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# An AHP based study of critical factors for TQM implementation in Shanghai manufacturing industries

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## Abstract

In recent years, many organizations have looked upon continuous improvement and total quality management (TQM) as the means by which they could maintain a competitive edge. This paper investigates the critical factors and sub-factors that determine the adoption and implementation of TQM in the state-owned enterprises (SOEs) and foreign joint ventures (FJVs) in China with particular reference to the Shanghai manufacturing industries. It incorporates the main findings of a recent study, in which an analytic hierarchy process (AHP) approach was employed to prioritize the relative importance of four critical factors and sixteen sub-factors among SOEs and FJVs in China. The findings advocate that these enterprises would stress the *soft* TQM factors of organizing, and culture and people rather than the *hard* TQM factors of the systems, techniques and measurement, and feedback. Top management commitment, leadership, education and training are among the most important sub-factors. The results suggest a generic hierarchy model for organizations to prioritize the critical factors and formulate strategies for implementing TQM in Shanghai, as well as other cities and regions in China.

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*Keywords:* Total quality management; Analytic hierarchy process

## 1. Introduction

Total quality management (TQM) is often regarded as a philosophy that aims to achieve customer satisfaction through continuous improvement and teamwork (Dean and Bowen, 1994). The transformation towards TQM is coupled with its spread, from the manufacturing to the service sector and onto public services (Dale, 1999). Implementation of TQM becomes a top management agenda in many organizations in the pursuit of positive business benefits, such as better product quality, higher customer satisfaction and less quality costs. Some recent studies advocated that many organizations launched TQM programs have gained any positive results (Hua et al., 2000; Miller, 1992; Pun, 2001). There have been sev-

eral approaches and models suggested for the TQM introduction and implementation (Dale, 1999; NIST, 2000; Tan, 1997). This paper presents the main findings of a recent study that investigated the critical success factors affecting the implementation of TQM in organizations in Mainland China with particular reference to the manufacturing sector in Shanghai. The Shanghai manufacturing industries had undergone fast pace economic developments with significant efforts of the state-owned enterprises (SOEs) and the foreign joint ventures (FJVs). This study attempted to identify the critical factors and sub-factors for these organizations to implement TQM using the analytic hierarchy process (AHP) approach. Based on two evaluator groups from SOEs and FJVs, the relative weights of individual factors were computed. A generic hierarchy model was elaborated to help prioritize these factors and formulate strategies for TQM implementation in China.

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## 2. Critical factors of TQM implementation

Implementing TQM needs to be a totally integrated, continuous and open system based on the commitment from top management and employees, as well as the communication with customers (Chin et al., 2000; Tan, 1997). An exhaustive list of critical factors consolidated from literature review on TQM implementation is depicted in Table 1. For facilitating discussions, they are divided into four categories of factors or elements, namely, organizing (OG), systems and techniques (ST), measurement and feedback (MF), and culture and people (CP). Both OG and CP categories represent the *soft* factors, while ST and MF are the *hard* factors of TQM implementation. Each category of factors has several sub-factors as elaborated later.

### 2.1. Organizing

This factor involves aligning a TQM program with an organization's strategic planning (SP) and providing associated plans and means that are necessary to introduce and promote continuous improvement. *Organizing* (OG) requires top management leadership and commitment, promotes the participation of employees, and provides company-wide education and training. Being its sub-factor, *strategic planning* functions as a vehicle to integrate quality requirements with business activities of an organization so that total quality is reflected in its corporate vision, mission and strategy statements (Crosby, 1979; Deming, 1986; Juran, 1986). The plan should match the organization's strategic directions, and optimize the use of resource and ensure the availability of trained employees for TQM implementation. This helps identify customers' and other stakeholders' requirement, estimate the organization's current position against its competitors in the market, and then design and deploy a strategic plan into specific activities within the organization. *Leadership* associated with clear vision and directions can foster knowledge sharing and generate commitment (NIST, 2000). Deming (1986) urges managers to institute leadership to usher the quality transformation process. Palermo and Watson (1993)

argue that leaders should exhibit role model behavior, establish clear objectives and create a supportive environment. *Education and training* is another sub-factor that provides employees with the knowledge and skills to meet their overall work and personal objective. If carried out consistently and reinforced in the workplace by being real time updating, education and training can form a solid base for continuous improvement (James, 1996). Furthermore, Grosby (1979) stresses *top management commitment* as the essential element for safeguarding TQM implementation. In order to communicate quality strategy across the organization, top management should create an organizational environment that focuses on continuous improvement. Their commitment promotes the creation of clear and visible quality values, along with a management system to guide all activities of the company towards quality excellence (Rao et al., 1997).

### 2.2. Systems and techniques

TQM embraces a wide range of systems, approaches, techniques and tools. *Systems and techniques* are also critical factors that have their own role in quality management. Dale and Lascelles (1990) argue that, because of the variety of starting points and motivations for continuous improvement, it is impossible to identify a unique implementation plan detailed clarifying the order in which particular *tools and techniques* should be used. Bunney and Dale (1997) add that they should be selectively used according to the different stages of quality management in an organization. *Process analysis and improvement* is another sub-factor that helps organizations evaluate the achievements of predicted results and monitor continuous improvement efforts moving to the right direction. Organizations should develop their quality philosophy, policy, procedures and objectives, and acquire information from employees, customers, suppliers and competitors (Ishikawa, 1985; Deming, 1986; Juran, 1986; McManus, 1994). If a *quality system* already exists, periodical assessments of its organizational performance are then vital to continuously improve the system (Ho, 1995; Karapetrovic and

Table 1  
Critical factors and sub-factors of TQM implementation

Factors	Organizing	Systems and techniques	Measurement and feedback	Culture and people
Sub-factors	1. Strategic planning	1. Tools and techniques	1. Internal performance measurement	1. Existing organizational culture
	2. Leadership	2. Quality system	2. External performance measurement	2. Culture change
	3. Education and training	3. Process analysis and improvement	3. Communication	3. Employee involvement
	4. Top management commitment	4. Supplier chain management	4. Recognition and rewards	4. Human resource development

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