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# Mapping the critical links between organizational culture and TQM/Six Sigma practices

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## ABSTRACT

This study investigates how organizational culture influences the implementation of different practices incorporated in the recent Six Sigma approach as well as those associated with traditional total quality management (TQM). We employed the competing values framework to capture the underlying value orientations of organizational culture. Using survey data collected from 226 US manufacturing plants, the relationships between four culture types and 10 TQM/Six Sigma practices were examined via the structural equation modeling technique. The results reveal the differential effects of the culture types on the implementation of TQM/Six Sigma practices. The implications of the links between different cultures and different TQM/Six Sigma practices are discussed. While the relationship between TQM practices and culture has been the subject of prior research, this is the first look at the relationship between organizational culture and a comprehensive set of quality management practices including the new Six Sigma practices. The understanding of the advantage of each culture type should help managers achieve effective implementation of TQM/Six Sigma practices from a holistic perspective of both quality management and culture.

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## 1. Introduction

Improving the quality of products and services is fundamental to a firm's business success. In an attempt to improve quality, firms have pursued many continuous improvement programs, most notably total quality management (TQM) and more recently, Six Sigma. As companies such as Motorola, General Electric, Honeywell, Sony, Caterpillar, and Johnson Controls claimed substantial financial benefits from their investments in Six Sigma, the adoption of Six Sigma showed an upward trend in industry (Desai, 2006). However, despite the claimed benefits from TQM and Six Sigma implementation, there are numerous reports of problems in the process of implementing them (e.g., Ahire and Ravichandran, 2001;

Gijo and Rao, 2005; Sila, 2007; Szeto and Tsang, 2005). In order to better understand whether and how quality management approaches affect organizational performance, it is important to study the organizational contexts in which these approaches are implemented (Sousa and Voss, 2002).

An appropriate organizational culture is widely considered a necessity for successful implementation of TQM (Buch and Rivers, 2001; Lagrosen, 2003; Lewis, 1996; Prajogo and McDermott, 2005) and Six Sigma (Antony and Banuelas, 2002; Cheng, 2007; Kwak and Anbari, 2004). While the impact of organizational culture on TQM has been extensively studied in the literature, little research has been done to examine the implementation of Six Sigma relative to culture, despite the recognized importance of organizational culture for Six Sigma adoption and deployment (Antony, 2004; Goffnett, 2004). Recently, Schroeder et al. (2008) have called for

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research investigating the question of internal fit in Six Sigma implementation, i.e., what types of organizations can successfully adopt Six Sigma and what changes in culture and structure may be required.

This study investigates the influence of the organizational context on individual quality management practices by empirically examining the links between different culture types and different TQM/Six Sigma practices. In addition to the traditional TQM practices, this study includes three distinctive Six Sigma practices that are identified as essential in applying Six Sigma principles and methods, which addresses the lack of empirical research on Six Sigma and its implementation in the literature. The results of this study can provide an up-to-date view of the effect of culture on quality management and supply managers with more pertinent information and guidance. Moreover, when examining the culture–quality management relationship, this study conducts a comprehensive assessment of different cultural characteristics. Most prior studies have focused on the effects of people- and flexibility-focused cultural characteristics on quality management, but “there has been little effort to synthesize what dimensions of culture have been studied to date or, more important, to identify which of these culture dimensions are more related to the implementation of change programs and subsequent improvements in important human and organizational outcomes” (Detert et al., 2000, p. 850). This study adopts the competing values framework (CVF) of culture to capture the underlying value orientations of an organization’s culture. This culture framework has been widely used to examine the relationship of different culture types and organizational practices. In this study, we seek to analyze in detail, how different culture types as defined in the CVF model affect the implementation of various TQM/Six Sigma practices in order to produce guidelines on how to better implement the TQM/Six Sigma practices in an organization according to its specific cultural environment.

## 2. Literature review

The literature review is presented in three sections. It starts with a description of TQM and Six Sigma and their key practices. This is followed by a section discussing organizational culture and the CVF model that is used to assess different culture types in this study. The third section discusses the relationship between organizational culture and quality management.

### 2.1. TQM and Six Sigma practices

TQM is among the most prominent operations management approaches in the 20th century (Ahire and Ravichandran, 2001). An enormous amount of research has been done on TQM practices and their effects on organizational performance. Several studies by Sousa and Voss (2002), Kaynak (2003), and Nair (2006) have demonstrated that in the quality management literature there is substantial agreement as to what are the key TQM practices. Based on a review of empirical studies on TQM,

we examine seven TQM practices in this study, those being top management support, customer relationship, supplier relationship, workforce management, quality information, product/service design, and process management.

Treading in the steps of TQM, Six Sigma is a new approach to quality management (Su et al., 2006; Kumar et al., 2008). Six Sigma was initiated by Motorola Inc. in the 1980s and has been defined as “an organized and systematic method for strategic process improvement and new product and service development that relies on statistical methods and the scientific method to make dramatic reductions in customer defined defect rates” (Linderman et al., 2003, p. 195). Some argue that Six Sigma is just a repackaging of TQM (e.g., Stamatis, 2000) and that “TQM makes many of the same claims that Six Sigma makes and with some justification” (Flott, 2000, p. 43). However, recent research suggests that Six Sigma introduces new and distinct concept and practices into quality management. In a grounded-theory-based search for the essence of Six Sigma, Schroeder et al. (2008) argued that although Six Sigma shares the tools and techniques with traditional quality management methods, it provides an organizational structure not previously seen. They suggested that Six Sigma presents “an organized, parallel-meso structure to reduce variation in organizational processes by using improvement specialists, a structured method, and performance metrics with the aim of achieving strategic objectives” (Schroeder et al., 2008, p. 5). In addition, Zu et al. (2008) empirically identified three distinctive practices essential for applying Six Sigma principles and methods, which are Six Sigma role structure, Six Sigma structured improvement procedure, and Six Sigma focus on metrics. Other research about the critical success factors for Six Sigma implementation also supports the existence of these Six Sigma practices (e.g., Nonthaleerak and Hendry, 2008; Szeto and Tsang, 2005). People suggest that Six Sigma should be integrated with TQM to produce synergistic effects on quality improvement (e.g., Ferng and Price, 2005; Revere and Black, 2003; Ricondo and Viles, 2005; Yang, 2004). As found by Zu et al. (2008), the three Six Sigma practices complement the traditional TQM practices in improving quality. Therefore, in this study we include the three Six Sigma practices as well as the seven TQM practices in the analysis to provide a comprehensive assessment of the cultural effect on contemporary quality management practices. The Appendix presents a brief description of these TQM/Six Sigma practices.

### 2.2. Organizational culture

In general, organizational culture represents the pattern of values, beliefs, and assumptions shared by members in an organization (Sigler and Pearson, 2000; Schein, 1985, 1992). Specifically, organizational culture is defined as “a pattern of basic assumptions—invented, discovered, or developed by a given group as it learns to cope with its problems of external adoption and internal integration—that has worked well enough to be considered valid and, therefore, to be taught to

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