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Exploring quality management practices and high tech firm performance

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Abstract

High tech firms compete based on the ability to respond to dynamic environments and to quickly develop innovative new products. However, can quality management (QM) also be a source of competitive advantage for high tech firms? This study empirically investigates the relationship between the extent of quality management implementation and performance in high tech manufacturing firms. Cluster analysis was done based on three performance variables, total inventory turnover, product quality, and sales growth. Two distinct groups, one low performing and one high performing, emerged as a result of cluster analysis. The results show that high performing firms have implemented QM more extensively than low performing high tech firms. Thus, QM can be a source of competitive advantage for high tech firms.

Keywords: Quality management; High tech firms; Firm perfomance

1. Introduction

High technology firms compete in an environment characterized by short product development life-cycles, high uncertainty, and heavy investment in research and development (Qian & Li, 2003). These firms rely on technical change and intellectual capital to attain a competitive advantage (Bruton & Wan, 1994; Mohrman & Von Glinow, 1990). Although innovation and agility may contribute to short term competitiveness, some have argued that in the long run, high technology firms must adopt good management practices to sustain their advantage (Pfeffer, 2001). Powell (1993) suggests that firm specific skills and resources such as quality management (QM) explain performance variance among high technology firms more than low technology firms. Some studies have explored specific QM techniques such as a multi-skilled workforce in a high tech context (Hoyt & Matuszek, 2001) or quality improvement efforts in a single high tech company (Sohal & Lu, 1998). However, empirical research has not specifically explored the relationship between the broad bundle of QM practices and performance across a range of high tech industries.

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Using replication research with two data sets collected at different times, we explore if the bundle of eight quality management (QM) practices differentiate high and low performing high technology firms. The eight quality management practices studied are: (1) management leadership, (2) training, (3) employee relations, (4) quality data and reporting, (5) supplier quality management, (6) product/service design, (7) process management, and (8) customer relations. Replication research, though relatively rare in business disciplines, is essential for the integrity of empirical research (Easley, Madden, & Dunn, 2000; Eden, 2002; Hubbard & Vetter, 1996). Testing theory using more than one data set increases the confidence in the generalization of the results and is essential for building a body of knowledge (Eden, 2002; Tsang & Kwan, 1999). The results are relevant to managers in high technology firms by providing information regarding QM implementation that can be used to improve their competitive positions.

In the next section, a theoretical foundation of this study is presented through a literature review of high tech firms, QM and organizational performance, which leads to the research hypothesis. Section 3 and Section 4 include descriptions of the research methodology for period 1 and period 2 studies, respectively. Following data analyses in Section 5, Section 6 presents the results of testing the research hypothesis, the implications of the findings for researchers and managers and further research directions.

2. Research hypothesis

QM can be defined as a holistic management philosophy that strives for continuous improvement in all functions of an organization. QM can be achieved only if the quality concept is used in all organizational processes starting from the acquisition of resources to customer service after the sale. Many studies have found a positive relationship between the use of QM practices and firm performance when a cross-section of industries is studied (e.g., Douglas & Judge, 2001; Easton & Jarrell, 1998; Hendricks & Singhal, 1996, 1997). Quality management practices can improve business performance by improving operational performance thus reducing costs and through marketing by increasing sales and market share (Sousa & Voss, 2002). QM practices can reduce waste and improve efficiency, increasing return on assets and profitability (Handfield, Ghosh, & Fawcett, 1998). Reduced rework, less scrap, and improved productivity lower costs, enabling a firm to offer lower prices, if it is motivated to do so, without denting its profit margin. Low prices can increase market share and sales (Deming, 1986; Maani, Putterill, & Sluti,1994; Reed, Lemak, & Montgomery, 1996).

Quality management can increase sales and market share. A reputation for delivering high quality products and services can decrease demand elasticity, enabling a firm to charge higher prices and earn higher profits (Shetty, 1988). Quality improvements increase customer satisfaction and loyalty, sales (Ahire & Dreyfus, 2000; Choi & Eboch, 1998; Handfield et al., 1998; Hendricks & Singhal, 1997), and competitive position (Aaker & Jacobson, 1994; Fornell, Johnson, Anderson, Cha, & Bryant, 1996). The beneficial effect of product/service quality on market share (Buzzell, Gale, & Sultan, 1975; Craig & Douglas, 1982; Jacobson & Aaker, 1987; Phillips, Chang, & Buzzell, 1983; Zeithamal & Fry, 1981) and profit when measured as return on investment (Craig & Douglas, 1982; Jacabson & Aaker, 1987; MacMillan, Hambrick, & Day, 1982; Phillips et al., 1983; Zeithamal & Fry, 1981) is a consistent finding of research published in the marketing literature. This positive relationship between QM practices and operating, financial, and market performance lays the foundation for the framework of Malcolm Baldrige National Quality Award (Pannirselvam & Ferguson, 2001).

Although QM practices have been shown to be related to performance in cross-industry studies, what is the effect on a high tech firm's performance? The operating environments for high tech firms are global, extremely complex, and prone to rapid change (Bruton & Wan, 1994; Harpaz & Meshoulam, 1997; Mohrman & Von Glinow, 1990). Complexity stems from rapid changes in product demand, competitors, and the technology that is the distinctive competency of a high tech firm (Bruton & Wan, 1994; Harpaz & Meshoulam, 1997). Under conditions of high uncertainty that is characteristic of this type of environment, firms should emphasize product design efficiency to be more competitive (Reed et al., 1996). To succeed in this environment, these firms must possess highly capable managers, effectively use teamwork, integrate functional activities, and create a unique culture that fosters organizational learning and innovation. To develop new products and innovative processes, high tech firms must attract and retain a highly educated workforce of scientists and engineers (Adler, 1987; Rogers, 2001), but attracting and retaining high tech workers alone is not sufficient for successful competition. The workers must collaborate and share their knowledge if the firm is to create innovative products (Rogers, 2001).