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Why TQM programmes fail? A pathology approach

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Abstract

Purpose – Implementing total quality management (TQM) is not without difficulties and achieving its promised benefits is not easy. The purpose of this paper is to identify the barriers to TQM successful implementation.

Design/methodology/approach – A literature review has been done to explore the major reasons for the failure of TQM programmes.

Findings – An examination of 54 TQM empirical studies identified 54 obstacles to successful TQM implementation. There are both theoretical and practical difficulties in applying TQM in organisations. An ineffective TQM package, inappropriate TQM implementation methods and an inappropriate environment for implementing TQM are the main reasons for TQM failure. The most frequently mentioned reasons for TQM implementation failures include insufficient education and training, lack of employees' involvement, lack of top management support, inadequate resources, deficient leadership, lack of a quality-oriented culture, poor communication, lack of a plan for change and employee resistance to the change programme.

Research limitations/implications – The review was limited to articles written in English language during the past 30 years (1980-2010).

Practical implications – TQM does deliver better performance when an appropriate model of TQM is appropriately implemented in a supportive environment. The findings of this paper provide managers with a practical understanding of the factors that are likely to obstruct TQM implementation. Managers should overcome these barriers to achieve the TQM benefits.

Originality/value – Understanding the factors that are likely to obstruct TQM implementation will help organisations in planning better TQM models.

Keywords Total quality management, Barriers, Failure, Success, Obstacles, Successful implementation

Paper type Literature review

Introduction

Total quality management (TQM) as a management strategy aims to enhance customer satisfaction and organisational performance through providing high-quality products and services through the participation and collaboration of all stakeholders, teamwork, customer-driven quality and continuously improving the performance of inputs and processes by applying quality management techniques and tools. A successful TQM implementation is related to economic and performance success. The benefits and improvements come in the areas of fewer defects and errors, reduced waste, increased sale, increased productivity, increased profit and market share, stronger relationships with suppliers and increased employee and customer satisfaction (Brah *et al.*, 2002; Hansson and Eriksson, 2002; Hendricks and Singhal, 2001; Kaynak, 2003).



While TQM has been suggested in principle to be effective for improving performance, its application in practice involves many difficulties. Several studies reported only 20-30 per cent improvement in productivity due to implementation of TQM programmes (Elmuti *et al.*, 1996; Eskildson, 1994; Schonberger, 1992; Tata and Prasad, 1998). Burrows (1992) reported a 95 per cent failure rate for initiated TQM programmes. Bak (1992) and Kearney (1992) claimed that 80 per cent of TQM programmes failed to produce benefits. Some studies reported estimates of TQM failure rates as high as 60-70 per cent (Becker *et al.*, 1994; Brown, 1993; Hutton, 1992; Hubiak and O'Donnell, 1996). While TQM was ranked third among all techniques that were management favourites in 1993, it dropped to 15th place in 2007 (Rigby and Bilodeau, 2007). Is the TQM age over? Is it another management fad? To respond to the critics, it is important to understand the reasons of the failure of many TQM programmes.

Aims

Understanding the factors that are likely to obstruct TQM implementation enables managers to develop more effective strategies for enhancing the chances of achieving business excellence. Therefore, in this paper, the author attempts to identify barriers that must be overcome for successful TQM implementation. Consequently, this provides direction and guidance in developing strategies for an effective quality management transformation.

Method

A meta-analysis of the existing research studies on TQM implementation barriers was undertaken. In total, 15 electronic databases were searched in this systematic and meta-analysis literature review. These include Academic Journals Database, Directory of Open Access Journals, Ebsco research databases, Elsevier science, Emerald, Google Scholar, JournalSeek, JSTOR, JURN, ScienceDirect, Social Science Citation Index, SpringerLink, Social Science Research Network, Web of Knowledge and WorldWideScience. In addition, journals such as *Decision Sciences*, *Academy of Management*, *TQM Journal*, *Total Quality Management and Business Excellence*, *Quality Progress*, *International Journal of Quality and Reliability Management*, *International Journal of Quality Science*, *International Journal of Healthcare Quality Assurance*, *Journal of Operations Management*, *Journal of Managing Service Quality*, etc. were searched for articles not yet indexed in those databases. Moreover, the reference lists of the retrieved books and articles were evaluated to identify additional relevant articles. The final step was a general internet search using Google, Yahoo and AltaVista search engines to find further information from unpublished research studies.

Keywords to search the literature included Total Quality Management (TQM), implementation, failure, barriers and obstacles. The selection was restricted to the following studies: published between 1980 and 2010; those written in English; and examining TQM implementation using an empirical approach (quantitative or qualitative); and identified barriers and obstacles to implementing the TQM programme.

The primary literature search identified over 400 documents that discussed TQM implementation. However, after manually screening and evaluation, many studies were excluded because they were review articles, described the process of TQM implementation merely and did not identify the barriers to implementing TQM successfully. Finally 54 empirical studies reporting obstacles to TQM implementation were selected for this systematic and meta-analysis. The empirical studies were conducted in 23 countries.

In total, 28 studies were reported in developed countries and 26 in developing countries. A questionnaire survey was used for data collection in 38 studies. The rest of the studies (16) used case study approach and interviews for collecting data.

Data analysis

Both qualitative and quantitative analyses were used in this study. Content analysis was used to describe and explain the reasons for the failure of TQM programmes. Open, axial and selective coding (Strauss and Corbin, 1998) were applied to the data to detect and code reasons for TQM failure, organise them into logical and meaningful categories, make connections between and among categories, explain the link between categories and develop a theory from the relationships found among the categories. NVivo software (version 7) was used for qualitative data analysis and retrieval.

In addition, SPSS software (version 11.5) was used to provide descriptive statistics such as frequency, percentage, means and standard deviations. *t*-Test was used to test the significance of occurrence of TQM programmes' inhibitors in developed and developing countries. Regression analysis was used to determine which obstacles were perceived as significant in TQM failure.

Results

The reasons for the failure of TQM addressed in the literature were categorised into three groups:

- (1) ineffective or inappropriate TQM model;
- (2) ineffective or inappropriate method for TQM implementation; and
- (3) inappropriate environment for TQM implementation.

1. *Ineffective or inappropriate TQM model*

TQM does not provide an explicit theory. There is little agreement on what it is and what its essential features are. Basically, a TQM model consists of two components: values and principles (i.e. management support, employee involvement and team working), and techniques and tools (e.g. statistical process control tools). There is no consensus among TQM gurus about TQM basic principles and critical success factors. Subsequently, various quality gurus and consultants include different constructs in their TQM frameworks. As a result, different TQM models may result in different outcomes. The theory of TQM has gradually developed over the last 30 years. Nevertheless, TQM is partially developed (Singh and Smith, 2006). Some complementary theories must be combined with TQM to achieve competitive advantage. The knowledge of sociology, psychology and change management helps develop a more effective TQM model.

2. *Ineffective or inappropriate method for TQM implementation*

Many of the failures of TQM are attributed to its implementation methods (Claver *et al.*, 2003; Hansson and Klefsjo, 2003; Seetharaman *et al.*, 2006). Although many quality management gurus and consultants have contributed to the evolution of TQM, relatively few offered practical frameworks and methods for operationalising TQM principles. Cooney and Sohal (2003) believe that TQM offers a vision of organisational change. However, it lacks the tools for implementing such a change. Similarly, Zairi and Matthew (1995) conclude that in TQM, the "ends" have been defined but not the "means". As a result, there is no standard method for implementing TQM values and principles in an organisation. This is left to the interpretation of

quality management practitioners. Consequently, the same TQM package may result in different outcomes in different organisations.

A holistic, consistent and coherent approach to organisational change should be applied to achieve sustainable results. There are three interrelated classifications of organisational change. These include structural, contextual and procedural changes. TQM mainly addresses procedural change (Cao *et al.*, 2000). Procedural changes may have little effect if there are incompatibilities between organisational structure and culture and TQM principles and core values. Implementation of TQM should be considered as a comprehensive change. It is necessary to change the organisational structure and culture to achieve a sustainable improvement in the quality of products or services. Structural and cultural changes promote and sustain procedural changes in the organisation.

The implementation of TQM principles and practices must be supported by techniques and tools to achieve business excellence. There are three main reasons for an in-effective TQM implementation method, i.e., over use, under use and misuse of techniques and tools. Overuse occurs when managers try to apply sophisticated techniques and tools which are beyond the understanding of the employees. Under use occurs when organisations do not fully implement all of the key values and principles of TQM. Most failures with TQM result from partial implementations (Hill and Wilkinson, 1995). Misuse occurs when managers implement techniques and tools which are not compatible with organisation's culture and operation (e.g. using participatory management techniques in an organisation with authoritative leadership style and individualism culture).

3. *Inappropriate environment for TQM implementation*

A supportive environment (supportive leadership, culture and structure) is needed to make TQM implementation successful. The most frequently cited reasons for TQM failure in this category listed in previous studies are listed in Table I.

The results of the multiple regression model indicate that management turnover, middle management resistance, poor leadership, inappropriate planning and unrealistic expectations were responsible for 69.9 per cent of TQM problems.

The TQM implementation barriers were grouped into five categories: strategic barriers, structural barriers, human resources barriers, contextual barriers and procedural barriers (Table II). Strategic problems are significant barriers to TQM implementation and have the most negative impact on its success. These barriers are mainly related to management and leadership of the organisation. The human

TQM failure reasons	Frequency of occurrence	Prioritised rank
Insufficient education and training	33	1
Lack of employees involvement	29	2
Lack of top management support	28	3
Inadequate resources	26	4
Deficient leadership and poor management	25	5
Lack of a quality-oriented culture	24	6
Poor communication	14	7
Lack of a plan for change	14	8
Employees' resistance	13	9
Short-term thinking	12	10
Lack of a monitoring and measurement system	12	11
Lack of customer focus	11	12

Table I.
Prioritisation of TQM
failure reasons

Table II.
Barriers to successful
TQM implementation

<i>Strategic barriers</i>	<i>Contextual barriers</i>
Unjustified TQM programme	Inappropriate organisational culture
TQM adoption barriers	Difficulties in changing organisational culture
Unrealistic expectations	Lack of team orientation
Deficient leadership	Poor and ineffective communication
Poor management	Poor coordination
Lack of top management support	Lack of employee trust in senior management
Management turnover	Problem-solving mindset
Middle management resistance	Lack of innovation
Inappropriate planning	Political behaviours
Lack of constancy of purpose	Diversity of workforce
Lack of long-term view	Mindset barriers
Lack of a vision and clear direction	<i>Procedural barriers</i>
Conflicting goals and priorities	Lack of process focus
Placing a poor priority on quality improvement	Lack of proper process management
Experience of previous failed change initiatives	Lack of customer focus
Lack of government support	Lack of supplier involvement
Political uncertainty	Bureaucracy and paperwork
<i>Human resources barriers</i>	Lack of evaluation and self-assessment
Lack of employee interest	Incompetent change agent or quality consultant
Lack of employee commitment and involvement	Ineffective corrective actions
Incompetent employees	Time consuming quality improvement efforts
Employees' resistance to change	<i>Structural barriers</i>
Lack of good human resource management	Inappropriate organisational structure
Inadequate empowerment at all levels	Lack of organisational flexibility
Employee shortage and increased work load	Lack of physical resources
Lack of employee training and education	Lack of information systems
Lack of employees' motivation and satisfaction	Lack of financial support, cost of implementation
High employee turnover	Time shortage
Lack of recognition and reward for success	

recourses barriers are those obstacles that are related to the human factor such as lack of employees' commitment and their resistance to the TQM change. The structural obstacles are related to the structure, systems and physical resources required for implementing TQM. The contextual barriers are those difficulties arising when an appropriate context and culture are not developed to achieve the highest potential from TQM implementation. Major procedural problems that organisations may encounter during the TQM implementation tend to be as follows complexity of processes, lack of customer focus, lack of supplier partnership, bureaucracy and lack of an evaluation and self-assessment system.

Strategic barriers

1. Deficient leadership

Leadership has a crucial role in the success of TQM programmes. According to Easton (1993), the moderate results of TQM programmes in American companies were attributed to deficient leadership. Shortell *et al.* (1995) argued that leadership styles based on command and control were a major obstacle to the application of TQM in organisations. Top management must create clear quality vision for employees and inspire them to continuously improve the quality of their products and outcomes. Top-down authoritative leadership style must be replaced with a more supportive, democratic, charismatic and participative style that allows employees' involvement in the TQM programme to improve their performance.

2. Poor management

Just as managers can support TQM, they can also obstruct it. According to Juran (1988), most of the problems associated with quality are attributed to management. Similarly, Deming (1986) believed that top management is responsible for 94 per cent of quality problems. Many of the obstacles hindering TQM efforts such as lack of a vision, lack of a strategic plan, poor organisational culture, poor communication, inadequate resources and employee resistance to change are linked to the management of TQM change. The success of TQM depends largely on management's ability to create a vision, plan for and lead the organisational change required for TQM success (Sebastianelli and Tamimi, 2003; Kotter, 1995).

3. Lack of top management commitment and involvement

Lack of top management commitment to and involvement in TQM can lead to failure in as many as 80 per cent of the firms (Atkinson, 1990; Jaehn, 2000). Juran and Gryna (1993) attribute the failure of the quality management initiatives in the west in the 1970s and 1980s to lack of top managers' involvement in quality management. They related quality excellence of Japanese companies to top management commitment to quality. A lack of knowledge about TQM, management turnover and ineffective communication between management and employees are the main reasons for the low management commitment to TQM (Mosadeghrad, 2005; Soltani *et al.*, 2005b; Psychogios and Priporas, 2007). Educated and experienced managers are crucial for successful TQM implementation (Mellahi and Eyuboglu, 2001). Managers must be educated in TQM principles and practices. They should understand the principles of TQM and have the skills and knowledge required for managing the TQM change. They should be committed to TQM implementation and provide the corporate resources for its implementation.

4. Lack of middle and front line managers' commitment and involvement

According to Manz and Sims (1993), the biggest obstacle to successful implementation of TQM is the middle management. TQM implementation would be halted without middle managers' support. Lack of involving middle and front line managers in TQM initiatives makes them resist the change programme and react with suspicion and uncertainty (Harrington and Williams, 2004; Jacobsen, 2008). The transition towards TQM may cost middle managers in status, power and recognition. TQM expects managers to empower their employees. However, middle managers may not let employees take responsibility (Venkatraman, 2007). The failure to define the role of middle managers in an organisation is another reason for TQM failure (Martin, 1992). Top management should involve middle managers in designing and promoting the TQM change. Middle managers can act as change facilitators. They can convert organisational goals, objectives and strategies into detailed departmental objectives and operational activities, explain the principles of TQM to the front-line employees and ensure their commitment (Baidoun, 2003; Oakland, 2000; Wimalasir and Kouzmin, 2000). Therefore, they should receive enough training in TQM.

5. Mobility of management

Management turnover is one of the most important obstacles for successful TQM implementation (Mosadeghrad, 2005; Ngai and Cheng, 1997). This study shows that management turnover explains 38 per cent of the variance in TQM successful implementation. Management turnover increases the chance of subjective

management, leading to unfavourable outcomes. Managers may avoid taking risks and making radical changes due to the fear of losing their jobs (Soltani *et al.*, 2005b). Managers cannot plan for the long term and have to maintain the status quo. Mobility of management was considered a deadly disease for business by Deming (1986). The job security of managers encourages long-term planning and their commitment to pursuing long-term objectives.

6. Inappropriate planning

Newall and Dale (1991) found poor planning in the introduction stages of TQM implementation as one of the key reasons for future difficulties in implementing TQM in eight UK companies. Quality efforts will fail if they are not incorporated into the organisation's strategies and goals (Lawrence and Early, 1992). A successful TQM implementation needs long-term strategic planning (Dayton, 2001; Mosadeghrad, 2005; Taylor and Wright 2003). Many TQM implementation problems can be overcome by proper planning. Planning for quality in terms of quality goal setting, determining policies, tactics and action plans, staffing and defining roles and responsibilities is crucial for TQM success. TQM concepts must be put into practice by the inclusion of quality objectives in the strategic planning process.

7. Lack of justification for TQM

Top management should justify the need for TQM implementation in the organisation. If top management adopts TQM because other organisations have or because it was forced by the situation, their understanding of TQM will be low. Subsequently, their commitment to and involvement in TQM initiatives will be low (Beer, 2003; Mosadeghrad, 2005). Consequently, employees will lose interest and faith in TQM. This will lead to early abandonment of the TQM programme. Managers must justify the necessity, importance, usefulness and possibility of TQM implementation in their organisations. They should adopt TQM as a strategy to improve processes and procedures to enhance the quality of products and services and productivity of the organisation. Quality costing and benchmarking techniques can be used to help justify the adoption of TQM initiatives.

8. Lack of vision and clear direction

Lack of vision and direction reduces the front-line managers' and supervisors willingness to take risks. This adversely affects innovation and problem-solving activities (Longenecker *et al.*, 1999). Top management desire for change is not enough. Managers must develop and build a shared vision for the organisation (Senge, 2006; Kotter, 1995). Employees expect managers to create a vision of better future for them and communicate it effectively to them and work together towards its achievement (Hoag *et al.*, 2002). Stalk and Schulman (1992) consider the clarity of quality goals determines the effectiveness of the TQM efforts. Managers have to articulate a clear vision and communicate it to employees, inspire them to apply the changes in the structure and the processes and manage the change programme effectively and efficiently (Kotter, 1995).

9. Lack of constancy of purpose

Quality management efforts should be linked with the corporate purpose (Deming, 1986). Senior managers must provide constancy of purpose through developing and sustaining a long-term vision of the changes necessary to establish a quality culture.

10. Conflicting goals and priorities

Conflicting goals are common in most organisations. Different departments in an organisation may have different goals and objectives that might be in conflict with each other. These conflicting demands and expectations affect the daily operations of the organisation and consequently negatively influence organisational change. Managers and employees should identify the areas of conflict and resolve them. Reducing conflict requires strong visionary leadership, clear direction and effective mutual communications (Longenecker *et al.*, 1999).

11. Lack of long-term view

Many organisations implemented TQM as a quick fix (Cole, 1995; Harari, 1997; Hendricks and Singhal, 1997; Shaari, 2010). Some managers thought that TQM can solve all organisational problems quickly. Therefore, when quick results were not achieved, they reduced their support. TQM is a long-term business strategy. The process of adapting and institutionalising TQM is a difficult, long-term, comprehensive and continuous process. It may take five years or longer to put TQM fundamental principles, and practices into place, create a supportive organisational structure and culture which is conducive to continuous improvement and change the values and attitudes of its people to participate continuously in the quality improvement process (Beer, 2003; Dale *et al.*, 1997; Satia and Dohlie, 1999; Saravanan and Rao, 2007). The longer organisations work at TQM, the more successful they will be.

12. Unsuccessful previous organisational change

Employees' attitude towards an organisational change can be influenced by their previous experience of organisational changes. If organisational changes have failed in the past, employees lose trust in organisational change effectiveness and look at other future change programmes with more scepticism. As a result, they will be reluctant towards new change programme (Schneider *et al.*, 1996). The history of change is related to employees' commitment to and involvement in the change programme (Reichers *et al.*, 1997). Employees' positive experience with previous change programmes encourages their commitment.

13. TQM adoption barriers

Various individual and organisational factors influence the adoption and adaption of TQM in an organisation. If an organisation has significant problems such as an unstable funding base, poor management and leadership, poor employee morale and serious tensions between managers and employees, TQM implementation should be delayed until favourable conditions exist. It is likely that implementing TQM at this time will result in even greater organisational problems. An organisation should be generally healthy before implementing TQM. Organisational structures and cultures, predominant leadership style, communication, and managers' and employees' attitudes about quality improvement affect the successful TQM adoption. Feasibility studies help managers measure the ability, readiness and the willingness of their organisation to TQM change. This assessment shows the current levels of organisational functioning, identifies areas in need of change and helps managers develop appropriate methods for TQM implementation.

14. Unrealistic expectations

Many organisations adopted TQM with unrealistic and overstated expectations (Cenek, 1995; Hendricks and Singhal, 1997; Huq, 2005). Consequently, when managers

and employees did not achieve the hoped for results, they reduced their support and the TQM programme failed. Organisations should be realistic about what to expect from their TQM programme. TQM is a strategy to improve organisational performance. Its effectiveness depends on the appropriate implementation of an effective model of TQM in a supportive environment. Managers should be realistic about the time frame, cost and benefit of TQM implementation.

Structural barriers

1. Lack of a quality structure

The success of TQM also depends on its fit with organisational structure (Douglas and Judge, 2001; Hackman and Wageman, 1995; McNabb and Sepic, 1995). Mechanistic, bureaucratic and authoritative structures, risk aversion and complexity impede successful TQM implementation (Jabnoun, 2005). A suitable infrastructure is required to support TQM initiatives. Juran (1988) sees organisation for quality in terms of structure and people. This requires the determination of activities to be performed, the responsibilities associated with the activities, determining job responsibilities and authorities, inter-job relations and communication channels. Organic structures with low centralisation and formalisation are more conducive to the success of TQM implementation (Jabnoun, 2005; Moreno-Lozon and Peris, 1998; Tata and Prasad, 1998).

2. Lack of resources

TQM involves high cost, effort and time. Failure to provide adequate resources is another cause for the failure of TQM (Bhat and Rajashekhar, 2009; Burcher *et al.*, 2010; Khan, 2011; Sebastianelli and Tamimi, 2003; Sila and Ebrahimpour, 2002). Those companies struggling financially will not be able to sustain the benefits of TQM programmes. Allocating necessary resources are essential for TQM programmes to be continued effectively. Purchased materials are often a major source of quality problems (Flynn *et al.*, 1994; Zhang *et al.*, 2000). An effective supplier relationship management system reduces procurement costs, enhances the quality of purchased products and services and provides differentiated and customised services for companies (Rao *et al.*, 1999; Slaight, 1999).

3. Lack of an information management system

Several studies reported that the lack of good information system and information required for quality improvement influenced the success of TQM negatively (Amar and Mohd Zain, 2002; Huq, 2005; Lee *et al.*, 2002). Fundamental to TQM is collecting timely, reliable and relevant data and information from both inside and outside the organisation for assessing and improving purposes (Joss and Kogan, 1995; O'Brien *et al.*, 1995). Such information is necessary for the effective resources usage, identification of customer requirements, evaluating the effectiveness and efficiency of the operations and determining the cause of quality problems.

Human resources barriers

1. Employee shortage

The implementation of a TQM programme results in more work pressure on employees (Parker and Slaughter, 1993; Walston *et al.*, 2000). Newall and Dale (1991) found employee shortage as the main reason for the TQM failure. Hence, enough employees should be recruited to implement the TQM programme effectively. Managers should examine the extra workload which organisational change may create

(Vakola and Nikolaou, 2005). They should provide a well-balanced work schedule for employees to reduce their job stress.

2. Lack of employee commitment and involvement

Successful TQM is highly dependent on the level of employees' involvement and commitment to the goals of the TQM programme. Crosby (1989) highlights the need for everyone in the organisation to understand her or his role to make quality happen. This requires creating a common understanding of quality by all employees and showing the importance of employee involvement to keep and maintain the quality momentum.

3. Lack of good human resource management

Many TQM programmes fail because of paying too little attention to human factor (Hiatt and Creasey, 2003; Senge, 2006). The implementation of TQM will result in more demands on employees and more work pressure. This is often caused by the organisational changes, new relationships and responsibilities (Parker and Slaughter, 1993; Walston *et al.*, 2000). The human factor is a fundamentally important aspect of the implementation of TQM in organisations. Hence, their empowerment, commitment and involvement are key factors in the successful implementation of TQM. Ahire *et al.* (1996) revealed that human resource management is a key factor in successful implementation of quality management by empowering employees to make quality-related decisions, ensuring a supporting infrastructure for full employee participation, and training employees in technical and management aspects of their roles in TQM. Human resource systems must support the TQM programme through the development of the necessary motivation, attitudes and the competencies (Snape *et al.*, 1995; Soltani *et al.*, 2005a; Wilkinson, 1992).

4. Lack of education and training

Poor education and training are also obstacles to the development and implementation of TQM programmes (Huq, 2005). Successfully implementing TQM requires managers and employees to have the appropriate knowledge, skills and expertise in the field of quality management. Training and education have important roles in securing commitment and behavioural change towards continuous quality improvement. Education and training force employees to not only possess the adequate knowledge and skills to perform their jobs, but also to possess specific values, knowledge and skills associated with TQM issues and activities.

5. Lack of employees' motivation and satisfaction

Lack of employee motivation is one of the main reasons for the failure of TQM programmes (Mosadeghrad, 2005; Pun and Jaggernath-Furlonge, 2012; Salegna and Fazel, 2000). Highly motivated and satisfied employees will have positive attitudes towards the change programme and are more motivated to support organisational change (Judge *et al.*, 1999; Wanberg, 2000). Employees' motivation and job satisfaction are also positively related to their commitment to their organisations (Mosadeghrad *et al.*, 2008).

6. High employee turnover

Jun *et al.* (2004) in their empirical study identified high employee turnover as a prevalent TQM barrier in the Mexico's Maquiladora industry. Organisational change can influence employees' decision to leave the organisation (Morrell *et al.*, 2004).

In particular, when employees' work patterns are changed and they were asked to do more work for less benefit, they may consider leaving the organisation. If turnover is avoidable following the change implementation, managers should assure employees that the change programme brings benefits for them. Job security is related to employee's commitment to the organisation and also his or her positive attitude towards organisational change (Morris *et al.*, 1993).

7. Lack of employee empowerment

Inadequate empowerment at all organisational levels is another reason for TQM failure (Al-Khalifa and Aspinwall, 2000; Salegna and Fazel, 2000). Empowerment and ownership are critical factors of TQM implementation. Organisations that empower employees to adapt their processes to environmental changes are better able to use TQM for competitive advantage (Douglas and Judge, 2001). Employee empowerment increases employee participation (Wuagneux, 2002). Empowerment and involvement enhances employees' self-esteem and improves their ability to solve problems. Empowerment does not mean only shifting the responsibility for quality decisions to employees. It also entails providing supporting framework (e.g. the necessary resources and technical support) to assist them in such decision making (Ahire *et al.*, 1996). Empowered employees should be responsible for their decisions and accountable to their managers.

8. Lack of an effective recognition and reward programme

Lack of incentives to support the TQM programme and failure to design reward systems to link employees' earnings with achieving quality objectives are obstacles to employees' commitment to and involvement in TQM programmes (Brown *et al.*, 1994; Cenek, 1995; Cole, 1995). Successful TQM implementation requires committed and well-trained employees who participate fully in quality improvement activities. Such participation can be reinforced by an appropriate and fair reward and recognition systems which emphasise the achievement of quality objectives. Recognition can also be used as the motivation for the cultural change required for TQM implementation (Juran, 1991).

9. Employee resistance to change

Employees' resistance to change is the primary obstacle to TQM implementation in an organisation. TQM can be a source of fear and anxiety (Khan, 2011; Morgan and Murgatroyd, 1994; Wellburn, 1996). The TQM change challenges individuals, cultures, systems and existing power relations. It can be perceived as a threat to the status quo (Williamson and Prosser, 2002). The reasons for employees' resistance to change may include fear of losing jobs and related benefits, personal uncertainty, group pressure, perceived loss of control, lack of knowledge of the nature and the impact of the proposed change, communication difficulties and lack of adequate planning (Alas, 2007; Carter, 2008; Harrington and Williams, 2004; Self and Schraeder, 2009). Managers must minimise the sense of ambiguity among employees using effective communication and planning. Managers must clarify the future state for employees and let them know what would happen and how they would be affected by the change programme (Abraham and Crawford, 1997). Managers should create the belief among employees that the appropriate training and education will be provided. Managers should clarify organisations' quality policies, motivate employees in order to participate actively in quality planning, decision making and processes improvements,

build a team work culture, use employee ideas and suggestions in quality management and provide the appropriate feedback. TQM must be introduced so that it maximises employees' enthusiasm and minimises their resistance.

Contextual barriers

1. Lack of a quality-oriented culture

Organisational culture appears to be a crucial factor to a successful TQM programme (Cicmil and Kekäle 1997; Tata and Prasad 1998). Cultural variables are found responsible for more than 50 per cent of the variance in TQM implementation (Carman *et al.*, 1996; Mosadeghrad, 2006; Wakefield *et al.*, 2001). According to Hill (1991), the main reason for the failure of quality circles in the UK was lack of attention to organisational culture. TQM programmes are more likely to succeed if the prevailing organisational culture is compatible with the values and basic assumptions proposed by the TQM discipline (Kujala and Lillrank, 2004). For instance, introduction and implementation of TQM programmes may encounter difficulties in countries with high-power distance. Managers in these cultures might be reluctant to accept changes in their own and their subordinates' job responsibilities. Therefore, any attempt to apply participative management techniques in such a context should be adjusted.

2. Difficulties in changing organisational culture

Difficulties in creating a supportive culture is one of the most frequently mentioned obstacles to TQM implementation (Mandal *et al.*, 2000; Tata and Prasad, 1998). TQM initiatives will not succeed unless rooted in a supportive organisational culture (James, 1992). According to Anjard (1995), cultural management is the most often ignored component of TQM when a company attempts to implement it. A "corporate culture of quality" should be developed. This involves building and enhancing trust, motivation, cooperation, innovation and continuous improvement through job security, empowerment, teamwork, support and equitable compensation. TQM requires changes in employees' behaviour to focus on prevention and continuous improvement and changes in management's behaviour so that quality is managed with as much priority (Anjard, 1995). Continuous and widespread education and training provide a good foundation for cultural change required for TQM implementation. However, it needs to be supplemented by appropriate systems to encourage effective communication and involvement. Employee participation programmes, enhanced communication programmes, revision of procedures and policies, modification of evaluation and reward system and behaviour of top managers can influence the culture of an organisation (Ghobadian and Gallea, 1997). Leadership has a key role in changing the culture of an organisation. Changing employees' knowledge, attitudes and behaviour requires political and diplomatic skills (Harrington and Williams, 2004).

3. Lack of teamwork

Complacency in teams inhibits TQM progress in organisations (Adebanjo and Kehoe, 1998; Bayazit, 2003; Gatchalian, 1997; Longenecker and Scazzero, 1996). Poor communication, lack of time to meet as a team and cultural values are the main reasons for lack of teamwork in an organisation. Teamwork and participation is important for implementing TQM and its continuity. Effective teams have higher morale and are more productive than the individuals. Everyone throughout the organisation must work together to improve processes. Teams need trained facilitators, committed and accountable members, a mission and a time frame for completing quality improvement

projects to be effective. Managers should foster teamwork in the organisation through providing enough training for employees in team working, empowering them to work in teams and make decisions and applying team-based rewards.

4. Lack of employee trust in senior management

Organisational change can result in lower employees' trust in management. Those managers who consider more shareholders over the stakeholders and do not empower employees will lose their employees' trust (Appelbaum *et al.*, 1999). Organisations should adapt to their employees' needs during the implementation of the TQM programme. This enhances employees' trust in management.

5. Problem-solving mindset

In some organisations the general approach to organisational change is problem solving. They wait until the problem happens. Then, they try to solve it using a change model (Cummings, 1995). This incremental approach to change depresses employees. It also results in minimal organisational learning and limited organisation's capacity to adapt. If employees plan for the desired situation and change the organisation accordingly, they would be more motivated and committed (Weisbord, 1992). Senge (2006) suggests managers to define a shared and agreed vision for the future and asks employees to move towards achieving the desired objectives.

6. Communication barriers

Smith (1994) warns that poor communication can lead to loss in momentum in the quality management initiative. Tamimi and Sebastianelli (1998) reported that poor communication was highly rated as an obstacle to successful implementation programme. Effective communication is important for the success of a TQM initiative. Every element of the TQM programme must be talked about, presented and discussed throughout the organisation (Rao *et al.*, 1996; Claver *et al.*, 2001).

Procedural barriers

1. Lack of proper process management

TQM focuses on studying, understanding and improving the processes. Many TQM writers have pointed out the importance of focusing on the effective management of processes (Beskese and Cebeci, 2001; Kaynak, 2003; Oakland, 2000; Raja *et al.*, 2007). Determining critical processes, understanding customers' needs and expectations, developing effective and efficient procedures, clarifying the standards and monitoring quality activities are helpful for the success of TQM. An attitude of continuous improvement needs to be maintained for TQM to be succeeded.

2. Lack of customer focus

The failure to build customer expectations into daily organisational activities is another reason for TQM failure (Cole, 1995). According to Sewell (1997), serious problems in TQM implementation are likely to occur if there is any attempt to achieve quality without a full understanding of the customers' needs and requirements. Peters and Waterman (1982) recognised learning customers' preferences and meeting their needs as crucial success factors differentiating "excellent" companies from those that were not. Quality should be customer oriented. Customers' needs should be integrated into the design and development of products and services (Goldman, 2005). The emphasis on customer satisfaction is considered by many gurus and writers as

a major success of the quality management effort (Deming, 1986; Crosby, 1989; Rao *et al.* 1996; Oakland, 2000).

3. Lack of suppliers' partnership

Poor quality of supplier products results in extra costs for the purchaser (Juran and Gryna, 1993). According to Crosby (1989) 50 per cent of an organisation's quality non-conformances are due to defective in-coming materials. According to Besterfield (1994) on the average, 40 per cent of production cost is due to purchased materials. Therefore, supplier management is extremely important. Supplier partnership is an important aspect of TQM since materials and purchased parts are often a major source of quality problems and affect buyer satisfaction (Zhang *et al.*, 2000).

4. Bureaucracy

TQM leads to an increased bureaucracy within organisations (Cole, 1995; Harari, 1997; Mueller and Carter, 2005). It results in additional paperwork related to new procedures and protocols. It can be perceived by employees as a barrier to doing their jobs effectively and as a factor of their dissatisfaction. Hence, the TQM implementation model should not involve extra work for employees. Quality improvement activities should be incorporated into employees' existing work schedules.

5. Lack of an evaluation and self-assessment system

Inappropriate measures and appraisal methods are also barriers to effective TQM implementation (Alexander *et al.*, 2007; Jun *et al.*, 2004; Ngai and Cheng, 1997). Evaluating the progress of the TQM implementation itself is necessary. Top management must continually monitor TQM to assure that it is fully institutionalised throughout the organisation. There is a need to know the strengths and weaknesses of the TQM implementation. Continuous monitoring and evaluation of the processes and providing good feedback are the most important factors in the success of TQM.

6. Incompetent change agents

An inappropriate interaction between the change agent (internal and external) and those employees who implement the change programme can be a key blocker to implementing the change programme effectively (Andrews *et al.*, 2008; McWilliam and Ward-Griffin, 2006). The change agent plays a critical role in the adoption, adaption and successful implementation of the change programme. The most important role of a change agent is to obtain personnel involvement in the change process and getting them committed to taking relevant actions. Thus, the acceptance of the change agent by other employees is very important. Change agents knowledge in TQM, and experience in its successful implementation can assure employees that the TQM programme can work.

Relationships between barriers to successful TQM implementation

As it has shown in Table III, organisations reported more human resources, strategic and contextual difficulties in TQM implementation. Regression analysis showed that lack of employees' commitment to and involvement in the TQM programme, employee resistance, lack of training and staff shortage were the main contributors to the human resource barriers. Management turnover, lack of top management commitment, poor planning and poor leadership were the main strategic barriers to the TQM programme. Poor communication, lack of team orientation and difficulties in changing

organisational culture were the main contextual barriers to implementing the TQM programme. Lack of customer focus, lack of process focus, lack of partnership with suppliers and inappropriate model for implementing change were the main procedural barriers. Lack of resources and inappropriate organisational structure were the main structural obstacles to TQM success.

Correlations between TQM implementation obstacles are displayed in Table IV. The most co-efficiency was between strategic problems and human resources problems. It was expected that those strategic problems lead to a culture which is not receptive to TQM change programme which in turn results in a lack of employees' interest and involvement in the TQM programme and eventually their resistance to the TQM change.

Poor leadership was related to the lack of employees' interest in TQM ($r = 0.293$), lack of training ($r = 0.324$), poor communication ($r = 0.361$) and lack of employees' trust in management ($r = 0.375$). Lack of top-management commitment to quality management leads to poor planning ($r = 0.324$), insufficient training ($r = 0.273$) and lack of employees' empowerment ($r = 0.283$), which results in a lack of employees' involvement in and commitment to the TQM programme ($r = 0.343$) and inappropriate organisational culture ($r = 0.324$). Poor planning was related to difficulties in developing an appropriate organisational culture ($r = 0.353$). Lack of constancy of purpose was related to unrealistic expectations ($r = 0.325$) and ineffective communication ($r = 0.282$).

Barriers to successful TQM implementation in developed and developing countries

Overall developing countries reported more strategic, human resource and structural problems than their counterparts in developed countries (Table V). *t*-Test showed significant differences in human resource barriers ($p = 0.034$) and structural barriers ($p = 0.044$) in developed and developing countries.

Table III.
The frequency and the Mean of TQM implementation problems

TQM problems' categories	Frequency	Mean
Human resources barriers	110	2.04
Strategic barriers	101	1.87
Contextual barriers	52	0.96
Procedural barriers	44	0.81
Structural barriers	39	0.72

Table IV.
Inter-correlations between TQM implementation problems

TQM barriers' categories	Strategic problems	Human resource problems	Contextual problems	Procedural problems
Human resource problems	0.338*	–		
Contextual problems	0.308*	0.090	–	
Procedural problems	0.122	0.052	0.091	–
Structural problems	0.023	0.155	0.047	0.026

Note: *Correlation is significant at the 0.05 level

Lack of employee involvement, lack of training, lack of management support, lack of resources, inappropriate organisational culture, poor leadership and lack of government support were the main barriers to successful TQM implementation in developing countries. Managers in developing countries did not understand the concept of TQM. They considered it as an optional and operational issue rather than a strategic factor. As a result quality was not integrated in functional operations and processes. They used mainly total quality control instead of TQM.

In contrast, lack of training and education lack of top management support, poor leadership, lack of employee involvement and inappropriate organisational culture were the most mentioned barriers to successful TQM implementation in developed countries. British organisations reported more problems with the lack of training, poor leadership, lack of top management support and poor communication. American organisations found lack of training, poor leadership, lack of employees' involvement, lack of top management support and inappropriate organisational culture as the most important reasons for the failure of TQM programmes.

Barriers to successful TQM implementation in manufacturing and service companies

Manufacturing companies reported more difficulties in TQM implementation than service-based companies (Table VI). *t*-test showed significant differences in strategic barriers ($p = 0.046$) in manufacturing and service companies. Lack of training, employee resistance, lack of resources, lack of top management support and poor leadership were the main barriers to successful TQM implementation in manufacturing companies. On the contrary, inappropriate organisational culture, lack of training, lack of top management support, employee resistance, poor leadership, lack of mechanisms for measuring organisation's activities and lack of resources were the most mentioned barriers to TQM implementation in service companies.

TQM problems' categories	Developed countries		Developing countries	
	Frequency	Mean	Frequency	Mean
Human recourses barriers	47	1.68	63	2.42
Strategic barriers	52	1.86	49	1.88
Contextual barriers	30	1.07	22	0.85
Procedural barriers	26	0.93	18	0.69
Structural barriers	15	0.54	24	0.92

Table V.
A comparison of TQM implementation barriers in developed and developing countries

TQM problems' categories	Manufacturing		Service	
	Frequency	Mean	Frequency	Mean
Human recourses barriers	66	2.20	43	1.87
Strategic barriers	64	2.13	37	1.61
Contextual barriers	31	1.03	20	0.87
Procedural barriers	24	0.80	20	0.87
Structural barriers	23	0.76	15	0.65

Table VI.
A comparison of TQM implementation barriers in manufacturing and service companies

Barriers to successful TQM implementation in 1990s and 2000s

It is interesting to note that organisations reported more human resource and structural difficulties in TQM implementation in 2000s than 1990s (Table VII). *t*-Test showed significant differences in human resource barriers between 1990s and 2000s. Lack of top management support, lack of training, lack of employees' involvement, poor leadership and inappropriate organisational culture were the main barriers to successful TQM implementation in 1990s. In contrast, lack of resources, lack of training, lack of employees' involvement, inappropriate organisational culture, poor leadership and lack of top management support were the most mentioned barriers to TQM implementation in 2000s.

Discussion

A gap model was developed using all those mentioned barriers to TQM implementation to identify the main causes of poor quality. Figure 1 shows the gaps that organisations should manage and minimise if intended benefits are to be achieved from their TQM programmes. The model illustrates five types of gaps: information-related gap; plan-related gap; implementation-related gap; and perceptions and expectations-related gaps.

Gap 1 is the gap between management perception of the TQM model and the actual specification of the TQM model. It shows the distance between what the TQM model contains and what managers think the model is. Proper education and training help to narrow this gap down. Gap 2, management perception-plan gap, shows the gap between management perception of the TQM model and the plan designed to implement the model. Adapting the TQM model, proper planning and considering contextual factors help develop a realistic and feasible plan for implementing the TQM model.

Despite careful planning, a TQM initiative can still fail. Gap 3, plan-implementation gap, shows the gap between what the plan says for implementing the TQM model and what actually has been implemented. Management support, education and training, commitment of resources and employees' involvement and commitment are necessary for implementing the plan properly. Gap 4, perceived results-manager's expected results, is the gap between perceived results of implementing the TQM model and managers' expected results from its implementation. Proper planning and effective implementation of the TQM plan helps narrow this gap down. Finally, Gap 5 is the gap between perceived results of implementing the TQM model and the actual TQM model's expectation of the results. A clear understanding of the TQM model, training and education, proper planning and effective implementation of the TQM plan helps narrow this gap down.

The model proposed in Figure 2 helps explain why TQM initiatives succeed or fail in practice (Gap 3). TQM does deliver better performance when an appropriate model of TQM is appropriately implemented in a supportive environment (i.e. supportive

TQM problems' categories	1990s (<i>n</i> = 24)		2000s (<i>n</i> = 25)	
	Frequency	Mean	Frequency	Mean
Human resources barriers	46	1.77	64	2.29
Strategic barriers	55	2.12	46	1.64
Contextual barriers	27	1.04	25	0.89
Procedural barriers	21	0.81	23	0.82
Structural barriers	13	0.50	26	0.93

Table VII.
A comparison of TQM implementation barriers in 1990s and 2000s

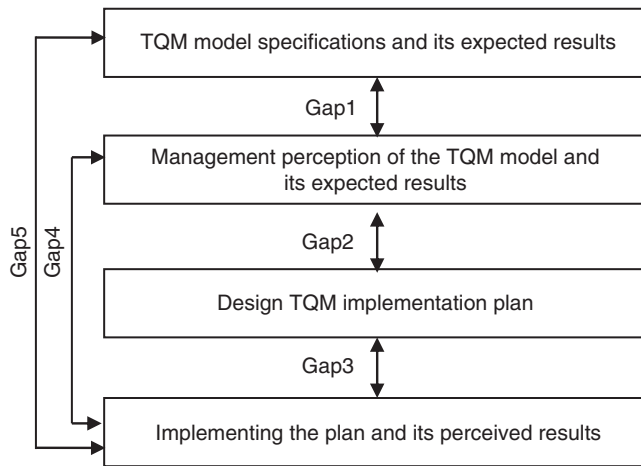


Figure 1.
A gap model for TQM implementation

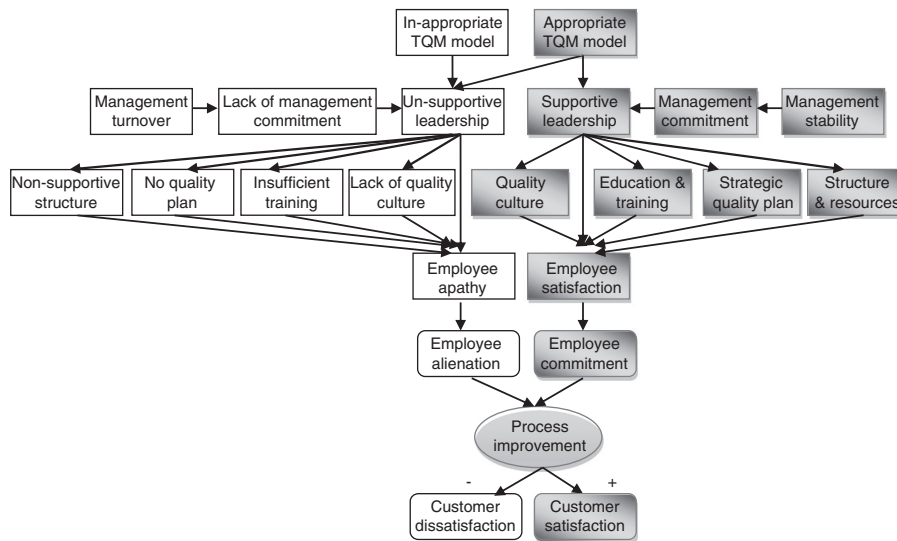


Figure 2.
Factors causing TQM success or failure

infrastructure, appropriate leadership and quality culture). This can be shown in the following equation:

$$\begin{aligned}
 & \textit{Effective TQM model} + \textit{Effective implementation method} \\
 & + \textit{Supportive environment} = \textit{Improved quality of} \\
 & \quad \quad \quad \textit{products and services}
 \end{aligned}$$

Variables identified in this study are connected by arrows indicating the sequence of influences resulting in process improvement and enhanced customer satisfaction. Many of the obstacles identified in this study that hinder TQM efforts are leadership factors, or strongly influenced by leadership. Top management involvement and continuous support through setting goals, training, creating a quality culture and

allocating resources improves employee satisfaction, which leads to their commitment to quality improvement which, in turn, affects perceived outcomes resulting from TQM.

Managers must invest in the following five capitals in order to eradicate the above-mentioned obstacles and facilitate the implementation of TQM (Figure 3):

- (1) *Physical capital*: physical capital refers to any non-human asset used in the production of products and services. Quality is not free. High-quality resources are needed to produce/provide high-quality products/services.
- (2) *Human capital*: human capital refers to an employee's knowledge, skill and experience for doing a job well. High-quality empowered employees are critical to producing high-quality products.
- (3) *Cultural capital*: successful TQM implementation requires a significant change in mindsets, attitudes and beliefs of individuals with regard to quality. Education and training, good communication, teamwork, cooperation and collaboration help employees act together more effectively, pursue shared objectives and produce quality products/services.
- (4) *Social capital*: social capital refers to people obligation, responsibility and accountability to society and human beings. Managers and employees must be accountable for the quality of products/services produced or delivered. Producing high-quality products/services should be considered as the corporate social responsibility of the organisation.
- (5) *Leadership capital*: the success of a quality management programme lies in the hands of leaders. Leadership capital refers to the leader's ability to create a quality vision for employees and inspire them to do the right job right from the beginning for ever. Managers should develop their leadership skills and demonstrate their commitment to quality by establishing a shared vision and setting a clear direction for the organisation.

In summary a right model of TQM should be implemented right in a right environment to achieve competitive advantage (the three rights condition). Several critical factors are essential if TQM is to be successfully implemented (see Figure 4). These include the top management support, strategic quality planning, visionary leadership, quality structure, effective management of human resources, training and education, employees' involvement, teamwork, continuous improvement, customer-driven quality, suppliers' partnership, management by fact to solve problems and a TQM culture.

Theoretical implications

From the theoretical point of view, this study contributes to the literature in terms of identifying and ranking obstacles to TQM implementation. TQM does deliver better performance when an appropriate model of TQM is appropriately implemented

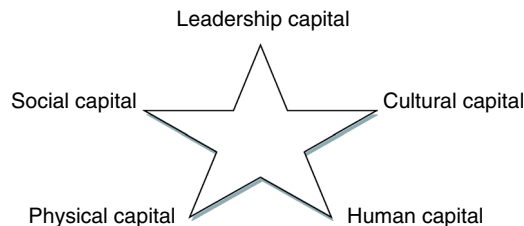


Figure 3.
The quality star

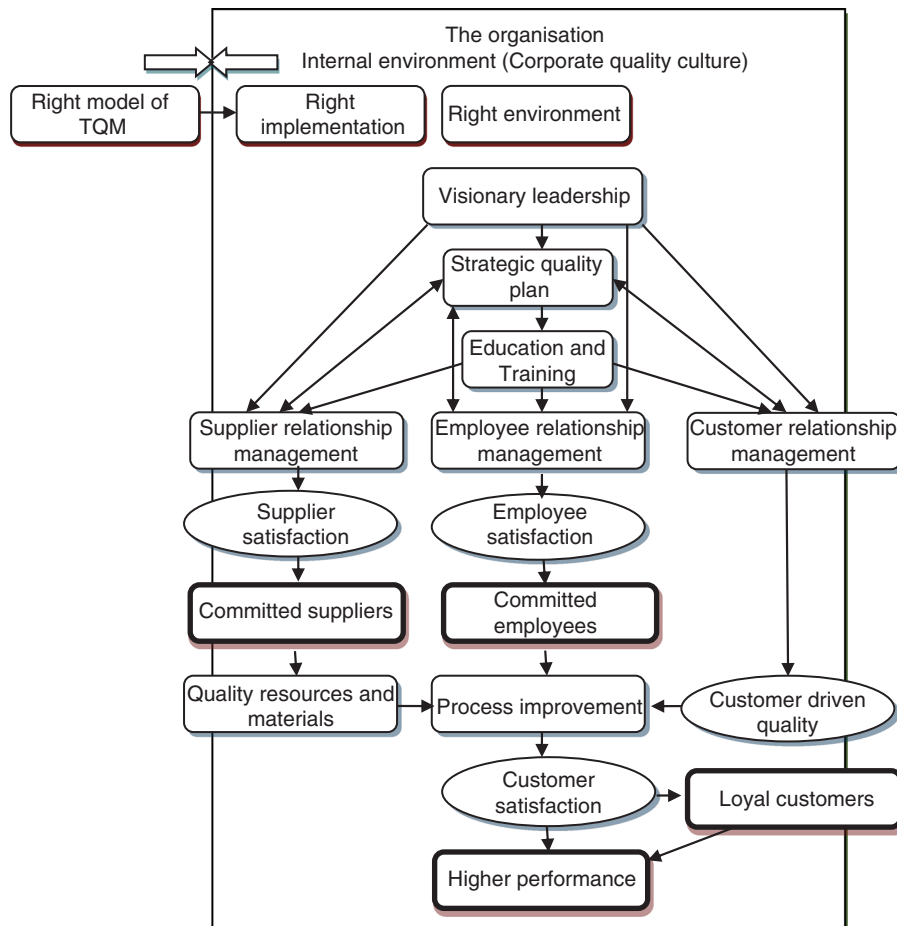


Figure 4. Factors affecting the success of TQM implementation

in a supportive environment (i.e. supportive infrastructure, appropriate leadership and quality culture).

Managerial implications

From a practical point of view, the findings of this study provide managers with a practical understanding of the factors that are likely to obstruct TQM implementation. A thorough understanding of these factors will increase the probability of TQM success by predicting and avoiding those barriers during TQM implementation. Consequently, this provides direction and guidance in developing strategies for an effective and efficient quality management transformation. Managers will be able to plan better TQM strategies that will avoid some of the problems identified here into the implementation of successful TQM initiatives.

Conclusions

This paper uncovers the main impeders to successful TQM implementation in organisations, as well as the issues a quality management model must take into account.

Managers need to be aware of, and address these barriers if the TQM programmes are to have a positive impact on organisational performance. These perceived barriers could be overcome by willingness to change, and strong leadership emphasising planning, training and developing a quality structure and culture.

Limitations and implications for further research

This literature review has examined the last 30 years of TQM implementation literature. One reviewer carried out this literature search, and this may have introduced bias into the search process because only that person's background and experience was applied to the search. The review was limited to articles written in the English languages. Relevant information from books, journals and web sites written in other languages would provide additional valuable information.

References

- Abraham, M. and Crawford, J. (1997), "Quality culture and the management of organization change", *International Journal of Quality & Reliability Management*, Vol. 14 No. 6, pp. 616-636.
- Adebanjo, D. and Kehoe, D. (1998), "An evaluation of quality culture problems in UK companies", *International Journal of Quality Science*, Vol. 3 No. 3, pp. 275-286.
- Ahire, S.L., Golhar, D.Y. and Waller, M.A. (1996), "Development and validation of TQM implementation constructs", *Decision Sciences*, Vol. 27 No. 1, pp. 23-56.
- Alas, R. (2007), "Reactions to organizational change from the institutional perspective: the case of Estonia", *Problems and Perspectives in Management*, Vol. 5 No. 3, pp. 19-31.
- Alexander, J.A., Weiner, B.J., Shortell, S.M. and Baker, L.C. (2007), "Does quality improvement implementation affect hospital quality of care?", *Hospital Topics*, Vol. 85 No. 2, pp. 3-12.
- Al-Khalifa, K.N. and Aspinwall, E.M. (2000), "The development of total quality management in Qatar", *The TQM Magazine*, Vol. 12 No. 3, pp. 194-204.
- Amar, K. and Mohd Zain, Z. (2002), "Barriers to implementing TQM in Indonesian manufacturing organisations", *The TQM Magazine*, Vol. 14 No. 6, pp. 367-372.
- Andrews, J., Cameron, H. and Harris, M. (2008), "All change? Managers' experience of organizational change in theory and practice", *Journal of Organizational Change Management*, Vol. 21 No. 3, pp. 300-314.
- Anjard, R.P. (1995), "Keys to successful TQM training and implementation", *Training for Quality*, Vol. 3 No. 1, pp. 14-22.
- Appelbaum, S.A., Close, T.G. and Klasa, S. (1999), "Downsizing: an examination of some successes and more failures", *Management Decision*, Vol. 37 No. 5, pp. 424-437.
- Atkinson, P.E. (1990), *Creating Culture Change: The Key to Successful Total Quality Management*, IFS Publications, Bedford.
- Baidoun, S. (2003), "An empirical study of critical factors of TQM in Palestinian organizations", *Logistics Information Management*, Vol. 16 No. 2, pp. 156-171.
- Bak, C. (1992), "Lessons from veterans of TQM", *Canadian Business Review*, Vol. 19 No. 4, pp. 17-19.
- Bayazit, O. (2003), "Total quality management in Turkish manufacturing organisations", *The TQM magazine*, Vol. 15 No. 5, pp. 345-350.
- Becker, S.W., Golomski, W.A.J. and Lory, D.C. (1994), "TQM and organization of the firm: theoretical and empirical perspectives", *Quality Management Journal*, Vol. 1 No. 2, pp. 18-24.

- Beer, M. (2003), "Why total quality management programs do not persist: the role of management quality and implications for leading a TQM transformation", *Decision Sciences*, Vol. 34 No. 4, pp. 623-642.
- Beskese, A. and Cebeci, U. (2001), "Total quality management and ISO 9000 applications in Turkey", *The TQM Magazine*, Vol. 13 No. 1, pp. 69-73.
- Besterfield, D. (1994), *Quality Control*, 4th ed., Prentice Hall, Englewood Cliffs, NJ.
- Bhat, K.S. and Rajashekhar, J. (2009), "An empirical study of barriers to TQM implementation in Indian industries", *The TQM Journal*, Vol. 21 No. 3, pp. 261-272.
- Brah, S.A., Tee, S.L. and Rao, B.M. (2002), "Relationship between TQM and performance of Singapore companies", *International Journal of Quality & Reliability Management*, Vol. 19 No. 4, pp. 356-379.
- Brown, M.G. (1993), "Why does total quality fail in two out of three tries?", *Journal for Quality and Participation*, Vol. 16 No. 2, pp. 80-84.
- Brown, M.G., Hitchcock, D.E. and Willard, M.L. (1994), "Why TQM fails and what to do about it", *Small Business Reports*, Vol. 19 No. 7, pp. 58-60.
- Burcher, P.G., Lee, G.L. and Waddell, D. (2010), "Quality lives on: quality initiatives and practices in Australia and Britain", *The TQM Journal*, Vol. 22 No. 5, pp. 487-498.
- Burrows, P. (1992), "TQM reality check: it works, but it's not cheap or easy", *Electronic Business*, Vol. 18 No. 1, pp. 47-54.
- Cao, G., Clarke, S. and Lehaney, B. (2000), "A systemic view of organisational change and TQM", *TQM Magazine*, Vol. 12 No. 3, pp. 186-193.
- Carman, J.M., Shortell, S.M., Foster, R.W., Hughes, E.F., Boerstler, H., O'Brien, J.L. and O'Connor, E.J. (1996), "Keys for successful implementation of total quality management in hospitals", *Health Care Management Review*, Vol. 21 No. 1, pp. 48-60.
- Carter, E. (2008), "Successful change requires more than change management", *The Journal for Quality and Participation*, Vol. 31 No. 1, pp. 20-23.
- Cenek, R.E. (1995), "Why improvement efforts fail and what to do about it", *Journal for Quality and Participation*, Vol. 18 No. 1, pp. 66-75.
- Cicmil, S. and Kekäle, T. (1997), "Implications of organizational and individual learning for effective change management in education", *The Journal of Workplace Learning*, Vol. 9 No. 5, pp. 169-176.
- Claver, E., Gasco, J., Llopis, J. and Gonzalez, R. (2001), "The strategic process of a cultural change to implement total quality management: a case study", *Total Quality Management*, Vol. 12 No. 4, pp. 469-482.
- Claver, E., Tari, J.J. and Molina, J.F. (2003), "Critical factors and results of quality management: an empirical study", *Total Quality Management*, Vol. 14 No. 11, pp. 91-118.
- Cole, R.E. (1995), *The Death and Life of the American Quality Movement*, Oxford University Press, New York, NY.
- Cooney, R. and Sohal, A. (2003), "The human side of total quality management", in Holman, D., Wall, T., Clegg, C., Sparrow, P. and Howard, A. (Eds), *The New Workplace: A Guide to the Human Impact of Modern Working Practices*, Wiley, Indianapolis.
- Crosby, P. (1989), *Let's Talk Quality: 96 Questions that you Always Wanted to Ask Phil Crosby*, McGraw-Hill, New York, NY.
- Cummings, T.G. (1995), "From programmed change to self design: learning how to change organisations", *Organization Development Journal*, Vol. 13 No. 4, pp. 20-31.
- Dale, B., Cooper, C. and Wilkinson, A. (1997), *Managing Quality and Human Resources: A Guide to Continuous Improvement*, Blackwell Publishers, Oxford.

- Dayton, N.A. (2001), "Total quality management critical success factors, a comparison: the UK versus the USA", *Total Quality Management*, Vol. 12 No. 3, pp. 293-298.
- Deming, W.E. (1986), *Out of the Crisis*, Cambridge University Press, Cambridge, MA.
- Douglas, T.J. and Judge, W.Q. (2001), "Total quality management implementation and competitive advantage: the role of structural control and exploration", *The Academy of Management Journal*, Vol. 44 No. 1, pp. 158-169.
- Easton, G.S. (1993), "The 1993 state of US total quality management: a Baldrige examiner's perspective", *California Management Review*, Vol. 35 No. 3, pp. 32-54.
- Elmuti, D., Kathawala, Y. and Manippallil, M. (1996), "Are total quality management programmes in higher education worth the effort?", *International Journal of Quality & Reliability Management*, Vol. 13 No. 6, pp. 29-44.
- Eskildson, L. (1994), "Improving the odds of TQM's success", *Quality Progress*, Vol. 27 No. 4, pp. 61-63.
- Flynn, B.B., Schroeder, R.G. and Sakakibara, S. (1994), "A framework for quality management research and an associated measurement instrument", *Journal of Operations Management*, Vol. 11 No. 4, pp. 339-366.
- Gatchalian, M. (1997), "People empowerment: the key to TQM success", *The TQM Magazine*, Vol. 9 No. 6, pp. 429-433.
- Ghobadian, A. and Gallear, D. (1997), "TQM and organization size", *International Journal of Operations & Production Management*, Vol. 17 No. 2, pp. 121-163.
- Goldman, H.H. (2005), "The origins and development of quality initiatives in American business", *The TQM Magazine*, Vol. 17 No. 3, pp. 217-225.
- Hackman, J.R. and Wageman, R. (1995), "Total quality management: empirical, conceptual, and practical issues", *Administrative Science Quarterly*, Vol. 40 No. 2, pp. 309-342.
- Hansson, J. and Eriksson, H. (2002), "The impact of TQM on financial performance", *Measuring Business Excellence*, Vol. 6 No. 4, pp. 44-54.
- Hansson, J. and Klefsjo, B. (2003), "A core value model for implementing total quality management in small organisations", *The TQM Magazine*, Vol. 15 No. 2, pp. 71-81.
- Harari, O. (1997), "Ten reasons why TQM doesn't work", *Management Review*, Vol. 86 No. 1, pp. 38-44.
- Harrington, D. and Williams, B. (2004), "Moving the quality effort forward: the emerging role of the middle manager", *Managing Service Quality*, Vol. 14 No. 4, pp. 297-306.
- Hendricks, K.B. and Singhal, V.R. (1997), "Does implementing an effective TQM programme actually improve operating performance? Empirical evidence from firms that have won quality awards", *Management Science*, Vol. 43 No. 9, pp. 1258-1274.
- Hendricks, K.B. and Singhal, V.R. (2001), "Firm characteristics, total quality management and financial performance", *Journal of Operations Management*, Vol. 19 No. 3, pp. 269-285.
- Hiatt, J.M. and Creasey, T.M. (2003), *Change Management: The People Side of Change*, Prosci Learning Centre Publications.
- Hill, S. (1991), "Why quality circles failed but total quality management might succeed", *British Journal of Industrial Relations*, Vol. 29 No. 4, pp. 541-568.
- Hill, S. and Wilkinson, A. (1995), "In search of TQM", *Employee Relations*, Vol. 17 No. 3, pp. 8-25.
- Hoag, B.G., Ritschard, H.V. and Cooper, C.L. (2002), "Obstacles to effective organization change: the underlying reasons", *Leadership & Organisation Development Journal*, Vol. 23 No. 1, pp. 6-15.
- Hubiak, W.A. and O'Donnell, S.J. (1996), "Do Americans have their minds set against TQM?", *National Productivity Review*, Vol. 15 No. 3, pp. 19-32.

- Huq, Z. (2005), "Managing change: a barrier to TQM implementation in service industries", *Managing Service Quality*, Vol. 15 No. 5, pp. 452-469.
- Hutton, D.W. (1992), "TQM: Sustaining the momentum", *Quality Progress*, Vol. 25 No. 12, pp. 45-47.
- Jabnoun, N. (2005), "Organizational structure for customer-oriented TQM: an empirical investigation", *The TQM Magazine*, Vol. 17 No. 3, pp. 226-236.
- Jacobsen, J. (2008), "Avoiding mistakes of the past: lessons learned on what makes or breaks quality initiatives", *The Journal for Quality and Participation*, Vol. 31 No. 2, pp. 4-9.
- Jaehn, A.H. (2000), "Requirements for total quality leadership", *Intercom*, Vol. 47 No. 10, pp. 38-39.
- James, E. (1992), "Identifying the benefits of TQM projects", *International Journal of Health Care Quality Assurance*, Vol. 5 No. 4, pp. 14-16.
- Joss, R. and Kogan, M. (1995), *Advancing Quality: Total Quality Management in the National Health Service*, Open University Press, Buckingham.
- Judge, T.A., Thoresen, C.J., Pucik, V. and Welbourne, T.M. (1999), "Managerial coping with organizational change: a dispositional perspective", *Journal of Applied Psychology*, Vol. 84 No. 1, pp. 107-122.
- Jun, M., Cai, S.H. and Peterson, R.T. (2004), "Obstacles to TQM implementation in Mexico's Maquiladora industry", *Total Quality Management and Business Excellence*, Vol. 15 No. 1, pp. 59-72.
- Juran, J. (1988), *Quality Control Handbook*, 4th ed., McGraw-Hill, New York, NY.
- Juran, J.M. (1991), *Juran on Quality by Design*, Free Press, New York, NY.
- Juran, J.M. and Gryna, F.M. (1993), *Quality Planning and Analysis*, 3rd ed., McGraw-Hill Inc, New York, NY.
- Kaynak, H. (2003), "The relationship between total quality management and their effects on firm performance", *Journal of Operations Management*, Vol. 21 No. 4, pp. 405-435.
- Kearney, A.T. (1992), *Total Quality – Time to take off the Rose-Tinted Spectacles*, IFS Publications, London.
- Khan, M.A. (2011), "An empirical study of barriers in implementing total quality management in service organizations in Pakistan", *Asian Journal of Business Management Studies*, Vol. 2 No. 4, pp. 155-161.
- Kotter, J.P. (1995), "Leading change: why transformation efforts fail", *Harvard Business Review*, Vol. 73 No. 2, pp. 59-66.
- Kujala, J. and Lillrank, P. (2004), "Total quality management as a cultural phenomenon", *Quality Management Journal*, Vol. 11 No. 4, pp. 43-55.
- Lawrence, D.M. and Early, J.F. (1992), "Strategic leadership for quality in healthcare", *Quality Progress*, Vol. 25 No. 4, pp. 45-48.
- Lee, S., Choi, K.S., Kang, H.Y. and Chae, Y.M. (2002), "Assessing the factors influencing continuous quality improvement implementation: experience in Korean hospitals", *International Journal for Quality in Health Care*, Vol. 14 No. 5, pp. 383-391.
- Longenecker, C.O. and Scazzero, J.A. (1996), "The ongoing challenge of total quality management", *The TQM Magazine*, Vol. 8 No. 2, pp. 55-60.
- Longenecker, C.O., Simonetti, J.L. and Sharkey, T.W. (1999), "Why organizations fail: the view from the front-line", *Management Decision*, Vol. 37 No. 6, pp. 503-513.
- McNabb, D.E. and Sepic, F.T. (1995), "Culture, climate, and total quality management: measuring readiness for change", *Public Productivity and Management Review*, Vol. 18 No. 4, pp. 369-385.
- McWilliam, C.L. and Ward-Griffin, C. (2006), "Implementing organizational change in health and social services", *Journal of Organizational Change Management*, Vol. 19 No. 2, pp. 119-135.

- Mandal, P., Love, P.E., Sohal, A.S. and Bhadury, B. (2000), "The propagation of quality management concepts in the Indian manufacturing industry: some empirical observations", *The TQM Magazine*, Vol. 12 No. 3, pp. 205-211.
- Manz, C.C. and Sims, H.P. (1993), *Business without Bosses*, John Wiley, New York, NY.
- Martin, P.K. (1992), "The missing piece of the total quality puzzle", *Training*, Vol. 29 No. 9, pp. 90-91.
- Mellahi, K. and Eyuboglu, F. (2001), "Critical factors for successful total quality management implementation in Turkey: evidence from the banking sector", *Total Quality Management & Business Excellence*, Vol. 12 No. 6, pp. 745-756.
- Moreno-Lozon, M.D. and Peris, F.J. (1998), "Strategic approach, organizational design and quality management", *International Journal of Quality Science*, Vol. 3 No. 4, pp. 328-347.
- Morgan, C. and Murgatroyd, S. (1994), *Total Quality Management in the Public Sector*, Open University Press, Buckingham.
- Morrell, K.M., Loan-Clarke, J. and Wilkinson, A.J. (2004), "Organisational change and employee turnover", *Personnel Review*, Vol. 33 No. 2, pp. 161-173.
- Morris, T., Lydka, H. and O'Creevy, M. (1993), "Can commitment be managed? A longitudinal analysis of employee commitment and human resource policies", *Human Resource Management Journal*, Vol. 3 No. 3, pp. 21-42.
- Mosadeghrad, A.M. (2005), "A survey of total quality management in Iran: barriers to successful implementation in health care organisations", *International Journal of Health Care Quality Assurance incorporating Leadership in Health Services*, Vol. 18 No. 3, pp. 12-34.
- Mosadeghrad, A.M. (2006), "The impact of organisational culture on the successful implementation of total quality management", *TQM Magazine*, Vol. 18 No. 6, pp. 606-625.
- Mosadeghrad, A.M., Ferlie, E. and Rosenberg, D. (2008), "A study of relationship between job satisfaction, organisational commitment and turnover intention among hospital employees", *Health Services Management Research*, Vol. 21 No. 4, pp. 211-227.
- Mueller, F. and Carter, C. (2005), "The scripting of total quality management within its organizational biography", *Organization Studies*, Vol. 26 No. 2, pp. 221-247.
- Newall, D. and Dale, B.G. (1991), "The introduction and development of a quality improvement process: a study", *International Journal of Production Research*, Vol. 29 No. 9, pp. 1747-1760.
- Ngai, E.W. and Cheng, T.C. (1997), "Identifying potential barriers to total quality management using principal component analysis and correspondence analysis", *International Journal of Quality & Reliability Management*, Vol. 14 No. 4, pp. 391-408.
- Oakland, J. (2000), *TQM: Text With Cases*, 2nd ed., Butterworth-Heinemann, Oxford.
- O'Brien, J.L., Shortell, S.M., Hughes, E.F., Foster, R.W., Carman, J.M., Boerstler, H. and O'Connor, E.J. (1995), "An integrated model for organisation-wide quality improvement: lessons from the field", *Quality Management in Health Care*, Vol. 3 No. 4, pp. 19-30.
- Parker, P. and Slaughter, J. (1993), "Should the labour movement buy TQM?", *Journal of Organizational Change Management*, Vol. 6 No. 4, pp. 43-56.
- Peters, T. and Waterman, R. (1982), *In Search of Excellence: Lessons from America's Best Run Companies*, Harper and Rowe, New York, NY.
- Psychogios, A.G. and Priporas, C.V. (2007), "Understanding total quality management in context: qualitative research on managers' awareness of TQM aspects in the Greek service industry", *The Qualitative Report*, Vol. 12 No. 1, pp. 40-66.
- Pun, K.F. and Jaggernath-Furlonge, S. (2012), "Impacts of company size and culture on quality management practices in manufacturing organisations: an empirical study", *The TQM Journal*, Vol. 24 No. 1, pp. 83-101.

- Raja, M.P.N., Deshmukh, S.G. and Wadhwa, S. (2007), "Quality award dimensions: a strategic instrument for measuring health service quality", *International Journal of Health Care Quality Assurance*, Vol. 20 No. 5, pp. 363-378.
- Rao, A., Carr, L., Dambolena, I., Kopp, R., Martin, J., Rafii, F. and Schlesinger, P. (1996), *Total Quality Management: A Cross-functional Perspective*, John Wiley and Sons, New York, NY.
- Rao, S.S., Solis, L.E. and Raghunathan, T.S. (1999), "A framework for international quality management research: development and validation of a measurement instrument", *Total Quality Management*, Vol. 10 No. 7, pp. 1047-1075.
- Reichers, A.E., Wanous, J.P. and Austin, J.T. (1997), "Understanding and managing cynicism about organizational change", *Academy of Management Executive*, Vol. 11 No. 1, pp. 48-59.
- Rigby, D. and Bilodeau, B. (2007), "Bain's global 2007 management tools and trends survey", *Strategy & Leadership*, Vol. 35 No. 5, pp. 9-16.
- Salegna, G. and Fazel, F. (2000), "Obstacles to implementing quality", *Quality Progress*, Vol. 33 No. 7, pp. 53-57.
- Saravanan, R. and Rao, K.S.P. (2007), "The impact of total quality service age on quality and operational performance: an empirical study", *TQM Magazine*, Vol. 19 No. 3, pp. 197-205.
- Satia, J. and Dohlie, M.B. (1999), "Achieving total quality management in public health systems", *Journal of Health Management*, Vol. 1 No. 2, pp. 301-322.
- Schneider, B., Brief, A.P. and Guzzo, R.A. (1996), "Creating a climate and culture for sustainable organizational change", *Organizational Dynamics*, Vol. 24 No. 4, pp. 7-19.
- Schonberger, R.J. (1992), "Is strategy strategic? Impact of total quality management on strategy", *Academy of Management Executive*, Vol. 6 No. 3, pp. 80-87.
- Sebastianelli, R. and Tamimi, N. (2003), "Understanding the obstacles to TQM success", *Quality Management Journal*, Vol. 10 No. 3, pp. 45-56.
- Seetharaman, A., Sreenivasan, J. and Boon, L.P. (2006), "Critical success factors of total quality management", *Quality and Quantity*, Vol. 40 No. 5, pp. 675-695.
- Self, D.R. and Schraeder, M. (2009), "Enhancing the success of organizational change: matching readiness strategies with sources of resistance", *Leadership & Organization Development Journal*, Vol. 30 No. 2, pp. 167-182.
- Senge, P.M. (2006), *The Fifth Discipline: The Art & Practice of the Learning Organisation*, Currency Doubleday, New York, NY.
- Sewell, N. (1997), "Continuous quality improvement in acute health care: creating a holistic and integrated approach", *International Journal of Health Care Quality Assurance*, Vol. 10 No. 1, pp. 20-26.
- Shaari, J.A.N. (2010), "Barriers to implement TQM in Japanese way: a study on companies in Malaysia", *International Review of Business Research Papers*, Vol. 6 No. 5, pp. 400-410.
- Shortell, S.M., O'Brien, J.L., Carman, J.M., Foster, R.W., Hughes, E.F., Boerstler, H. and O'Connor, E.J. (1995), "Assessing the impact of continuous quality improvement/total quality management: concept versus implementation", *Health Services Research*, Vol. 30 No. 2, pp. 377-401.
- Sila, I. and Ebrahimpour, M. (2002), "An investigation of the total quality management survey based research published between 1989 and 2000: a literature review", *International Journal of Quality & Reliability Management*, Vol. 19 No. 7, pp. 902-970.
- Singh, P.J. and Smith, A. (2006), "Uncovering the faultiness in quality management", *Total Quality Management*, Vol. 17 No. 3, pp. 395-407.
- Slaight, T.H. (1999), "Strategic sourcing: not a squeeze your vendor process", *Telecommunication*, Vol. 33 No. 3, pp. 59-62.

- Smith, S. (1994), *The Quality Revolution*, Management Books, 2000 Ltd, Didcot.
- Snape, E., Wilkinson, A., Marchington, M. and Redman, T. (1995), "Managing human resources for TQM: possibilities and pitfalls", *Employee Relations*, Vol. 17 No. 3, pp. 42-51.
- Soltani, E., van der Meer, R. and Williams, T.M. (2005a), "A contrast of HRM and TQM approaches to performance management: some evidence", *British Journal of Management*, Vol. 16 No. 3, pp. 211-230.
- Soltani, E., Lai, P. and Gharneh, N.S. (2005b), "Breaking through barriers to TQM effectiveness: lack of commitment of upper-level management", *Total Quality Management*, Vol. 16 Nos 8-9, pp. 1009-1021.
- Stalk, G.P. and Schulman, L.E. (1992), "Competing on capabilities: the new rules of corporate strategy", *Harvard Business Review*, Vol. 70 No. 2, pp. 57-69.
- Strauss, A. and Corbin, J. (1998), *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory*, 2nd ed., Sage, Thousand Oaks, CA.
- Tamimi, N. and Sebastianelli, R. (1998), "The barriers to total quality management", *Quality Progress*, Vol. 31 No. 6, pp. 57-60.
- Tata, J. and Prasad, S. (1998), "Cultural and structural constraints on total quality management implementation", *Total Quality Management and Business Excellence*, Vol. 9 No. 8, pp. 703-710.
- Taylor, W.A. and Wright, G.H. (2003), "The impact of senior managers' commitment on the success of TQM programmes: an empirical study", *International Journal of Manpower*, Vol. 24 No. 5, pp. 535-550.
- Vakola, M. and Nikolaou, I. (2005), "Attitudes towards organizational change: what is the role of employees' stress and commitment?", *Employee Relations*, Vol. 27 No. 2, pp. 160-174.
- Venkatraman, S. (2007), "A framework for implementing TQM in higher education programs", *Quality Assurance in Education*, Vol. 15 No. 1, pp. 92-112.
- Wakefield, B.J., Blegen, M.A., Uden Holman, T., Vaughn, T., Chrischilles, E. and Wakefield, D.S. (2001), "Organizational culture, continuous quality improvement, and medication administration error reporting", *American Journal of Medical Quality*, Vol. 16 No. 4, pp. 128-134.
- Walston, S.L., Burton, L.R. and Kimberley, J.R. (2000), "Does engineering really work? An examination of the context and outcomes of hospital reengineering initiatives", *Health Services Research*, Vol. 34 No. 1, pp. 1363-1388.
- Wanberg, C.R. (2000), "Predictors and outcomes of openness to changes in a reorganizing workplace", *Journal of Applied Psychology*, Vol. 85 No. 1, pp. 132-142.
- Weisbord, M.R. (1992), *Discovering Common Ground*, Berrett-Koehler, San Francisco, CA.
- Wellburn, J. (1996), "A TQM life cycle case study", *The TQM Magazine*, Vol. 8 No. 3, pp. 35-45.
- Wilkinson, A. (1992), "The other side of quality: soft issues and the human resource dimension", *Total Quality Management*, Vol. 3 No. 3, pp. 323-329.
- Williamson, G.R. and Prosser, S. (2002), "Action research: politics, ethics and participation", *Journal of Advanced Nursing*, Vol. 40 No. 5, pp. 587-593.
- Wimalasiri, J.S. and Kouzmin, A. (2000), "A comparative study of employee involvement initiatives in Hong Kong and the USA", *International Journal of Manpower*, Vol. 21 No. 8, pp. 614-634.
- Wuagneux, D. (2002), "Quality from the inside out", *Quality Progress*, Vol. 35 No. 4, pp. 60-65.
- Zairi, M. and Matthew, A. (1995), "An evaluation of TQM in primary care: in search of best practice", *International Journal of Health Care Quality Assurance*, Vol. 8 No. 6, pp. 4-13.
- Zhang, Z., Waszink, A. and Wijngaard, J. (2000), "An instrument for measuring TQM implementation for Chinese manufacturing companies", *International Journal of Quality and Reliability Management*, Vol. 17 No. 7, pp. 730-755.

Further reading

- Tapiero, C.S. (1996), *The Management of Quality and its Control*, Chapman & Hall, London.
- Wacker, K.A. (1993), "Uncommon common sense", *Quality Progress*, Vol. 26 No. 7, pp. 97-100.
- Whalen, M.J. and Rahim, M.A. (1994), "Common barriers to implementation and development of a TQM programme", *Industrial Management*, Vol. 36 No. 2, pp. 19-22.

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