A study of total quality management and supply chain management practices

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Abstract

Purpose – The purpose of this paper is to present a set of total quality management (TQM) and supply chain management (SCM) practices through an extensive literature review and to identify the relationships among them by comparing the identified TQM and SCM practices.

Design/methodology/approach – An extensive overview of the practices of TQM and SCM is carried out using published research papers and some major TQM and SCM practices were extracted. These identified practices are then compared to explore the relationship between them for better understanding and application.

Findings – The results reveal six major TQM and SCM practices from as many as 50 TQM practices and 40 SCM practices. The paper further compares these practices and found that management support and commitment, customer focus, and supplier partnership are the most common practices found in both TQM and SCM literature, and have the strongest impact in the integration of TQM and SCM across organizations.

Research limitations/implications – This paper focuses only on the literature review of previously published studies, further empirical study can be undertaken using these six identified practices which may allow the validation and generalization of results.

Practical implications – The result of this paper will help in providing greater understanding of identified TQM and SCM practices that will lead to successful implementation of TQM and SCM strategies to improve customer service levels and, hence, business performance.

Originality/value – Much of the literature on TQM practices and SCM practices are available, but as far as the authors know there is no study undertaken to integrate TQM and SCM practices. This is the first kind of study that compares TQM and SCM practices taken together and can be thus, treated as filling a gap in the extant literature.

Keywords Total quality management, Supply chain management, Working practice, Organizational performance, Competitive advantage, Business performance

Paper type Literature review

Introduction

Total quality management (TQM) and supply chain management (SCM) have been identified as the two most important strategies for manufacturing, services and

small-to-medium size enterprises (SMEs); and have become a prerequisite for success in the global market. TQM and SCM act as important tools to achieve competitive advantage together with strengthening organizational competitiveness (Sila *et al.*, 2006; Vanichchinchai and Igel, 2009). TQM is an integrated approach, consisting of principles and practices, whose goal is to improve the quality of an organization's goods and services through continuously meeting and exceeding customer's needs in most competitive ways. TQM focuses on enhancing customer satisfaction (Gunasekaran and McGaughey, 2003). On the other hand, SCM is seen as an approach to improve competitive performance by integrating the internal functions of an organization and linking these with the external operations of suppliers, customers and other members of the supply chain. This may lead to changes in the traditional structure of the organization (Tutuncu and Kucukusta, 2008). SCM focuses on coordination and configuration of the processes that are necessary to make products on time (no delay), reproducibly, and in a satisfactory condition (quality assurance) together with handling procurement of the material/service inputs (Forker *et al.*, 1997).

In addition to the above, TQM is a total system approach which works horizontally across functions and departments, involving all employees, top to bottom, and extends backwards and forwards to include the supply chain and customer chain. SCM takes a vertical view of the relationship between the buyer and supplier, focusing on the performance of upstream and downstream organizations (Kanji and Wong, 1999). Both upstream and downstream organizations have to be managed directly or indirectly by companies in order to satisfy their customers.

TQM applications help reduce process variance, which has a direct impact on supply chain performance measures, such as cycle time and delivery dependability (Flynn *et al.*, 1995). TQM practices result in set-up time reduction, allowing improved schedule attainment and correspondingly faster response to market demands (Flynn and Flynn, 2005). This helps in synchronizing, to a greater extent, the whole supply chain (Tutuncu and Kucukusta, 2008; Ferdows *et al.*, 2004). TQM practices ensure that processes are followed and customers are satisfied. SCM includes a set of approaches and practices to effectively integrate suppliers, manufacturers, distributors and customers for improving the long-term performance of the individual organizations and the supply chain as a whole in a cohesive and high-performing business model (Chopra and Meindl, 2001). Thus, it is important to have a customer-focused corporate vision in place while striving to implement TQM and SCM practices effectively both upstream and downstream (Sila *et al.*, 2006); doing so can produce a number of competitive advantages for the supply chain.

Based on this evaluation, there is a need to study which TQM and SCM practices are responsible to achieve the goals of the organization by appeasing the customer and keeping the supplier relationship intact for long-term. It is, therefore, necessary to identify the TQM and SCM practices for success of these strategies in all types of organizations.

The outcome of this study will aid practitioners to implement TQM and SCM successfully and thus gain better competitive advantage and customer satisfaction, and will help researchers to further study the impact of TQM and SCM in the organization by integrating them. The literature further suggests that both TQM and SCM are critical to organizational performance and are rarely studied together (Gunasekaran and McGaughey, 2003; Robinson and Malhotra, 2005; Casadesús and de

Castro, 2005; Vanichchinchai and Igel, 2009) and there are only a few studies that integrate the two concepts.

This paper aims to identify a comprehensive list of practices for TQM and SCM separately and then extract some major practices of TQM and SCM which are then compared. The remainder of this paper is organized as follows. The next section presents the research objectives and methodology of this study and then an overview of literature on TQM practices that helps to identify the different TQM practices used by the organizations followed by a similar treatment of the literature on SCM practices. The discussion and conclusion are presented at the end including the managerial implications and scope for further study.

Research objectives and methodology
The objective of this study is to identify a set of TQM and SCM practices which organizations frequently consider for implementation. Also, this study compares and describes the relationship between TQM and SCM. The methodology adopted was a literature review of published research papers on practices of TQM and SCM adopted in different organizations and how such practices are linked. The chosen papers contain either empirical or review studies only. The articles containing studies, which are limited to describing one specific quality improvement action, were excluded to refine the search. A comprehensive search was carried out using Emerald and ProQuest advanced search for articles published from 1996 to 2010. One exception was the inclusion of an important study by Saraph *et al.*, 1989. The results of the study were achieved with keywords such as "Linkage between TQM and SCM practices", "QM in SCM", "TQM practices", 'SCM practices", and "SCQM". The search was limited to English language, and scholarly peer-reviewed papers. Finally, a total of 37 research papers (21 research papers on TQM practices and 16 on SCM practices) were selected for review. These research papers represent the core issues of TQM and SCM practices and implementation in both manufacturing and service organizations as well as covering the linkage between TQM and SCM, and use of QM/TQM principles in SCM. Moreover, these studies are mostly considered and referred to by researchers when carrying out further research studies. As indicated above, a paper by Saraph *et al.* (1989) was also included because of its significance to the current study. The major practices extracted from these research papers were recorded based on their frequency of occurrence and are listed in Tables I and II.

Overview of TQM practices
TQM is a set of management practices applicable throughout the organization and geared to ensure the organization consistently meets or exceeds customer requirements. Introducing TQM practices in an organization is a long-term commitment. The successful implementation and adoption of TQM practices requires planning, time and effort. A number of studies have been carried out to investigate practices of TQM and to examine its implementation process. The common conclusion of these studies is that the implementation process is central to the long-term success of TQM within an organization and implementation is firm-specific (Bayazit, 2003; Ghobodian and Gallear, 2001).

An earlier study by Saraph *et al.* (1989) revealed eight practices for TQM implementation:

No.	Major TQM practice	Supporting references
1.	Top-management commitment (includes leadership, management support and management commitment)	Saraph *et al.* (1989), Antony *et al.* (2002), Samat *et al.* (2006), Brah *et al.* (2000), Sila and Ebrahimpour (2002), Lakhal *et al.* (2006), Ahire *et al.* (1996), Khamalah and Lingaraj (2007), Bergman and Klefsjö (2007), Sun (2001), Quazi *et al.* (1998), Huq and Stolen (1998), Woon (2000), Singh *et al.* (2006), Saravanan and Rao (2004), Fotopoulos and Psomas (2009), Mahapatra and Khan (2006), Zhang *et al.* (2000), Kanji and Wallace (2000), Talib and Rahman (2010)
2.	Customer focus (includes customer satisfaction and orientation)	Black and Porter (1996), Antony *et al.* (2002), Brah *et al.* (2000), Samat *et al.* (2006), Sila and Ebrahimpour (2002), Lakhal *et al.* (2006), Ahire *et al.* (1996), Bergman and Klefsjö (2007), Woon (2000), Singh *et al.* (2006), Saravanan and Rao (2004), Fotopoulos and Psomas (2009), Mahapatra and Khan (2006), Zhang *et al.* (2000), Kanji and Wallace (2000), Talib and Rahman (2010)
3.	Training and education	Ahire *et al.* (1996), Ueno (2008), Lakhal *et al.* (2006), Sila and Ebrahimpour (2002), Saraph *et al.* (1989), Samat *et al.* (2006), Brah *et al.* (2000), Antony *et al.* (2002), Khamalah and Lingaraj (2007), Quazi *et al.* (1998), Fotopoulos and Psomas (2009), Mahapatra and Khan (2006), Zhang *et al.* (2000), Talib and Rahman (2010)
4.	Continuous improvement and innovation	Antony *et al.* (2002), Samat *et al.* (2006), Sila and Ebrahimpour (2002), Lakhal *et al.* (2006), Khamalah and Lingaraj (2007), Bergman and Klefsjö (2007), Saravanan and Rao (2004), Mahapatra and Khan (2006), Zhang *et al.* (2000), Fotopoulos and Psomas (2009), Talib and Rahman (2010)
5.	Supplier management (includes supplier relationship, supplier quality and supplier partnership, collaboration)	Saraph *et al.* (1989), Black and Porter (1996), Antony *et al.* (2002), Brah *et al.* (2000), Sila and Ebrahimpour (2002), Lakhal *et al.* (2006), Ahire *et al.* (1996), Khamalah and Lingaraj (2007), Quazi *et al.* (1998), Singh *et al.* (2006), Mahapatra and Khan (2006), Fotopoulos and Psomas (2009), Talib and Rahman (2010)
6.	Employee involvement	Antony *et al.* (2002), Brah *et al.* (2000), Samat *et al.* (2006), Lakhal *et al.* (2006), Ahire *et al.* (1996), Singh *et al.* (2006), Sila and Ebrahimpour (2002), Fotopoulos and Psomas (2009), Kanji and Wallace (2000), Mahapatra and Khan (2006), Zhang *et al.* (2000), Talib and Rahman (2010)

Table I.
Major TQM practices
extracted from the
literature

No.	Major SCM practice	Supporting references
1.	Customer relationship (includes complaints handling, customer satisfaction, and long term relationship establishment, close partnership with customer, customer service management, customer needs, increased customer responsiveness)	Chandra and Kumar (2000); Kuei *et al.* (2001); Millen *et al.* (1999); Min and Mentzer (2004); Ulusoy (2003); Tan (2001); Tan *et al.* (1998); Koh *et al.* (2007); Li *et al.* (2005)
2.	Re-engineering material flows/Lean practices (including management of material flows, reducing inventory, elimination of waste, JIT delivery/JIT Capability, manage inventory investment in the chain)	Chandra and Kumar (2000); Millen *et al.* (1999); Tan (2001); Alvarado and Kotzab (2001); Koh *et al.* (2007); Li *et al.* (2005); Chin *et al.* (2004)
3.	Strategic supplier partnership (includes many supplier relationship, supplier involvement, supplier quality management, collaboration)	Chandra and Kumar (2000); Kuei *et al.* (2001); Chen and Paulraj (2004); Ulusoy (2003); Donlon (1996); Koh *et al.* (2007); Li *et al.* (2005)
4.	Employing information and communication technologies (including information technology sharing/communication, information systems)	Lee and Kincade (2003); Chandra and Kumar (2000); Burgess *et al.* (2006); Chen and Paulraj (2004); Donlon (1996); Chin *et al.* (2004)
5.	Changing corporate culture (including management support and commitment, leadership, participative management, cooperation, top-management leadership)	Lee and Kincade (2003); Kuei *et al.* (2001); Burgess *et al.* (2006); Min and Mentzer (2004); Chin *et al.* (2004)
6.	Close partnership with suppliers (include long-term relationship, partnership, reliable suppliers)	Lee and Kincade (2003); Kuei *et al.* (2001); Millen *et al.* (1999); Chen and Paulraj (2004); Koh *et al.* (2007)

Table II.
Major SCM practices extracted from the literature

(1) top-management leadership;

(2) role of quality department;

(3) training;

(4) product design;

(5) supplier quality management;

(6) process management;

(7) quality data reporting; and

(8) employee relations in the study of manufacturing and service organizations.

Meanwhile Antony *et al.* (2002) described 11 TQM practices:

(1) management commitment;

(2) role of the quality department;

(3) training and education;

(4) employee involvement;

(5) continuous improvement;

(6) supplier partnership;

(7) product/service design;

(8) quality policies;

(9) quality data and reporting;

(10) communication to improve quality; and

(11) customer satisfaction orientation.

Black and Porter (1996), in their study of manufacturing and service industries argue that there are ten major TQM practices:

(1) strategic quality management;

(2) people and customer management;

(3) supplier partnerships;

(4) communication of improvement information;

(5) customer satisfaction orientation;

(6) external interface management;

(7) teamwork structures for process improvement;

(8) operational quality planning;

(9) quality improvement measurement systems; and

(10) corporate quality culture.

On the other hand, Samat *et al.* (2006) extracted seven practices from 25 TQM practices prescribed by Sila and Ebrahimpour (2002):

(1) management support and commitment;

(2) employee involvement;

(3) employee empowerment;

(4) information and communication;

(5) training and education;

(6) customer focus; and

(7) continuous improvement.

A very recent study conducted by Talib and Rahman (2010) found nine important TQM practices in their literature review on service industries:

(1) top-management commitment;

(2) customers focus;

(3) training and education;

(4) continuous improvement and innovation;

(5) supplier management;

(6) employee involvement;

(7) employee encouragement;

(8) benchmarking; and

(9) quality information and performance.

In addition to this, a study by Al-Marri *et al.* (2007) proposed 16 TQM practices which were found to be critical for successful implementation of TQM in the banking service sector:

(1) top-management support;
(2) customer focus;
(3) strategy;
(4) benchmarking;
(5) employee involvement;
(6) recognition and reward;
(7) problem analysis;
(8) quality technologies;
(9) service design;
(10) servicescapes;
(11) service culture;
(12) social responsibility;
(13) human resource management;
(14) continuous improvement;
(15) quality department; and
(16) quality systems.

Lakhal *et al.* (2006) grouped TQM practices into ten general practices:

(1) top-management commitment and support;
(2) organization for quality;
(3) employee training;
(4) employee participation;
(5) supplier quality management;
(6) customer focus;
(7) continuous support;
(8) quality system improvement;
(9) information and analysis; and
(10) statistical quality technique use.

Ueno (2008) described seven predominant practices in the promotion of service quality:

(1) recruitment and selection;
(2) training;
(3) teamwork;
(4) empowerment;
(5) performance appraisals and rewards (including measurement and recognition);
(6) communication (two-way); and
(7) culture (of the organization).

Saravanan and Rao (2004) examined the 12 dimensions of total quality service (TQS) in 306 service firms:

(1) top-management commitment and leadership;
(2) benchmarking;
(3) customer focus and satisfaction;
(4) service marketing;
(5) social responsibility;
(6) human resource management;
(7) employee satisfaction;
(8) service culture;
(9) servicescape;
(10) continuous improvement;
(11) technical system; and
(12) information and analysis.

Another study, by Brah *et al.* (2000) on TQM and business performance in Singapore service sector, has come out with 11 practices of TQM implementation:

(1) top-management support;
(2) customer focus;
(3) employee involvement;
(4) employee training;
(5) employee empowerment;
(6) supplier quality management;
(7) process improvement;
(8) service design;
(9) quality improvement rewards;
(10) benchmarking; and
(11) cleanliness and organization.

Finally, a study by Fotopoulos and Psomas (2009) on Greek companies identified nine critical factors which were found to be beneficial to them and could support sustainability of a company:

(1) leadership;
(2) strategic quality planning;
(3) employee management and involvement;
(4) supplier management;
(5) customer focus;
(6) process management;
(7) continuous improvement;

(8) information and analysis; and

(9) knowledge and education.

Other similar studies on TQM practices by Ahire *et al.* (1996); Quazi *et al.* (1998); Singh *et al.* (2006); Mahapatra and Khan (2006); Bergman and Klefsjö (2007); Woon (2000); Kanji and Wallace (2000); Khamalah and Lingaraj (2007); and Zhang *et al.* (2000) are of interest too.

Overview of SCM practices

SCM entails coordination and configuration of the process that is necessary to make products available in a timely, reproducible, and satisfactory condition. Thee characteristics of SCM could be achieved by identifying and making use of SCM practices, in organized way. SCM practices involve a set of activities undertaken by the organization to promote effective management of their supply chain (Koh *et al.*, 2007). This section deals with the identification of these different SCM practices from a variety of literature.

In a recent study, Koh *et al.* (2007) determined the underlying dimensions of SCM practices and tested empirically a framework identifying the relationship among SCM practices, operational performance and SCM-related organizational performance for SMEs in Turkey. The set of 12 identified SCM practices used were:

(1) JIT supply;

(2) many suppliers;

(3) holding safety stock;

(4) subcontracting;

(5) few suppliers;

(6) close partnerships with suppliers;

(7) strategic planning;

(8) outsourcing;

(9) 3PL;

(10) close partnerships with customers;

(11) e-procurement; and

(12) supply chain benchmarking.

Li *et al.* (2005) attempted to develop and validate a measurement instrument for SCM practices. Their instrument has six empirically-validated and reliable dimensions:

(1) strategic supplier partnership;

(2) customer relationship;

(3) information sharing;

(4) information quality;

(5) internal lean practice; and

(6) postponement.

Another study by Lee and Kincade (2003) proposed six major dimensions of SCM:

(1) partnership;

(2) information technology;

(3) operational flexibility;

(4) performance measurement;

(5) management commitment; and

(6) demand characterization.

A study by Chin *et al.* (2004) examined the practices in developing and implementing SCM strategies for Hong Kong manufacturers. The five identified SCM practices used were:

(1) building customer-supplier relationship;

(2) employing information and communication technologies;

(3) re-engineering material flows;

(4) changing corporate culture; and

(5) identifying performance measures.

Kuei *et al.* (2001) uses 11 supply quality-management practices to study and test manager's perception on the association between supply-chain quality-management practices and organizational performance, and found enhanced organizational performance through improved supply-chain quality-management. The 11 factors were:

(1) top-management leadership;

(2) training;

(3) product design;

(4) supplier quality management;

(5) process management;

(6) quality data reporting;

(7) employee's relations;

(8) customer's relations;

(9) benchmarking;

(10) supplier selection; and

(11) supplier participation.

Ulusoy (2003) comes out with four SCM practices which aims to assess the supply chain and innovation management in the manufacturing industries of Turkey. They are:

(1) logistics;

(2) supplier relations;

(3) customer relations; and

(4) production.

Similarly, a study by Burgess *et al.* (2006) proposes a set of seven practices:

(1) leadership;

(2) inter-organizational relationship;

(3) logistics;

(4) process improvement;

(5) orientation;

(6) information system; and

(7) business results and outcomes extracted from structured literature in the field of SCM.

A study on the development of SCM practices by Chen and Paulraj (2004), identified a set of four reliable and valid practices significant to SCM:

(1) supplier base reduction;

(2) long-term relationship;

(3) cross-functional teams; and

(4) supplier involvement.

Finally, Flynn and Flynn (2005) in their empirical study, examine the relationship between quality management and SCM using three quality management practices which were found to be significant in SCM:

(1) information and analysis;

(2) process management; and

(3) strategic planning.

The result shows that there was strong support for these three practices indicating that there is a relationship between quality management and SCM.

Beside the above studies, there are a few more studies which explore SCM practices in different directions and areas, for example: Donlon (1996); Tan *et al.* (1998; Tan, 2001); Alvarado and Kotzab (2001); Min and Mentzer (2004); Millen *et al.* (1999); and Chandra and Kumar (2000).

The main objective of this paper is to look at the practices of TQM and SCM, and compare them for their commonalities to gain maximum benefits. To support this, studies on the following have been extensively investigated and are important to help integrate SCM and TQM: adoption of QM systems in the logistics function (for example, Millen and Maggard, 1997; Millen *et al.*, 1999; Sohal *et al.*, 1999; Read and Miller, 1991), QM and its positive influence on SCM, particularly the impact on supplier quality (for example, Tracey and Vonderembse, 2000; Kuei *et al.*, 2001; Burt *et al.*, 2003; Cagnazzo *et al.*, 2010), and the role of customer/supplier relationships on quality (for example, Wong *et al.*, 1999, Kuei *et al.*, 2001, Millen *et al.*, 1999; Koh *et al.*, 2007).

Discussion and conclusions

Based on the literature review, a set of six TQM and SCM practices that are applicable to different organizations were identified separately from as many as 50 TQM practices and 40 SCM practices. Table I and II shows these lists of TQM and SCM practices as recommended by different authors. This reduced set of practices were

extracted based on their high frequency of occurrence in different research papers and are treated as major practices.

The six major TQM practices are:

(1) top-management commitment (20/21);

(2) customer focus (16/21);

(3) training and education (14/21);

(4) continuous improvement and innovation (11/21);

(5) supplier management (13/21); and

(6) employee involvement (15/21)

Six major SCM practices identified are:

(1) customer relationship (9/16);

(2) material management (7/16);

(3) strategic supplier partnership (7/16);

(4) information and communication technologies (6/16);

(5) corporate culture (5/16); and

(6) close supplier partnership (5/16).

The figures in the parentheses after each practice represent their frequency of occurrence from the total number of research papers reviewed. These major practices of TQM and SCM are presented in Table III. Also, this literature review indicates that implementation of these TQM and SCM practices in the organization will result in many desirable outcomes and benefits such as customer satisfaction; JIT delivery; reduced cycle time and many more as presented in Figure 1.

Further, comparing these TQM and SCM practices, the following can be concluded:

- Top-management commitment and customer focus are the most cited practices found in both TQM and SCM strategies. Looking critically, top-management commitment is referred to in SCM by different levels and names like changing corporate culture, management support, participative management, and cooperation but the concept is the same in both the cases of TQM and SCM. Similarly, customer focus in TQM includes customer complaints, satisfaction, close partnership with the customer, customer responsiveness and other similar terms that are found in SCM. The finding that both these practices (top management commitment and customer focuse) are common and have a high level of usage in TQM and SCM practices appears to be somewhat well known and obvious. This can be largely attributed to the fact that the two concepts are to a very large extent management and customer driven. TQM and SCM will only succeed in achieving improved performance in the organization with the continuous support of the top-management and their efforts towards never-ending improvement in customer services and customer satisfaction.

- Another aspect that was found to be important and can be correlated in both TQM and SCM is supplier relationship and management (including supplier quality, supplier partnership, collaboration, supplier involvement, and supplier quality management). This practice is common and preferred in TQM and SCM

S. No.	TQM practices	SCM practices
1.	Top-management commitment (includes leadership, management support and management commitment)	Customer relationship (includes complaints handling, customer satisfaction, and long term relationship establishment, close partnership with customer, customer service management, customer needs, increased customer responsiveness)
2.	Customer focus (includes customer satisfaction and orientation)	Re-engineering material flows/Lean practices (including management of material flows, reducing inventory, elimination of waste, JIT delivery/JIT capability, manage inventory investment in the chain)
3.	Training and education	Strategic supplier partnership (includes many supplier relationship, supplier involvement, supplier quality management, collaboration)
4.	Continuous improvement and innovation	Employing information and communication technologies (including information technology sharing/communication, information systems)
5.	Supplier management (includes supplier relationship, supplier quality and supplier partnership, collaboration)	Changing corporate culture (including management support and commitment, leadership, participative management, cooperation, top-management leadership)
6.	Employee involvement	Close partnership with suppliers (includes long-term relationship, partnership, reliable suppliers)

Table III.
Major TQM and SCM practices as identified from the literature

organizations (especially by the latter) and has one of the highest levels of usage in such organizations. It was also found during the literature survey that while studying TQM-related organizations, supplier management was used more by manufacturing firms rather than by service organizations. This may be due to the nature of the firm/organization and the products or services they are rendering. TQM and SCM rely a great deal on the supplier and their relationships with the organization internally and externally.

· The TQM practices with the highest level of usage out of 50 practices identified from the literature in this study, include: top-management commitment; customer focus and satisfaction; training and education; continuous improvement and innovation; supplier management; and employee involvement. On the other hand, SCM practices with the highest level of use out of 40 practices include: customer relationship; material management (JIT, reduced inventory); strategic supplier partnership; information and communication technologies; corporate culture (management commitment and support, leadership); and close partnership with suppliers. The criteria selected to extract these six TQM and SCM practices in this study was the frequency of
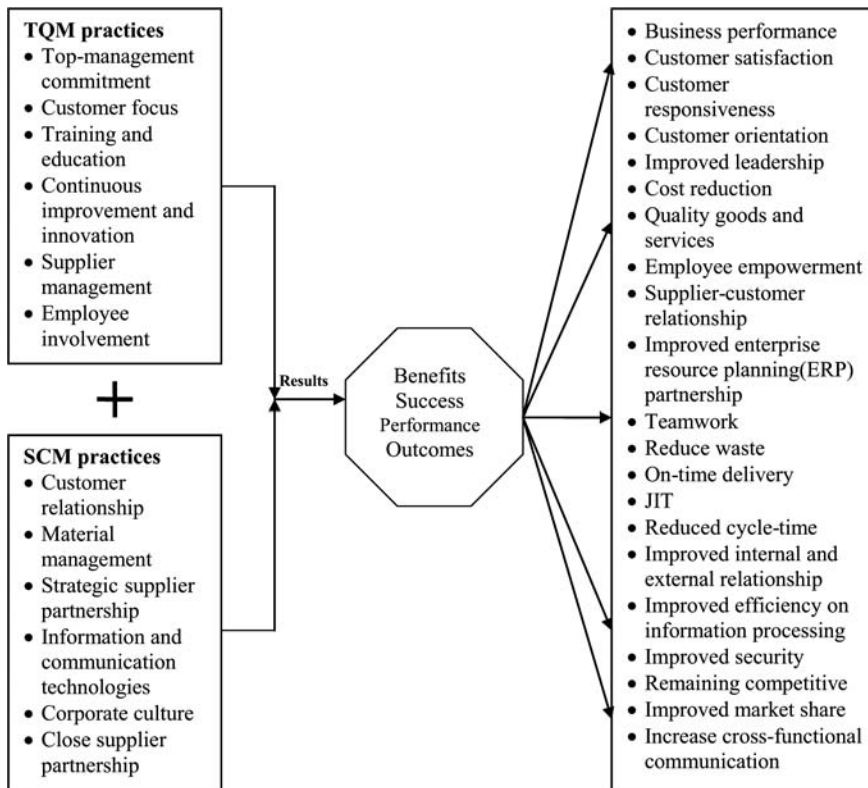
TQM practices
- Top-management commitment
- Customer focus
- Training and education
- Continuous improvement and innovation
- Supplier management
- Employee involvement

+

SCM practices
- Customer relationship
- Material management
- Strategic supplier partnership
- Information and communication technologies
- Corporate culture
- Close supplier partnership

Results

Benefits
Success
Performance
Outcomes

- Business performance
- Customer satisfaction
- Customer responsiveness
- Customer orientation
- Improved leadership
- Cost reduction
- Quality goods and services
- Employee empowerment
- Supplier-customer relationship
- Improved enterprise resource planning(ERP) partnership
- Teamwork
- Reduce waste
- On-time delivery
- JIT
- Reduced cycle-time
- Improved internal and external relationship
- Improved efficiency on information processing
- Improved security
- Remaining competitive
- Improved market share
- Increase cross-functional communication

Figure 1.
TQM and SCM practices
and their outcome

use and therefore these six TQM and SCM practices have the highest frequency of use as compared with other practices found in this literature review.

- From the six major practices for TQM and SCM as mentioned above, this study recommends three practices: top-management commitment; customer focus; and supplier relationship and management, should be treated as the base or foundation for TQM and SCM by managers. Without a strong foundation, the house will never stand. Once the foundation is in place, attention should be given to other remaining practices like materials management; information and communication technologies; continuous improvement and innovation; and employee empowerment.

- Further, this study has some surprising results. It was found that some very popular SCM practices such as "3PL"; "Outsourcing"; "E-procurement"; "Benchmarking"; "Concentration on core competencies"; and "Supply chain integration" were found to be relatively lesser-used in the literature review, although they are supposed to be popular because of the widespread use of electronic business and advanced information systems in day-to-day business practices. One of the possible reasons for this may be that the organizations studied in the reviewed papers are less familiar with, or are still at the initial state

of implementation, or are planning to implement these SCM practices in their organizations.

· A further conclusion from the present study is the use of some important practices – like supplier selection, information quality (including quality data reporting, evaluation, information analysis), supply chain benchmarking, building customer-supplier relationships, operational flexibility which can effect the implementation of TQM and SCM concepts in long run – were found to be missing from the list of six major TQM and SCM practices identified. However, most of them were present in the top 20 TQM and SCM practices except for supply chain benchmarking. The reason behind this may be the limited number of research papers selected in the study to refine the voluminous available literature on TQM and SCM practices and therefore, these practices were not able to find a place in the top six major practices of TQM and SCM.

Implications of the study
This paper successfully accomplishes the research objectives and offers a number of managerial implications and scope for further study. First, by identifying a set of common and major TQM and SCM practices, the study provides TQM and SCM managers with a useful tool for modifying their current TQM and SCM practices. Besides this, for the new entrants who are planning to implement TQM and SCM practices in their organization for the first time, these sets of identified practices will surely help them in getting desired results. For example, Chin *et al.* (2004) argued that understanding the success factors will lead to successful implementation of SCM through reduction of supply chain wide costs and improved customer service levels. Similarly, Sila *et al.* (2006) reported that although organizations included a few major practices in their quality initiatives, they did not include an overall set of major practices like the involvement of customer and supplier in their organization. Therefore, they recommended that the attributes that characterize customer-supplier relationships and the SCM factors focusing on quality to improve product and service quality within the supply chain should be analyzed and improved. Other studies/cases which support this implication are by Lakhal *et al.* (2006); Prajogo and McDermott (2005); Sila and Ebrahimpour (2005); Romano and Vinelli (2001). These studies can further enlighten the task of identifying TQM and SCM practices and help managers in adopting the conclusions of this study in their organization.

Second, while implementing these practices the SCM and TQM managers should be more conscious towards three practices, which are management support and leadership; customer relationship and satisfaction; and supplier relationship and partnership. For example, a research study by Sakthivel (2007) on management support and leadership commitment in higher educational institutions shows their significant effect on overall education excellence. Beside this customer (students) relationships and satisfaction with their faculty also contributed greatly to overall education excellence. Vanichchinchai and Igel (2009) in their literature review on TQM and SCM try to contrast and compare these strategies using various aspects including these three major practices to strengthen TQM and the entire supply chain. Another example to elaborate this finding is the study performed by Kuei *et al.* (2001) to test middle manager's perceptions on the association between supply chain quality management practices and organizational performance. They found that

organizational performance is associated with the improvements in supply chain quality management practices like supplier quality management, customers' relationships and satisfaction, supplier relationships and partnership, and supplier selection. Other relevant examples which support this implication and can guide managers of organizations are: Chandra and Kumar (2000); Casadesús and de Castro (2005); and Salvador *et al.* (2001).

Third, the finding of the study may not be treated as an ideal set for all types of organization and are firm specific. For example, in the studies of TQM and SCM, especially of TQM, the literature review suggest that there exists different sets of practices for manufacturing and service organizations, and for the different sectors within these. Different sets of TQM practices are identified and implemented to improve performance for different sectors such as processing industries, manufacturing industries, healthcare establishments, banking industry, and educational institutions. However, some authors have argued that the same set of practices are applicable to manufacturing and service organizations and can be directly transferred from one type of organization to another without modification (Behara and Gundersen, 2001; Schonberger, 1992). As such, this identifies that there is a need to address issue related to the appropriateness and adoptability of various TQM and SCM practices for manufacturing and service organizations. Also, the diverse nature of services is an additional dimension capable of effecting the implementation of TQM and SCM principles. Hence, there is a need for further research that addresses the broader aspects of industry. Finally, since SCM involve supplier, manufacturers, distributors, retailers, and customers; establishing trustworthy relationships among all the supply chain partners is the most important factor that managers have to take care of to share accurate information and to establish effective and efficient SCM practices. This implication of the present study can further be explained through a research paper by Rajagopal *et al.* (2009) who empirically examined for supply chain partners (SCP) the significant determinants that can be manipulated by the firm to increase their effectiveness in SCP efforts. The finding indicates that resource sharing can have a positive influence on SCP. Other similar studies supporting this implication are by Wu *et al.* (2004) and O'Keeffe (1998).

Scope for future research
Through this study, a number of interesting results were revealed that require further research. One particular area relates to the need to provide more understanding about TQM and SCM practices and association between them, and a system's overall performance. A further case-based exploration approach should be carried out to better understand the applicability of the TQM and SCM practices by integrating them. Another area that requires further exploration includes the investigation of management's role in supplier selection and evaluation in TQM and SCM. Also, the use of information systems and technologies to support TQM in SCM is an emerging area for future research. There is a need to investigate the cultural and behavioral issues that can influence the applicability of TQM in SCM. Further research into SCM and its potential contribution to TQM applications include developing universal SCM standards or certificates and the need for internal and external integration both in TQM and SCM. Finally, it is necessary to validate and empirically test the current findings of this study for its generalizability and development of a working model.

Researchers can use the findings herein to generate ideas for future studies in the current area and top-managers can gather important knowledge about how effective TQM and SCM practices, if implemented properly, can impact organizational performance.

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Further reading

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