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Mapping the linkage between Organizational Culture and TQM
The case of Indian auto component industry

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Abstract

Purpose – The purpose of this paper is to examine the impact of Organisational Culture (OC) on total quality management (TQM) implementation in Indian small and medium enterprises (SMEs) in the auto component sector. Specifically; it attempts to propose a model linking OC and TQM for this sector.

Design/methodology/approach – Survey method was used for data collection by targeting the whole population of 482 Indian auto component SMEs drawn from Auto Component Manufacturers Association members' database. Out of 482, 150 completely filled questionnaires were taken for data analysis. Proposed relationships among identified dimensions of OC and TQM interventions have been validated through parameter estimation statistics and goodness-of-fit statistics using path analysis technique of structural equation modelling using AMOS 18.0.

Findings – Based on the results, a culture influenced TQM model has been developed. The model demonstrates a linkage between cultural dimensions and TQM interventions, thereby suggesting that OC characterised by "openness", "confrontation", "trust", "authenticity", "proaction", "autonomy", "collaboration" and "experimentation" has a significant and positive impact on TQM implementation.

Practical implications – The study presents many practical implications, specifically for quality managers in Indian auto component SMEs. The study has developed a culture influenced TQM model which identifies dimensions of OC that promote TQM implementation. The study also identifies various interventions of TQM in their order of significance, which can be used by SMEs in mapping the critical links between OC and TQM through this model. Thus, findings of the present study will help SMEs in this sector to move up the value chain and sustain their global competitiveness.

Originality/value – The study provides a culture influenced TQM model which would assist managers in quality implementation in Indian auto component SMEs.

Keywords Indian auto component SMEs, OCTAPACE culture, TQM interventions

Paper type Research paper

1. Introduction

There is considerable evidence that the success of performance enhancing strategies such as reengineering and total quality management (TQM) is dependent on cultural change (Becker and Gerhart, 1996; Daymon, 2000; Delaney and Huselid, 1996; Heifetz and Laurie, 1997). Foster and Whittle (1989) have found that TQM is a fundamental shift away from traditional approach to quality. It is seen that control based on systematic analysis, preplanning and blueprinting of operations continue to be core of

the organisational operations but the focus has shifted to continuous improvement, where control is embedded in and driven through the culture of the organisation. According to Cameron and Quinn (1999), the assessment of Organisational Culture (OC) in terms of key dimensions has become increasingly important because of the need for organisations to change while maintaining stability in the current turbulent external environment. Therefore, identification of those core organisational cultural values that are conducive for planning and execution of TQM interventions can be especially beneficial for the effective implementation of TQM in any organisation.

In recent years, TQM is increasingly being adopted in emerging economies such as China and India across many industries in pursuit of higher market share and enhanced customer satisfaction. A study by Auto SCM India (2006) highlighted that growing base of global automakers such as Hyundai, Ford and Toyota has ensured rapid establishment and growth of a robust auto component sector in India. In its quest to be globally competitive, Indian automotive component manufacturers have embraced quality initiatives to a great extent. According to an estimate by India Brand Equity Foundation (2015), Indian auto component makers are well positioned to benefit from the globalisation of the sector as exports potential could be increased by up to four times to US$40 billion by 2020. India is poised to emerge as a global hub for auto component organisation structure and management wisdom have speedily and timely adapted new quality techniques. As a result, these large local component manufacturers have not just become globally competitive but have successfully aligned themselves with the global supply chains of some of the international automotive companies.

There is increasing evidence that a growing number of OEMs are forming partnerships with firms deeper in the lower tiers, increasingly the small and medium enterprises (SMEs) (Petrick, 2009). Consequently, over past few years the quality focus has shifted to smaller Tier-1 and Tier-2 suppliers which usually do not have a well-developed management structure and expertise. The fast changing global economic scenario, while on one hand has created several opportunities for the SMEs, on the other hand it has put relentless pressure on them to upgrade their competencies and enhance quality to meet the growing demand with newer products in shorter time. Under this new emerging supply chain, larger, well-established Tier-1 suppliers are mentoring the smaller players to fast-track their movement up the quality learning curve so as to integrate them as well with global supply chains of some of the major auto manufacturers. The apex body for the Indian auto component industry, namely, Automotive Component Manufacturers Association (ACMA, 2011) of India has also been instrumental in driving some of these initiatives.

The extent to which SMEs in this sector will develop their quality systems would play a critical role in attainment of the 2020 target for the Indian Automotive Component Industry. Majority of these SMEs are proprietorship concerns or family run organisations with inadequate management acumen and resources As a result, the quality initiatives in these units are fundamentally influenced by the OC created and infused by the top management. This suggests that primarily, there is a prerequisite to investigate the extent of TQM implementation in small organisations and further a need to develop an implementation framework/model for small organisations. In the present study, an attempt has been made to examine the impact of OC on TQM implementation in the SMEs in the Indian auto component sector. The study also aims to develop a model linking OC and TQM for this sector. The research finding is expected to develop a culture influenced TQM model highlighting particular dimensions of OC which are relevant in positively influencing TQM.

The rest of the paper is organised as follows: Section 2 reviews the existing literature on the subject. Section 3 describes the objective, hypotheses and proposed model. Section 4 includes the research methodology while Section 5 presents data analysis, results and discussion. Paper ends with conclusion and recommendations which are presented in Section 6.

2. Literature review

2.1 OC

According to Schein (1985), OC is defined as "a pattern of basic assumptions-invented, discovered or developed by a given group as it learns to cope with its problems of external adaptation and internal integration".

In Indian context, the cultural values in organisation have been examined using OCTAPACE Profile developed by Pareek (2003). Empirical studies conducted by Rohmetra (1998), Rao and Abraham (1999), Bhardwaj and Mishra (2002) and Kumar and Patnaik (2002) indicate that culture of many organisations include OCTAPACE values to a good or moderate degree which help in fostering a climate of continuous development of human resources. Since, human resource development is an essential aspect of TQM implementation; hence, in the present study OC has been conceptualised using OCTAPACE Profile. Eight dimensions of culture as defined by Pareek (2003) are:

(1) Openness is reflected in the extent of spontaneous expression of feelings and thoughts of the employees. With openness employees share their ideas without the fear of being ridiculed and are not defensive about it.

(2) Confrontation means employees face the issues and difficulties directly without shirking them and work together with others towards its solution.

(3) Trust denotes the degree to which employees maintain the secrecy of facts and information shared by others and do not misuse it. Trust also gives assurance to employees that others will respect mutual commitments and will help in times of need.

(4) Authenticity means the extent to which employees maintain congruity between their feelings, communications and actions. It also means that employees admit their mistakes and frankly share their feelings.

(5) Proaction refers to the degree to which employees are action-oriented and are willing to take initiative. This also means that employees anticipate the issues well in advance and respond to future requirements.

(6) Autonomy means the extent to which employees have some liberty to act independently within their job limits. This also implies effective delegation of authority to employees and decrease in references made to senior persons for consent of planned activities.

(7) Collaboration denotes the degree to which employees work together and use each other's forte for a common purpose. This also means that employees discuss their problems with others, prepare action plans and execute them together thus exhibiting team-spirit.

(8) Experimentation refers to the extent to which employees give importance to innovation and creativity. This implies that employees try out novel ways of handling problems in the organisation.

2.2 TQM

Prajogo and McDermott (2005) defined TQM as an integrative organisational-wide philosophy aimed towards continuously improving the quality of products/services and processes in order to meet or exceed customer expectations.

Studies have enumerated different sets of factors considered essential to the success of TQM implementation (Saraph *et al.*, 1989; Flynn *et al.*, 1995; Powell, 1995; Hackman and Wageman, 1995; Black and Porter, 1996; Quazi and Padibjo, 1998; Grandzol and Gershon, 1998; Conca *et al.*, 2004; Sila and Ebrahimpour, 2005; Demirbag *et al.*, 2006; Karuppusami and Gandhinathan, 2006; Salaheldin, 2009). However, the terminology of TQM constructs differ across various studies, some studies refer to it as "practices", while others mention it as "critical success factors" or "principles" or even "interventions" but the meaning of constructs remain the same.

TQM in the present study has been conceptualised in terms of seven interventions. These interventions have been selected from the eight quality management principles (QMPs) on which ISO 9001: 2000 standard (ISO, 2012) are based, which are: customer focus; leadership; involvement of people; process approach (PA); system approach to management; continual improvement; factual approach to decision making (FADM); and mutually beneficial supplier relationship (MBSR). These principles are aimed at continually improving performance over the long term by focusing on customers while addressing the needs of other stakeholders (Russell, 2000). Review of extensive literature suggests that these seven TQM interventions have also been identified in previous studies. Table I presents seven TQM interventions together with their sources. These interventions are: top management commitment (TMC); employee involvement (EI); PA; MBSR; customer orientation (CO); continual improvement (CI); and FADM analysis. A brief explanation of these interventions is given below:

(1) PA means that quality can be managed more effectively when associated resources and activities are managed as a process. This indicates that at the time of designing processes for quality implementation, managers must align related activities, control measures and other resources with the processes.

(2) TMC implies that top management must be personally involved in setting and monitoring "quality policy" and must communicate it to the employees. This means top management must guide, demonstrate and support quality issues in the organisation.

(3) EI denotes that an organisation should make efforts to ensure full involvement of employees in quality implementation so that maximum benefits can be derived from them. This suggests that employees are acknowledged and rewarded for their contribution to the quality objectives.

(4) MBSR means that a firm and its suppliers are mutually dependent and a mutually beneficial relationship between them improves their capability to create value. This suggests that there should be efforts by a firm to work together with suppliers for improvement in design, cost and delivery.

(5) CO implies that an organisation must determine their customer needs and make efforts to meet their requirements. This indicates that organisations should frequently gauge their customer needs through focus groups, surveys, personal meets, etc.

Sl. no.	TQM interventions	Sources
1.	Process approach	Saraph *et al.* (1989), Flynn *et al.* (1995), Powell (1995), Hackman and Wageman (1995), Black and Porter (1996), Ahire *et al.* (1996), Quazi and Padibjo (1998), Grandzol and Gershon (1998), Conca *et al.* (2004), Sila and Ebrahimpour (2005), Tari (2005), Demirbag *et al.* (2006), Karuppusami and Gandhinathan (2006), Salaheldin (2009)
2.	Top management commitment	Saraph *et al.* (1989), Flynn *et al.* (1995), Powell (1995), Hackman and Wageman (1995), Black and Porter (1996), Ahire *et al.* (1996), Quazi and Padibjo (1998), Grandzol and Gershon (1998), Yusof and Aspinwall (2000), Bayazit (2003), Sila and Ebrahimpour (2005), Conca *et al.* (2004), Karuppusami and Gandhinathan (2006), Demirbag *et al.* (2006), Salaheldin (2009)
3.	Employee involvement	Powell (1995), Hackman and Wageman (1995), Black and Porter (1996), Ahire *et al.* (1996), Yusof and Aspinwall (2000), Bayazit (2003), Sila and Ebrahimpour (2005), Demirbag *et al.* (2006), Salaheldin (2009)
4.	Mutually beneficial supplier relationships	Saraph *et al.* (1989), Hackman and Wageman (1995), Black and Porter (1996), Flynn *et al.* (1995), Ahire *et al.* (1996), Yusof and Aspinwall (2000), Conca *et al.* (2004), Sila and Ebrahimpour (2005), Karuppusami and Gandhinathan (2006), Demirbag *et al.* (2006), Salaheldin (2009)
5.	Customer orientation	Flynn *et al.* (1995), Hackman and Wageman (1995), Ahire *et al.* (1996), Black and Porter (1996), Rahman (2001), Bayazit (2003), Conca *et al.* (2004), Sila and Ebrahimpour (2005), Karuppusami and Gandhinathan (2006), Demirbag *et al.* (2006), Salaheldin (2009)
6.	Continual improvement	Hackman and Wageman (1995), Black and Porter (1996), Grandzol and Gershon (1998), Conca *et al.* (2004), Salaheldin (2009)
7.	Factual approach to decision making	Saraph *et al.* (1989), Flynn *et al.* (1995), Hackman and Wageman (1995), Black and Porter (1996), Ahire *et al.* (1996), Yusof and Aspinwall (2000), Sila and Ebrahimpour (2005), Demirbag *et al.* (2006), Karuppusami and Gandhinathan (2006), Salaheldin (2009)

Table I.
TQM interventions and their sources

(6) CI denotes that managers should periodically assess existing products, process and systems against established criteria of excellence to identify areas for potential improvement. This implies that continuous enhancement of products, processes and systems should be a permanent objective for every organisation.

(7) FADM means that managers must realise that quality-related decisions must be based on the analysis of adequate data and information. This suggests that managers while taking decision on quality must confirm data accuracy and should always take decision based on rational analysis balanced with experience and intuition.

2.3 OC and TQM: examining the association
The impact of OC on TQM implementation has been extensively emphasised in the recent literature (Fu *et al.*, 2015; Gimenez-Espin *et al.*, 2013; Haffar *et al.*, 2013; Pun and Jaggernath-Furlonge, 2012; Al-Swidi and Mahmood, 2012; Baird *et al.*, 2011; Schroeder *et al.*, 2011; Zu *et al.*, 2011; Rad, 2006; Ambroz, 2004).

2.3.1 Importance of OC for TQM implementation. A recent survey carried out by
Fu *et al.* (2015) on manufacturing and service companies revealed that the performance
of business outcome is positively correlated to their TQM OC. Another study by
Al-Swidi and Mahmood (2012) on Yemini banking industry confirmed the importance
of developing a supporting OC for effective TQM implementation. In a similar study by
Schroeder *et al.* (2011) on manufacturing plants located in eight countries, namely;
Austria, Finland, Germany, Italy, Japan, Korea, Sweden and USA further confirmed the
importance of quality culture in TQM implementation. Yet another study by Zu *et al.*
(2011) investigated the underlying characteristics that influence quality management
implementation at manufacturing companies operating in China. Findings suggest that
cultural profile is a distinguishing factor to explain the difference in quality
management implementation among the companies and thus, suggested the
importance of a supportive culture for quality management in China. Irani *et al.*
(2004) also stresses the importance of a strong total quality culture as a key element of
improving organisational competitiveness using a case study. In addition, a study by
Al-Khalifa and Aspinwall (2008) on manufacturing industries in UK revealed that
amongst the various critical factors of TQM, leadership and quality culture are the
most important factors. Studies by Yusof and Aspinwall (2001) and Zabada *et al.* (1998)
further highlighted the need for transforming OC for effective implementation of TQM.

2.3.2 Impact of different types of culture on TQM implementation. Quite a lot of
studies have also examined the impact of various types of culture on TQM
implementation. In this line of research, Haffar *et al.* (2013) empirically examined the
influence of four types of OC on TQM implementation in Syrian manufacturing
organisations. Results of the study indicate that the adhocracy and group culture types
are the most supportive cultures than the market culture and hierarchy culture for the
implementation of TQM practices. Similar results were reported in an empirical study
by Gimenez-Espin *et al.* (2013) which established a positive impact of adhocratic culture
on TQM. The clan culture was found to have no significant effect on TQM while mixed
culture was found to be the most appropriate for a TQM system. Study also reported
negative effect of market and hierarchical culture on the quality management system.
Results of an empirical study by Karimi and Kadir (2012) in an oil industry in Iran
suggest that different cultural types namely; group culture, developmental culture,
hierarchical culture and rational culture have different impacts on soft and hard TQM.

2.3.3 Role of cultural values in TQM implementation. Many researchers have further
scrutinised the role of cultural values or dimensions on TQM implementation. A recent
study by Karyotakis and Moustakis (2014) on large public sector companies in Greece
found that essential condition for the successful application of TQM is teamwork backed
by commitment of each member in the chain. The study further emphasised that
teamwork ensures creativity, participation and development of the worker. Pun and
Jaggernath-Furlonge (2012) in a study on manufacturing organisations in Trinidad and
Tobago signified five core dimensions of culture that would facilitate quality
management practices implementation. Baird *et al.* (2011) conducted a study on both
manufacturing and service industries in Australia and found three cultural factors;
outcome orientation, teamwork/respect and innovation exhibiting a significant positive
association with the extent of use of TQM practices. Another study by Rad (2006) also
determined the impact of cultural values on the success of TQM implementation at a
university hospital in Iran. Results highlighted that TQM requires a quality-oriented OC
supported by senior management commitment and involvement, organisational learning

and entrepreneurship, team working and collaboration, risk taking, open communication, continuous improvement, customers focus, partnership with suppliers, and monitoring and evaluation of quality. A study by Ambroz (2004) on three manufacturing companies in Slovenia found that only an open and human-oriented corporate culture that is based on autonomy of workplace and human resource management can be successful in implementing TQM in all working processes in the company. In a similar study, Hansson and Klefsjo (2003) studied TQM implementation in nine small organisations and found three core values such as committed leadership, everybody's commitment and CO both necessary and suitable for TQM implementation.

Review of existing literature on the subject has resulted in identification of various research gaps. The literature as summarised in Table II, provides clear evidence that majority of these studies have been conducted in the large enterprises especially in developed countries. However, no such research has been undertaken in a developing country like India, particularly in the auto component SMEs. This indeed shows inadequate literature on this subject in the SMEs, which have emerged as a highly vibrant and dynamic sector of the Indian auto component industry. Moreover, no study has been undertaken so far to investigate the mechanics of the linkage between OCTAPACE cultural values and TQM. Therefore, it's worth exploring how OCTAPACE cultural values influence TQM implementation in Indian auto component SMEs.

3. Objective, hypotheses and proposed model

3.1 Objective of the study
To examine the impact of OC on implementation of TQM in Indian auto component SMEs and develop a culture influenced TQM model for SMEs in this sector.

3.2 Proposed model
The proposed model consists of two types of variables: OC and TQM. The conceptual model including the research hypotheses is shown in Figure 1.

3.3 Hypotheses
According to Figure 1, hypotheses are:

H1. OC is defined as a higher-order construct which represents Openness, Confrontation, Trust, Authenticity, Proaction, Autonomy, Collaboration and Experimentation.

H2. TQM is defined as a higher order construct which represents Process Approach, Top Management Commitment, Employee Involvement, Mutually Beneficial Supplier Relationships, Customer Orientation, Continual Improvement and Factual Approach to Decision-Making.

H3. OC will positively influence TQM implementation.

4. Research methodology

4.1 Sampling procedure
In this study, auto component SME members of ACMA spread across the country, i.e. 482 members formed the population. The population has been accessed through the ACMA member's database. Survey method was used for data collection by targeting the whole population of auto component SMEs. Quality Heads of all 482 auto component SMEs drawn from ACMA member's database were contacted for seeking

Sl. no.	References	Theme of research	Country	Size	Major findings
1.	Zabada et al (1998)	Obstacles to the application of total quality management in health-care organisations	USA (developed)	Large health-care organisation	The study found that TQM can be effective if enough resources and time are devoted to changing health-care organisation culture
2.	Yusof and Aspinwall (2001)	Case studies on the implementation of TQM in the UK automotive SMEs	UK (developed)	Automotive SMEs	The study highlighted three similarities in the companies under study: focus on people to transform to a quality culture; adopting the QS 9000 standard and TQM implementation conducted through a series of quality initiatives and business improvements
3.	Hansson and Klefsjo (2003)	A core value model for implementing total quality management in small organisations	Sweden (developed)	Small organisations	The study found three core values such as committed leadership, everybody's commitment and customer orientation both necessary and suitable for TQM implementation
4.	Ambroz (2004)	Total quality system as a product of the empowered corporate culture	Slovenia (developed)	Medium manufacturing companies	The study found that only an open and human-oriented corporate culture that is based on the autonomy of the workplace and human resource management can be successful in implementing TQM in all working processes in the company
5.	Irani et al. (2004)	Total quality management and corporate culture: constructs of organisational excellence	UK (developed)	Large organisation	Study stresses the importance of a strong total quality culture as a key element of improving organisational competitiveness using a case study
6.	Rad (2006)	The impact of Organisational Culture on the successful implementation of total quality management	Iran (developing)	Isfahan University Hospitals (large organisation)	The study highlighted that TQM requires a quality-oriented Organisational Culture
7.	Al-Khalifa and Aspinwall (2008)	Critical success factors of TQM: a UK study	UK (developed)	Large manufacturing companies	The study revealed that amongst the various critical factors of TQM, leadership and quality culture are the most important factors

(*continued*)

Table II.

Sl. no.	References	Theme of research	Country	Size	Major findings
8.	Baird *et al.* (2011)	The relationships between Organisational Culture, total quality management practices and operational performance	Australia (developed)	Small, medium and large firms in manufacturing and service industries	The study suggested the importance of prevailing Organisational Culture in providing an environment that is conducive to implementation of TQM practices
9.	Schroeder *et al.* (2011)	Customization of quality practices: the impact of quality culture	Austria, Finland, Germany, Italy, Japan, Korea, Sweden and USA (developed)	Large manufacturing plants	The study confirmed the importance of quality culture in TQM implementation, particularly in the way that it influences how to customise quality practices to achieve higher performance outcome
10.	Zu *et al.* (2011)	Quality management in China: the effects of firm characteristics and cultural profile	China (developing)	Small, medium and large manufacturing companies	Findings revealed that cultural profile is a distinguishing factor to explain the difference in quality management implementation among the companies and thus, suggested the importance of a supportive culture for quality management
11.	Al-Swidi and Mahmood (2012)	Total quality management, entrepreneurial orientation and organisational performance: the role of Organisational Culture	Yemen (developing)	Bank branches (large organisations)	Findings of this study confirmed the importance of developing a supporting Organisational Culture for effective implementation of TQM
12.	Karimi and Kadir (2012)	The impact of Organisational Culture on the implementation of TQM: empirical study in the Iranian Oil Company	Iran (developing)	Large companies under Iranian oil industry	Study suggested that different cultural types, namely; group culture, developmental culture, hierarchical culture and rational culture have different impacts on soft and hard TQM
13.	Pun and Jaggernath-Furlonge (2012)	Impacts of company size and culture on quality management practices in manufacturing organizations	Trinidad and Tobago-(developing)	Small, medium and large manufacturers	The study signified five core dimensions of culture that would facilitate quality management practices implementation

(continued)

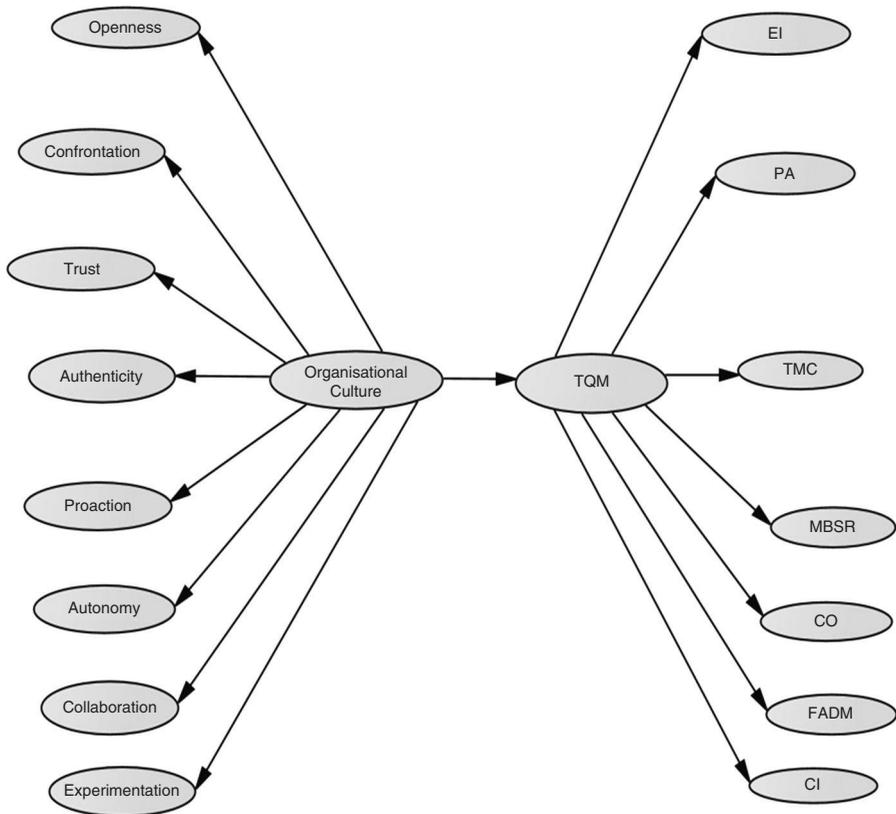| Sl. no.	References	Theme of research	Country	Size	Major findings
14.	Haffar et al. (2013)	An analysis of the influence of Organisational Culture on TQM implementation in an era of global marketing: the case of Syrian manufacturing organisations	Syria (developing)	Large manufacturing organisations	Results of the study indicate that adhocracy and group culture types are the most supportive cultures than the market culture and hierarchy culture for the implementation of TQM practices
15.	Gimenez-Espin et al. (2013)	Organisational Culture for total quality management	Spain (developed)	Large and medium firms	The study established a positive impact of adhocratic culture on TQM. The clan culture was found to have no significant effect on TQM while mixed culture was found to be the most appropriate for a TQM system
16.	Karyotakis and Moustakis (2014)	Reinvention of the public sector: total quality management and change management	Greece (developed)	Large public sector companies	The study found that essential condition for the successful application of TQM is teamwork backed by commitment of each member in the chain. The study further emphasised that teamwork ensures creativity, participation and development of the worker
17.	Fu et al. (2015)	Assessment and cultivation of total quality management Organisational Culture – an empirical investigation	Taiwan (developed)	Large, medium and small scale companies	The study reveals that the performance of business outcome in the companies is positively correlated to their TQM Organisational Culture

Table II.

Figure 1.
A hypothesised
model showing
relationship between
Organisational
Culture (OC)
and TQM

their participation in the survey. Initially, very few SMEs agreed to participate in the survey. At this stage, ACMA officials were contacted and a letter of support from ACMA, requesting its members for participation in this survey helped in better response to the survey. In total, 150 completely filled questionnaires (30 per cent response rate) were taken for analysis. Thus, the present study is based on a sample of 150 auto component SMEs that are ACMA members.

Non-response bias was checked by comparing 150 companies that participated in the research with 332 companies that did not participate in the survey. No statistically significant differences were detected with respect to their demographics such as year of establishment, annual turnover, number of employees and geographical location. This analysis indicated absence of non-response bias.

4.2 Research instrument
The research instrument consisted of a structured questionnaire which comprised of two parts: Questionnaire-"A" and Questionnaire-"B".

4.2.1 Questionnaire-A. The preliminary task in developing a questionnaire was to identify TQM interventions from literature and previous studies on the subject. Seven constructs of TQM were identified, then items pertaining to each construct were generated through review of literature on TQM and finally a draft questionnaire was prepared. The questionnaire was initially pre-tested through a pilot study conducted on

a small sample of 30 auto component SMEs, wherein the questionnaire was distributed to quality heads of respective companies. The questionnaire was also shown to experts in the field of quality management from both academics and corporate organisations for seeking their feedback on its' content, clarity and overall structure. Based on their suggestions and comments, the questionnaire was revised. Hence, content validation of the questionnaire was done.

The final questionnaire consists of two sections: Section 1 aims to obtain general information about the respondent companies. Section 2 aims to assess the extent of implementation of TQM interventions in the respondent companies. It is a 36 item questionnaire in which each item is rated on a five point scale ranging from – "never", "rarely", "occasionally", "often" to "always".

4.2.2 Questionnaire-B (OCTAPACE cultural profile). The scale, OCTAPACE cultural profile developed by Pareek (2003) has been used to study OC. Reliability and validity of this questionnaire has already been tested and the split-half reliability of the test as reported is 0.81. It is a 40 item instrument that gives the profile of organisation's ethos in eight values on four point rating scale ranging from highly valued, fairly high value, a rather low value to a very low value.

In order to standardise the measurement scale, reliability and validity of the measurement scale need to be established. In the present study, the research instrument was then tested for reliability and validity, thus confirming standardisation.

4.3 Reliability and validity

4.3.1 Reliability. The summary statistics of the present study are shown in Tables III-IV. For reliability evaluation Cronbach's α was used. After determination of the number of factors, Cronbach's coefficient was computed to determine the internal consistency among the group of tested items under each factor. Nunnally (1978) has indicated 0.7 to

Variable	TQM interventions	Mean	SD	Cronbach's α
Factor-1	Process approach	4.33	0.57	0.935
Factor-2	Top management commitment	4.51	0.53	0.936
Factor-3	Employee involvement	4.30	0.59	0.927
Factor-4	Mutually beneficial supplier relationships	4.02	0.70	0.937
Factor-5	Customer orientation	4.45	0.47	0.942
Factor-6	Continual improvement	4.45	0.58	0.942
Factor-7	Factual approach to decision making	4.24	0.84	0.935

Table III.
Descriptive
statistics for
TQM interventions

Variable	Organisational Culture dimensions	Mean	SD	Cronbach's α
Dimension-1	Openness	3.36	0.61	0.936
Dimension-2	Confrontation	3.39	0.56	0.942
Dimension-3	Trust	3.28	0.57	0.940
Dimension-4	Authenticity	3.18	0.62	0.934
Dimension-5	Proaction	3.38	0.57	0.942
Dimension-6	Autonomy	3.36	0.60	0.946
Dimension-7	Collaboration	3.32	0.64	0.939
Dimension-8	Experimentation	3.30	0.60	0.935

Table IV.
Descriptive statistics
for Organisational
Culture dimensions

be an acceptable reliability coefficient. The α coefficients for all seven TQM interventions and for all eight dimensions of OC were all greater than 0.9, thus indicating a high reliability of factors.

4.3.2 Validity. For assessing validity of questionnaires, content validity and construct validity were determined.

4.3.2.1 Content validity. The content validity of a construct can be defined as the degree to which the measure spans the domain of the construct's theoretical definition (Rungtusanatham, 1998). For the present study, content validity of the instrument has been ensured as TQM interventions have been identified from literature and have been thoroughly reviewed by experts from both academics and corporate organisation. As the scale, OCTAPACE cultural profile is a standardised scale developed by Pareek (2003), therefore, content validity of the instrument was already confirmed.

4.3.2.2 Construct validity. Construct validity measures the extent to which indicators measure the underlying construct. According to Ahire *et al.* (1996), confirmatory factor analysis (CFA) provides enhanced control for assessing unidimensionality (i.e. the extent to which items on a factor measure one single construct) of the construct. Establishing construct validity involves the empirical assessment of unidimensionality, reliability and convergent validity. In order to check for unidimensionality, a measurement model has been specified for each construct of TQM and OC separately and CFA is being run for each construct. Individual items in the model have been examined to see how closely they represent the same construct. CFA has been run through AMOS 18.0 software. The Goodness-of-Fit Index (GFI) and Comparative Fit Index (CFI) suggest a perfect fit when they are equal to 1, while values greater than 0.90 or above for the model implies good fit (Bollen, 1995). The CFI and GFI values obtained for all the seven dimensions of TQM and eight dimensions of OC were found to be above 0.90 thus indicating a strong evidence of unidimensionality of the scale. The reliability of scale items has already been established (Tables III and IV).

Convergent validity is the degree to which multiple methods of measuring a variable provide the same results (O'Leary-Kelly and Vokurka, 1998). Convergent validity can be established using a coefficient called Bentler-Bonett Normed Fit Index (NFI). Scale with NFI values of 0.90 or above shows strong evidence of convergent validity (Bentler and Bonett, 1980). The values of Bentler-Bonett NFI for all the dimensions of TQM and OC were found to be more than 0.90, thereby demonstrating strong convergent validity and hence construct validity.

Overall, the scale items for all constructs of TQM and OC were found both reliable and valid.

4.4 Structural equation modelling (SEM)

SEM is a family of structural models that seek to explain the relationship among multiple variables by examining the structure of inter-relationships expressed in a series of multiple regression equations. These equations depict all the relationships among constructs, i.e., dependent and independent variables in the given problem. Usually, any multivariate technique can be classified as interdependence or dependence techniques, but SEM is a unique combination of both types of techniques, as its foundation lies in two familiar multivariate techniques, namely, factor analysis and multiple regression analysis (Henley *et al.*, 2006). Thus, SEM examines the nature and magnitude of postulated dependence relationships and at the same time assesses the direct and indirect relationship of these variables (Reisinger and Mavondo, 2006).

In the present study, OC dimensions are the independent variables while TQM interventions are the dependent variables. Since, there are multiple independent and dependent variables; therefore, SEM (using AMOS 18.0) is used to examine the hypothesised model showing the impact of OC on TQM implementation. Proposed relationships among identified factors of OC and TQM factors have been validated using parameter estimation statistics and goodness-of-fit statistics of path analysis technique of SEM using AMOS 18.0.

The key model fit indices as advocated by Kline (2005) have been used for confirming model fitment. The five fit indices used and values indicating acceptable model fit include:

(1) a CMIN/DF ratio smaller than 3:1 indicates that the fit of the hypothesised model is favourable;

(2) CFI value equal to 1 suggests a perfect fit, while a value greater than 0.90 or above for the model implies good fit;

(3) Root Mean Square Error of Approximation (RMSEA) index value below 0.08 shows a good fit;

(4) Root Mean Square Residual (RMR) value should be less than 0.05; and

(5) the standardised RMR (SRMR) value as high as 0.08 is deemed acceptable.

5. Data analysis, results and discussion

Data analysis is conducted by inferential statistics techniques such as exploratory factor analysis using SPSS 17.0 and CFA using AMOS 18.0. In this section, seven constructs of TQM have been identified through exploratory factor analysis. Thereafter, CFA was first applied to confirm the latent constructs of OC and then to confirm the latent constructs of TQM.

In the subsequent sections, results of exploratory factor analysis and SEM are presented. In the present study, the proposed model has been tested in the following three steps:

(1) OC: its latents and indicators;

(2) TQM: its latents and indicators; and

(3) the effect of OC on TQM.

5.1 The results of exploratory factor analysis
5.1.1 Exploratory factor analysis result of TQM questionnaire. We considered 36 items by factor analysis based on 150 gathered questionnaires; KMO was 0.911 showing that the sample size was enough. The findings from factor analysis of 36 items yielded seven factors which accounted for 77.669 per cent of the total variance. As a result, the seven dimensions of TQM were isolated. Following the rotation, each cluster of variables was carefully examined to determine the underlying construct and its substantive meaning, in other words, what the items (in each cluster) have in common. The result of exploratory factor analysis for TQM has been shown in Table V.

5.2 The results of CFA
5.2.1 X model; CFA model of OC. In the initial step, CFA in AMOS 18.0 was applied and eventually path diagram of X model was conducted as per Figure 2. Through confirmatory analysis, the relationship between OC latents and its indicators has been tested. Though a

	PA	TMC	EI	Component MBSR	CO	CI	FADM
Q12	0.766						
Q36	0.750						
Q26	0.729						
Q16	0.723						
Q22	0.720						
Q24	0.685						
Q30	0.671						
Q14	0.647						
Q25	0.596						
Q1		0.812					
Q2		0.793					
Q19		0.780					
Q17		0.765					
Q13		0.742					
Q5		0.710					
Q15		0.684					
Q9		0.617					
Q6			0.756				
Q34			0.740				
Q29			0.737				
Q27			0.715				
Q20			0.657				
Q7			0.656				
Q10				0.840			
Q4				0.835			
Q32				0.818			
Q35				0.801			
Q3					0.949		
Q21					0.916		
Q18					0.912		
Q8						0.840	
Q11						0.798	
Q23						0.795	
Q28							0.826
Q31							0.810
Q33							0.767

Table V.
Rotated component
matrix for
TQM factors

standardised scale for OC with 40 items measuring eight dimensions was used, when CFA was run, ten items with standardised regression weights (factor loading) less than 0.50 were dropped (Hair *et al.*, 2009). This may be explained by the time lag and resulting change in the corporate cultural values and ethos since the development of this scale.

Fitness indices in Table VI show good fitness of our X model, proving selected indicators are good representative for each dimension of OC. This suggests that OC is defined as a higher order construct which represents openness, confrontation, trust, authenticity, pro action, autonomy, collaboration and experimentation. Thus, *H1* is supported.

5.2.2 Y model; CFA model of TQM. In the next step, CFA was applied for TQM and its indicators in AMOS 18.0 and eventually path diagram of Y model was conducted as per Figure 3. Through confirmatory analysis, the relationship between TQM latents and its indicators has been tested. Fitness indices in Table VII indicate good fitness of Y model;
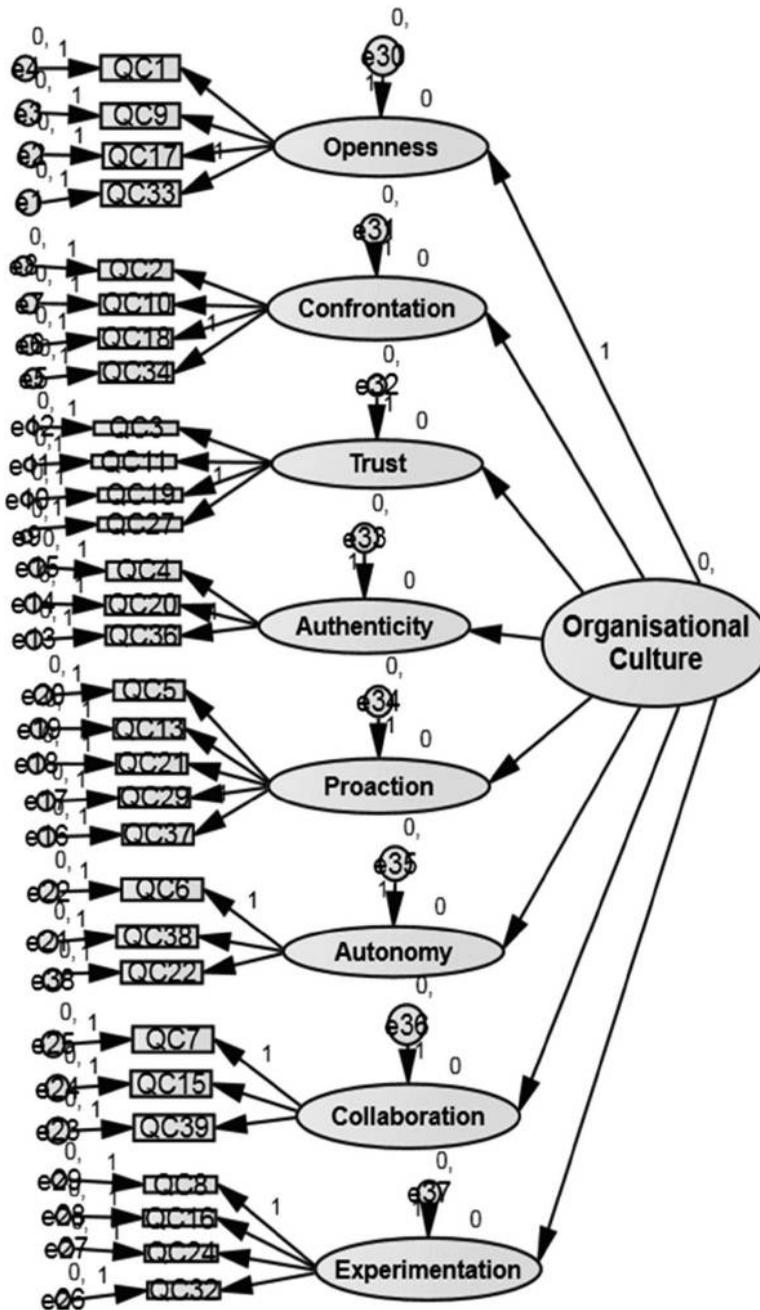
Figure 2.
X model; CFA model
of Organisational
Culture (OC)

proving selected indicators are good representative for each dimension of TQM. This indicates that TQM is defined as a higher order construct which represents PA, TMC, EI, MBSR, CO, continual improvement and FADM. Hence, *H2* is supported.

5.2.3 Validity of the proposed model. In order to check the validity of the proposed model, first the measurement model was tested. The measurement model is described in Figure 4. The measurement model yields the following model fit results (refer Table VIII): Results of the model fit indices indicate that overall fit of the measurement model is acceptable.

5.2.4 Testing the structural model. For investigating the third hypothesis, the structural model including eight dimensions of OC and seven constructs of TQM was tested. Specifically, OC was modelled as a second-order model with first order dimensions of openness, confrontation, trust, authenticity, pro action, autonomy, collaboration and experimentation. Therefore, the arrows flow out from OC to each of the eight dimensions. On the right hand side of the Figure 5, second-order OC is linked with TQM.

TQM is also hypothesised as a higher order construct which represents PA, TMC, EI, MBSRs, CO, continual improvement and FADM. Thus, the arrows flow out from TQM to each of the seven dimensions. The entire structural model (i.e. 15 constructs) is tested simultaneously, as shown in Figure 5. The structural model is then tested by maximum likelihood estimation method of SEM using AMOS 18.0.

Fitness indices in Table IX suggest good fitness of the structural model. The parameter estimated results, i.e. value of regression weights, standard errors and critical ratios (CR) of the model are presented in Table X. Standard errors reflect the precision with which a parameter has been estimated, with small values suggesting accurate estimation. Standard errors presented in Table X are ranging from 0.077 to 0.170, shows that they are in good order. The test statistics here is CR, which represents the parameter estimate divided by its standard error; as such it operates as a *z*-statistic in testing that the estimate is statistically different from zero. Based on a probability level of 0.05, then the test statistic (CR) needs to be $> \pm 1.96$ before the hypothesis can be rejected (Byrne, 2009). CRs presented in Table X indicate that all the paths are significant (CR ranging between 2.70 and 11.34), i.e. CR $> \pm 1.96$. It is found that path from OC to TQM is significant and positive (std_$\beta = 0.51$ and $p \leqslant 0.000$). So, *H3* is supported.

The standardized regression weights as shown in Table X indicate the comparative influence of dimensions to its construct. The results of the model indicate that the dimensions of "openness", "confrontation", "pro action", "trust", "collaboration", "experimentation", "authenticity" and "autonomy" represent OC, with std_β value ranging from 0.965 to 0.253. The model also suggests that the dimensions of "PA" (with std_β value of 0.852), "EI" (with std_β value of 0.849), "TMC" (with std_β value of 0.795), "FADM" (with std_β value of 0.721), "continual improvement" (with std_β value of 0.716), "MBSRs" (with std_β value of 0.672) and "CO" (with std_β value of 0.317) represent TQM.

Hence, based on the results a culture influenced TQM model for Auto component SMEs has emerged as shown in Figure 6. Outcome of hypotheses testing is depicted in Table XI.

Model	CMIN/DF	CFI	RMSEA	RMR	SRMR
Default model	1.423	0.960	0.060	0.022	0.053
Recommended value	< 3.00	$\geqslant 0.90$	< 0.08	< 0.05	$\leqslant 0.08$

Table VI.
Model fit indices for Organisational Culture CFA model
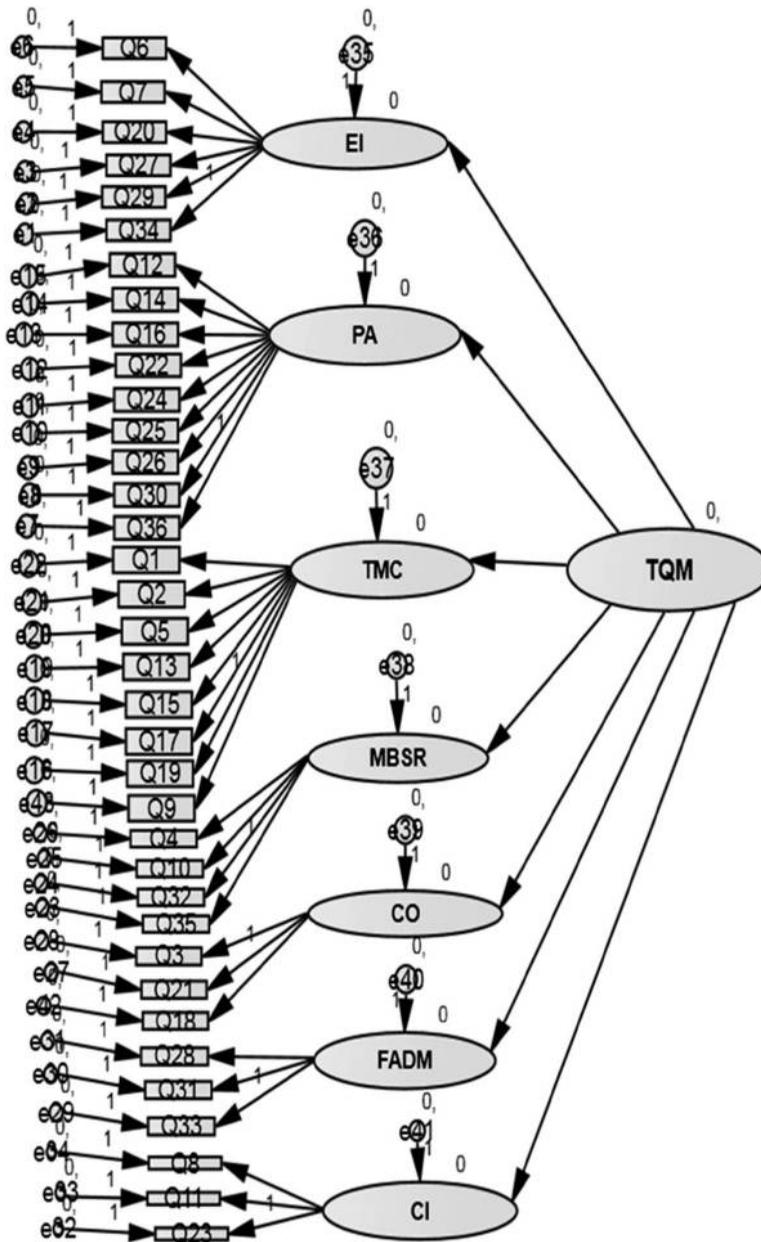
Figure 3.
Y model; CFA
model of TQM

Model	CMIN/DF	CFI	RMSEA	RMR	SRMR	
Default model	1.377	0.942	0.056	0.026	0.055	Table VII.
Recommended value	< 3.00	≥ 0.90	< 0.08	< 0.05	≤ 0.08	Model fit indices for TQM CFA model
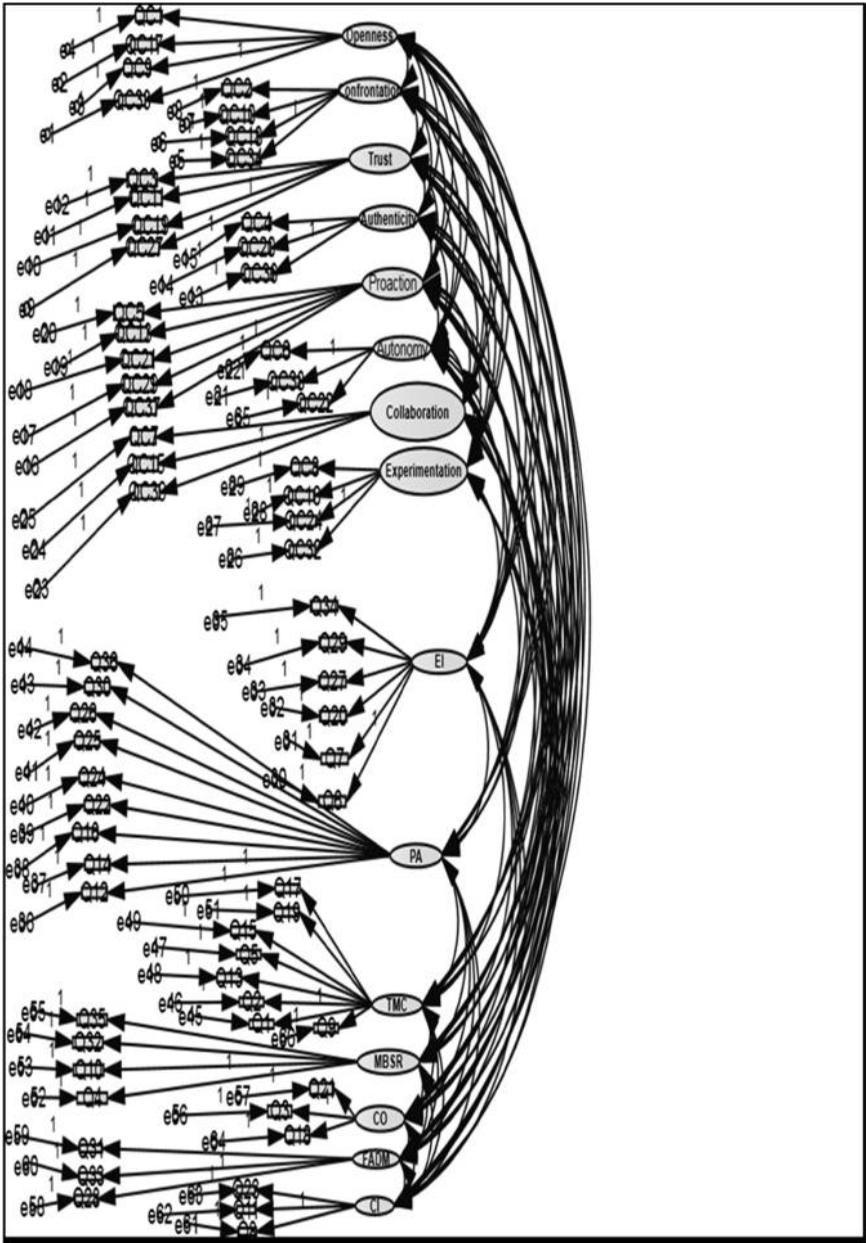
Figure 4.
Measurement model

Model	CMIN/DF	CFI	RMSEA	RMR	SRMR
Default model	1.403	0.907	0.058	0.022	0.049
Recommended value	< 3.00	⩾ 0.90	< 0.08	< 0.05	⩽ 0.08

Table VIII.
Model fit indices for
measurement model
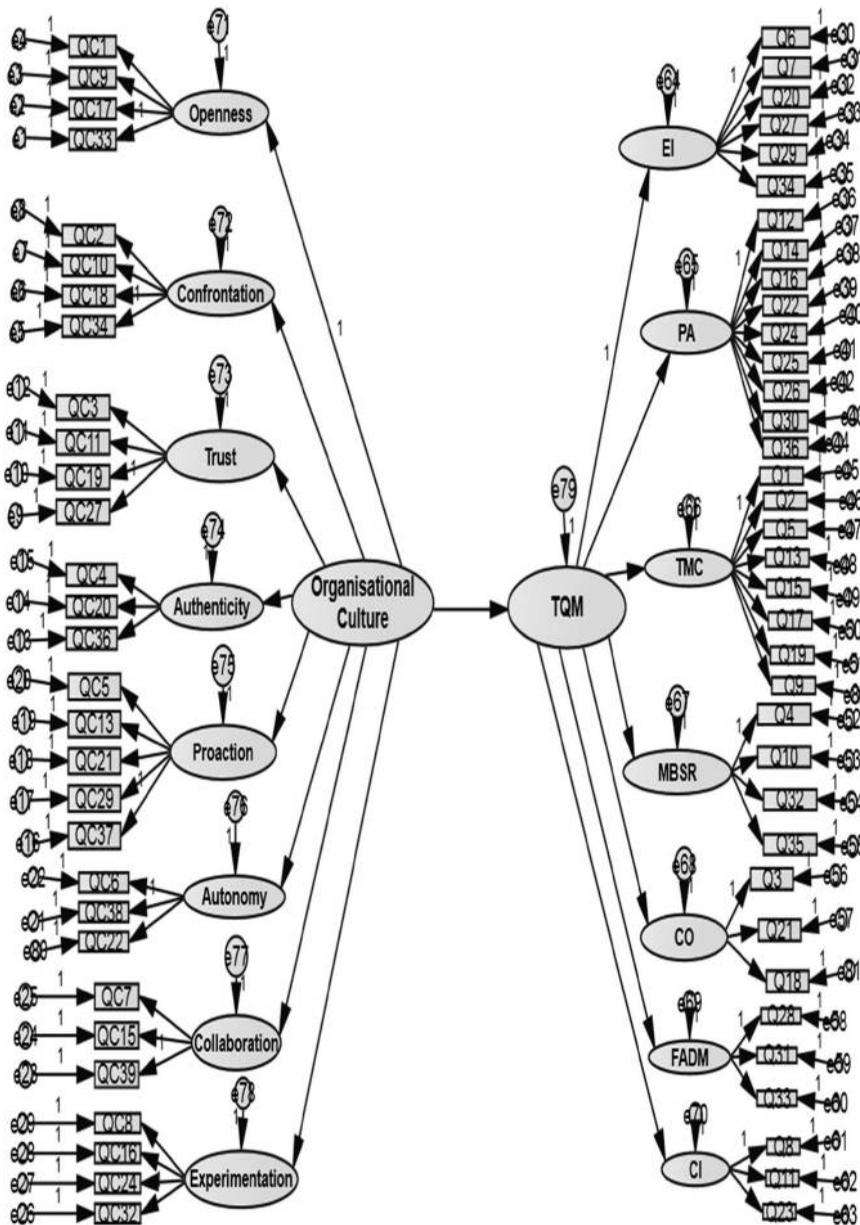
Figure 5.
Structural model

Model	CMIN/DF	CFI	RMSEA	RMR	SRMR
Default model	1.402	0.903	0.058	0.029	0.066
Recommended value	< 3.00	≥ 0.90	< 0.08	< 0.05	≤ 0.08

Table IX.
Model fit indices
for structural model

Path	Unstandardised regression weights	Standardized regression weights	SE	CR	p
TQM←culture	0.416	0.511	0.083	4.980	***
Confrontation←culture	0.874	0.918	0.077	11.334	***
Trust←culture	0.813	0.860	0.078	10.429	***
Authenticity←culture	0.772	0.738	0.090	8.527	***
Proaction←culture	0.892	0.908	0.079	11.349	***
Autonomy←culture	0.224	0.253	0.083	2.704	***
Collaboration←culture	0.987	0.857	0.088	11.256	***
Experimentation←culture	0.672	0.817	0.082	8.222	***
Openness←culture	1.000	0.965			
PA←TQM	0.924	0.852	0.126	7.335	***
TMC←TQM	0.917	0.795	0.129	7.126	***
MBSR←TQM	1.014	0.672	0.156	6.505	***
CO←TQM	0.329	0.317	0.103	3.197	***
FADM←TQM	1.160	0.721	0.170	6.817	***
CI←TQM	0.898	0.716	0.127	7.056	***
EI←TQM	1.000	0.849			

Note: ***Significant of $p \leqslant 0.000$ at 0.05 levels

Table X.
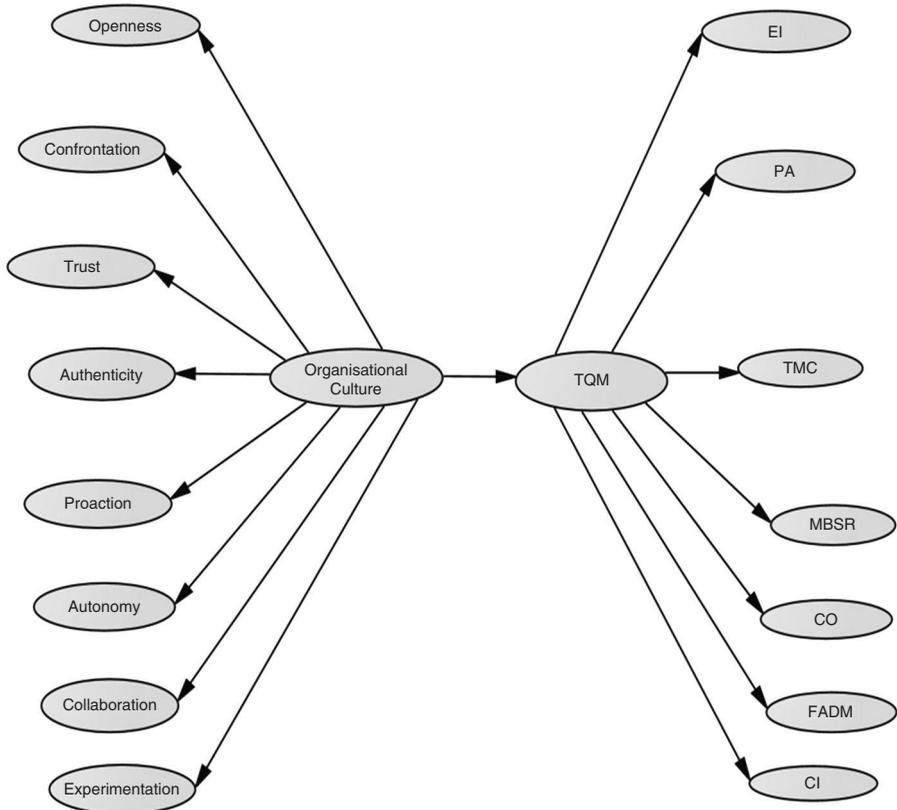Parameter estimates for the structural model

Figure 6.
A culture influenced TQM model for Indian auto component SMEs

6. Conclusion and recommendation

The present study intended to examine the impact of OC on TQM implementation in Indian auto component SMEs by using SEM. The proposed model has been tested in three steps: first, OC: its latents and indicators; second, TQM: its latents and indicators; and third, the effect of OC on TQM. Results obtained from the study suggest that OC has a significant and positive impact on TQM implementation. This research finding is consistent with the findings of previous studies conducted by Fu *et al.* (2015), Gimenez-Espin *et al.* (2013), Haffar *et al.* (2013), Pun and Jaggernath-Furlonge (2012), Al-Swidi and Mahmood (2012), Baird *et al.* (2011), Schroeder *et al.* (2011), Zu *et al.* (2011), Rad (2006) and Ambroz (2004).

Based on the findings, a culture influenced TQM model has been developed. The model demonstrates a linkage between cultural dimensions and TQM interventions, thereby suggesting that OC comprising of these eight dimensions has a significant and positive influence on TQM implementation. This implies that a culture characterised by "openness", "confrontation", "trust", "authenticity", "pro action", "autonomy", "collaboration" and "experimentation" would help in promoting TQM implementation. First, an open culture where employees are empowered to share their ideas for quality enhancement while confronting the issues directly would definitely stimulate continuous improvement. Further, a culture which promotes confrontation would also help in dealing with suppliers and working towards joint solution by resolving contentious issues if any. Second, mutual trust and authenticity are *sine qua non* for success of any management initiative. Most of the times, employees on the shop floor are so alienated from the senior management team that they do not trust their motives, resulting in lack of authenticity. As a result, employees do not even consider complying with implementation requests for quality improvement. Therefore, employees show more commitment to quality goals when they are taken into confidence by management before implementing TQM. Third, work place where employees are encouraged to take initiative and enjoy discretion for quality improvement without supervisory interference are likely to make quality implementation a regular and continuous practise within the firm. Fourth, a culture which encourages team work and propensity to experiment among its employees leading to innovation is likely to promote TQM implementation in the organisation.

Results of the study provide significant insights to both academia and auto component industry. Since, there is inadequate literature on this subject; this study contributes immensely to the body of knowledge in this area. Findings of the study have several implications for the practicing mangers in the auto component SMEs. Primarily, to create a culture that promotes TQM, cultural values of "openness", "confrontation" and "pro action" need to be reinforced. This implies building a culture

Hypotheses	Remarks
H1: Organisational Culture (OC) is defined as a higher order construct which represents openness, confrontation, trust, authenticity, proaction, autonomy, collaboration, and experimentation	Supported
H2: TQM is defined as a higher order construct which represents process approach, top management commitment, employee involvement, mutually beneficial supplier relationships, customer orientation, continual improvement and factual approach to decision making	Supported
H3: Organisational Culture (OC) will positively influence TQM implementation	Supported

Table XI.
Outcome of
hypotheses testing

which allows free interaction among employees, encourages them to face challenges and take initiative. For example, to encourage initiative-taking among employees, management can implement quality linked initiative-based incentive scheme for them. Furthermore, cultural values of trust, collaboration, experimentation and authenticity need to be strengthened. This denotes cultivating a culture where employees can confide in seniors without fear; team work and innovative ways of problem-solving are promoted while pretentious behaviour is discouraged. For example, to reinforce the value of "experimentation" among employees, novel ideas of dealing with problems can be recognised by highlighting the "star performer". In addition, cultural value of "autonomy" needs to be ensured in the prevailing culture. This means developing a culture where employees are enthused to independently plan and execute activities related to their jobs. This indicates that employees are given freedom to act on their own rather than checking with seniors. Such a culture does not believe in close supervision and direction of employees. For example, management can persuade employees to form "Quality circles", which would not only ensure employee empowerment but would also help organisation towards quality improvement.

The extent to which SMEs in this sector will develop their quality systems would play a critical role in attainment of their export target and enhanced market power in the domestic market. Some of these SMEs are either proprietorship concerns or family owned organisations with limited management depth and resources. As a result, the quality initiatives in these entities are largely influenced by the organisation culture adopted and permeated by the top management. It is seen that the level of quality is increasingly a factor of the extent of automation and conformance to customer requirement, which calls for further investment. Most of the SMEs are hesitant to spend money as they are not sure of the returns. Without "pro action" and "experimentation", moving up the value chain would be an uphill task for these organisations. Thus, it is imperative for Indian auto component SMEs to cultivate the right culture for TQM implementation. In this context, the research study has made some valuable contribution. The study has developed a culture influenced TQM model for SMEs in the Indian auto component sector that supports quality interventions in some form or the other. The study has identified dimensions of OC in their order of importance, which can be strengthened for promoting TQM implementation. The study also identifies various interventions of TQM in their order of significance, which can be used by SMEs in mapping the critical links between OC and TQM through this model. Thus, findings of the present study will not only assist Indian auto component SMEs to successfully evolve in the fast changing global scenario but will also help them to meet the overall automotive industry's target as envisaged in the Vision 2020.

However, the present study has certain limitations that can definitely provide avenues for future research. Besides OC, there are various other variables which influence implementation of TQM. But the research design of this study has focused only on one variable, i.e. OC; and its impact on TQM. Further, given these limitations, this research has revealed several potential aspects for future research. First, a larger sample could be covered to ensure a wider analysis of the issues highlighted in the research. Second, similar study may be carried out in other developing nations to examine if the structural model fits into their operations, which would provide further validation of the model proposed in this study. Third, future research may also investigate the impact of other critical factors besides OC on TQM implementation.

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Further reading

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