talib *et al.* (2012)/TSM								
Gupta and Belokar (2012)								
Shaikh (2012)								
Sajjad and Amjad (2012)								
Talib *et al.* (2012)	1		1					
Wiengarten *et al.* (2013)								
Nwabueze (2013)				1				
Das (2014)								
Kaur and Sharma (2014)								
Psomas *et al.* (2014)								
Mehmood *et al.* (2014)								
Mora *et al.* (2014)								
Kafetzopoulos and Gotzamani (2014)		1						
Hassan *et al.* (2014)								
Sadikoglu and Olcay (2014)								
Mosadeghrad (2015)	1	1		1				
Valmohammadi and Roshanzamir (2015)		1						
Total	5	5	4	2	2	1	1	1

Table XI.
List of TQM impact "Vital Few" (80 percent)

S. no.	TQM impact	Symbol	Frequency of occurrence	Percentage of frequency of occurrence	Cumulative percentage
1	Customer satisfaction	CS	25	19.84	19.84
2	Improved business performance	IBP	20	15.87	35.71
3	Competitive advantage	CA	15	11.90	47.62
4	Employee satisfaction	ES	14	11.11	58.73
5	Improved service/ Product quality	IS/PQ	11	8.73	67.46
6	Improved financial performance	IFP	8	6.35	73.81
7	Operational effectiveness	OE	7	5.56	79.37

Table XII.
List of TQM impact "Useful Many" (20 percent)

S. no.	TQM impact	Symbol	Frequency of occurrence	Percentage of frequency of occurrence	Cumulative percentage
1	Cost reduction	CR	5	3.97	83.33
2	Improved market share	IMS	5	3.97	87.30
3	Social environment	SE	5	3.97	91.27
4	Improved productivity	IP	4	3.17	94.44
5	Improved innovativeness	II	2	1.59	96.03
6	Employee relations	ER	2	1.59	97.62
7	Improved leadership	IL	1	0.79	98.41
8	Improved communication	IC	1	0.79	99.21
9	Improved external and internal relations	IE&IR	1	0.79	100.00

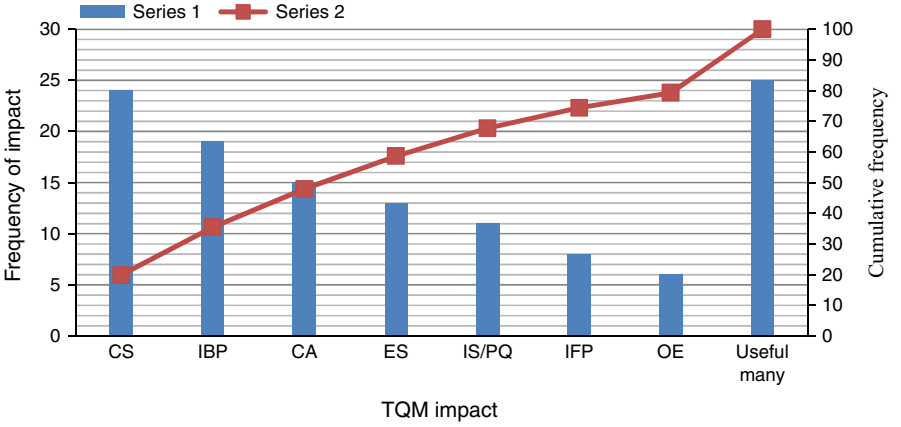

Figure 3.
Pareto analysis of TQM impact

business performance, competitive advantage, employee satisfaction, improved service/ product quality, improved financial performance, and operational effectiveness fall under "vital few." For development of the model, it was realized that considering all the impacts of TQM that fall under the vital few category would not be feasible as it would make the

validation of the model through different techniques difficult. To overcome the same, the impact of TQM was divided into two categories: external and internal. The impacts that fall under the external category are customer satisfaction and competitive advantage and those which fall under internal category are improved business performance, employee satisfaction, improved service/product quality, improved financial performance, and operational effectiveness. The customers and competitors (external category) would have a different view of TQM than the employees (internal category). Therefore, at the time of model development only one category of impact could be considered. In this case, internal impacts were considered for the development of the model because out of the seven impacts among the vital few, five belong to the internal impact category. Despite the fact that all the impacts that are listed under the vital few category are important, the two impacts having highest frequency of occurrence in vital few under internal impact category (improved business performance and employee satisfaction) were considered for this study. The model proposed from the result of the Pareto analysis is as shown in Figure 4.

Although many researchers have proposed various research models, the conceptual model is unique in itself as it has been proposed after using empirical analysis on identified practices and impacts of TQM which is one of its own kind. Further researcher can validate the proposed model with different sectors and different markets. The model can also be validated under different conditions such as environment, cultural, and situational.

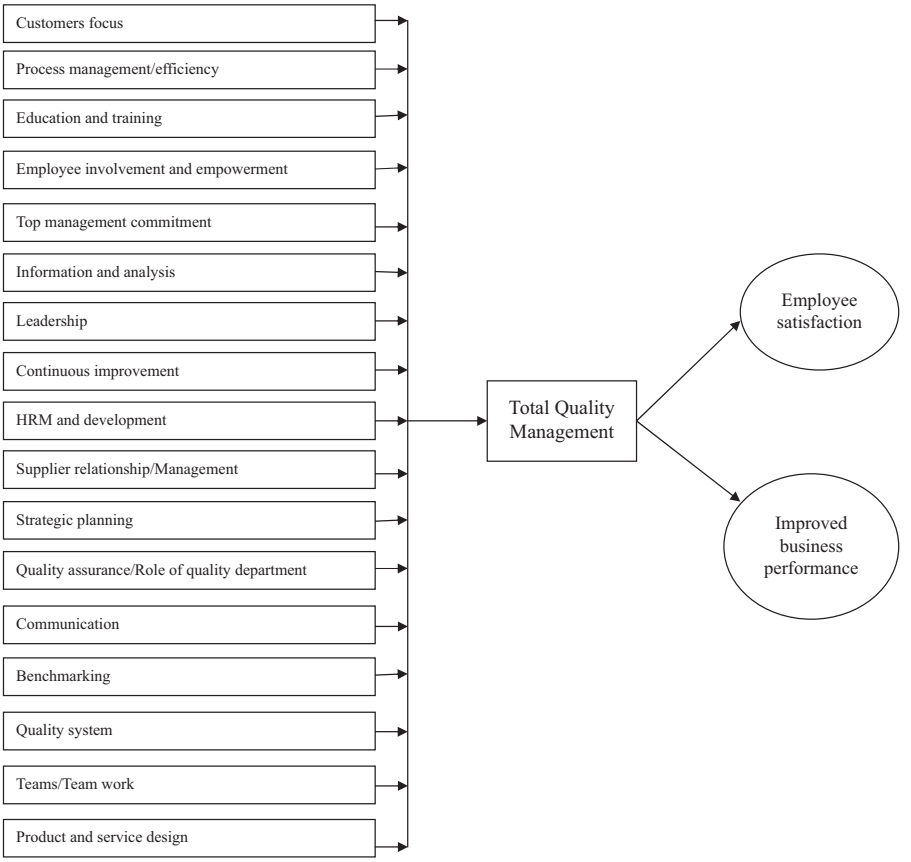

Figure 4.
A conceptual framework of total quality management

Future research may be carried out considering the external impacts with customer satisfaction and competitive advantage in the proposed model. Improved service/product quality, improved financial performance, and operational effectiveness from the internal impact category can also be considered for future studies.

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