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The moderating role of contextual factors on quality management practices

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ABSTRACT

This study investigates how contextual factors influence the relationship between Quality Management (QM) practices and manufacturing performance. It contributes to the contingency theory of QM effectiveness. Drawing on the management literature, we differentiate two different groups of QM practices: Quality Exploitation and Quality Exploration. The analysis empirically investigates the internal fit with organizational structure and the external fit with environmental uncertainty on the relationship between Quality Exploration, Quality Exploitation, and operational performance. The data comes from a survey of 238 manufacturing plants in three industries across eight countries. Regression analyses show that both internal fit with the organizational structure and external fit with the environment affect performance. The findings also provide insights for managers on how to customize QM programs to achieve optimal performance benefits. In stable environments Quality Exploitation practices provide the best performance outcomes, while in a dynamic environment Quality Exploration practices with an organic organizational structure give the best results.

1. Introduction

Organizations continuously search for new ways to improve performance and gain a competitive advantage. Quality Management (QM) initiatives offer one approach that firms use to improve performance. For example, 3M implemented Six Sigma to help improve performance (Fiedler, 2004). However, 3M's implementation has been met with mixed success (Hindo, 2007). Prior research of the relationship between QM and performance also shows mixed results. Some studies show a positive relationship with performance (e.g. Prajogo and Sohal, 2003; Ho et al., 2001), while other studies fail to find a relationship (e.g. Mohrman et al., 1995; Choi and Eboch, 1998; Yeung et al., 2006). In a study by Mohrman et al. (1995) 83% of the surveyed companies indicated a positive or very positive experience with QM, while a study by Dooyoung et al. (1998) reports failure rates as high as 60–70%.

Organizations need to understand how to implement QM to achieve the maximum benefit. Taking a one-size fits all approach to QM may not lead to optimal outcomes. Different organizations may need different approaches to QM. For instance, should a commodity based manufacturer use the same quality management system as a high tech manufacturer? Westphal et al. (1997) studied QM implementation in hospitals, and found that hospitals that customized the QM practices had higher performance than hospitals that adopted standardized approaches to QM. However, their study did not provide an explanation about how organizations can customize QM practices. This study draws on contingency theory and empirically shows that the contribution of different QM practices to performance depends on organizational structure and environmental contextual factors.

Scholars have recognized the importance of contingency theory (Lawrence and Lorsch, 1967; Thompson, 1967) in Operations Management (Sousa and Voss, 2001, 2008). As research in QM matures scholars need to move beyond simply justifying practices, they now need to better understand the effect of context on QM practices. Some scholars have started to develop a refined understanding of QM by drawing on contingency theory. For example, Foster (2006) notes the importance of taking a contingency theory perspective when implementing QM. Consistent with Foster (2006), Sousa and Voss (2008) also raise doubt about the "universal validity" of quality management practices. They suggest that the inconsistent performance in QM implementation may be due to contextual factors. Nair (2006) argues that future research in QM should consider contingency theory. Some empirical studies have considered contextual factors that influence QM effectiveness, such as country (e.g. Oliver et al., 1996; Rungtusanatham et al., 1998, 2005) and firm size (e.g. Ghobadian and Gallear, 1996; Ahire and Golhar, 1996; Sila, 2007). Recently, Jayaram et al. (2010) investigate the effect of firm size, quality program duration, unionization, and industry context on QM implementation. These studies provide some sup-

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port for the contingency theory perspective in quality management but treat QM as a single set of practices. Sitkin et al. (1994) note that scholars have treated QM practices as a single universal set of practices which does not allow for customization. However, studies have noted the importance of customization (Westphal et al., 1997). Sitkin et al. (1994) begin to theorize that quality practices have both a control and learning orientation, and that different QM practices are more suitable in different contextual settings.

This research draws on Sitkin's et al. (1994) theoretical model as a starting point to empirically investigate contextual factors that influence the relationship between different types of quality practices and performance. Their work argues that different QM practices are more or less effective under different environmental uncertainty conditions. This paper builds on Sitkin et al. (1994) theoretical argument and empirically tests the influence of two different contextual factors. It contributes to the contingency perspective of QM, and empirically addresses the question "how can organizations fit QM practices to different contextual settings?"

Drawing on the management literature (e.g. March, 1991; Sitkin et al., 1994), this study differentiates two orientations or types of QM practices: Quality Exploitation and Quality Exploration[2]. Quality Exploitation practices aim at cybernetic control – "a process in which a feedback loop is represented by using standards of performance, measuring system performance, comparing that performance with standards, feeding back information about unwanted variances in the system, and modifying the system" (Green and Welsh, 1988, p. 289). Quality Exploration, on the other hand, highlights increasing an organization's ability to explore the unknown and to identify and pursue novel solutions (Garvin, 1993, p. 80).

This research is the first empirical study that differentiates QM as two separate yet related practices bundles. The analysis examines the moderating effects of organizational structure and environmental uncertainty on the relationship between Quality Exploitation and Quality Exploration with operational performance. The findings provide implications for organizations in selecting the right mix of exploitation or exploration practices to customize QM, and to get better performance from their quality initiatives.

The rest of the paper is arranged as follows. Section 2 reviews the theoretical foundation for the proposed model. Section 3 describes empirical data and measurement instruments. Section 4 presents the data analysis and results. Section 5 concludes the paper with a discussion of theoretical and practical implications as well as limitations and possible future research.

2. Theoretical foundation

2.1. Research framework

Management theory can provide a useful lens to distinguish different orientations of QM practices (Amundson, 1998; Van de Ven and Poole, 1995). This study draws on March's (1991) concepts of Exploration and Exploitation to identify different types of QM practices. Exploitation implies activities consistent with terms such as refinement, choice, production, efficiency, and execution; while exploration includes activities characterized by search, discovery, experimentation, variation, and innovation. This same conceptual lens can help classify QM practices. On the one hand, organizations need to control stable and familiar processes and improve efficiency. As a result, Quality Exploitation includes the QM practices that aim to ensure the consistency and efficiency of outcomes. On the other hand, organizations need to discover new insights and explore the unknown. Thus, Quality Exploration includes the QM practices that aim to explore the unknown and to identify and pursue novel solutions, particularly for processes and products that are new to the firm. Quality Exploration keeps organizations open and flexible to new ideas. Organizations can benefit from both orientations. However, since each orientation competes for scarce resources, organizations need to choose the "right" mix between these orientations (March, 1991). Other management theorists have made similar distinctions between Exploitation and Exploration, or sometimes called Control and Learning (e.g. Sutcliffe et al., 2000; Eisenhardt and Tabrizi, 1995). The rest of the paper uses Exploitation and Exploration to denote Quality Exploitation and Quality Exploration.

Since some research indicates that QM practices depend on the context (Sousa and Voss, 2008; Foster, 2006; Nair, 2006), the appropriate mix of Exploitation and Exploration practices should also depend on the context. In fact, contingency theory argues that organizational effectiveness relies on fitting characteristics of the organization to contextual factors (Burns and Stalker, 1961; Donaldson, 2001). Contextual factors can have a moderating effect on the relationship between QM practices and performance. A moderating effect occurs when a third variable changes the relationship between two related variables. From this perspective, the effect of QM practices on performance depends on the level of certain contextual factors (third variable). Furthermore, the moderating effect may vary for QM Exploitation and Exploration practices. Recently scholars have developed a multi-contingency framework to understand how different factors affect performance (Burton et al., 2002; Burton and Obel, 2004). According to Burton and Obel (2004), "the fit ... of relevant contextual [and] structural ... factors will yield better performance (p. 18)." Siggelkow (2001) further makes a distinction between *internal fit* and *external fit*. Internal fit looks at relationships with the internal structure of the firm, whereas external fit looks at relationships with the external environment. This paper investigates organizational structure (internal fit) and environmental uncertainty (external fit) as two variables that moderate the relationship between QM Exploitation/Exploration practices and performance. Several scholars have studied these contextual variables using contingency theory in a general management setting (Donaldson, 2001; Germain et al., 2008). But, the effect of these contextual variables on QM Exploitation/Exploration practices has not been empirically addressed.

2.2. Quality exploitation and quality exploration

Defining the constructs of QM Exploitation and QM Exploration first requires specifying the common precepts underlying QM. Over time the term QM has gained some consistency in its meaning in the academic literature. A good definition of QM should be parsimonious and based on prior theory (Wacker, 1998, 2004). Snell and Dean (1992, p. 470) succinctly define QM as a management approach that can "be characterized by a few basic principles as well as a number of associated practices." The fundamental principles of QM generally include customer focus, process focus, and teamwork (Dean and Bowen, 1994; Evans and Lindsay, 2011). This study captures the concepts of QM at the practice level and investigates the practices that are associated with the principles. Practices that have been used to measure QM vary across different studies (Flynn et al., 1994; Powell, 1995; Ahire et al., 1996; Ahire and O'Shaughnessy, 1998; Rungtusanatham et al., 1998; Ahire and Dreyfus, 2000; Douglas and Judge, 2001; Kaynak, 2003). Based on a comprehensive literature review, four commonly used dimensions have been identified for this study – customer focus, process management, teamwork, and training. These dimensions are relevant to both theory (Dean and Bowen, 1994) and practice (Evans

[2] Sitkin et al. (1994) uses the terms TQC (Total Quality Control) and TQL (Total Quality Learning).