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# The impact of hard and soft quality management on quality and innovation performance: An empirical study<sup>☆</sup>

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## ABSTRACT

This study examines the conflicting relationship between quality management (QM) and innovation on a global basis using a multidimensional view of QM. QM is divided into two dimensions: hard QM and soft QM. Quality performance as an intended consequence of QM implementation is also examined as a potential mediator between QM and innovation. A conceptual framework is developed to postulate causal linkages between soft/hard QM, quality performance, and innovation performance. Data collected from 283 plants in eight countries and a technique of structural equation modeling are used to test this framework. The results indicate different paths to innovation from different dimensions of QM. Hard QM affects innovation performance directly and indirectly through its effect on quality performance. Soft QM has indirect effect on innovation performance through its effect on hard QM. This means that quality performance depends directly on hard QM which can be promoted by soft QM. Quality performance shows a partial mediating effect on the relationship between hard QM and innovation performance. Quality and innovation are not a matter of trade-off, but they can coexist in a cumulative improvement model with quality as a foundation. Firms have no need to abandon QM endeavor to achieve innovation. Instead, they should devote continuous efforts to maintain a solid quality system in place integrating a set of QM practices and corresponding performance measures. Managers are advised to emphasize on quality control tools and techniques and use teamwork, training, employee empowerment and problem-solving approaches as an underlying support.

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## 1. Introduction

In the more and more competitive marketplace, both quality and innovation are playing crucial roles in securing a sustainable competitive advantage. Quality-based competition is regarded more as an “order qualifier” criterion, while competition based on flexibility, responsiveness and particularly innovation is viewed as one of “order winner criteria” (Tidd et al., 1997). To survive in a dynamic environment, organizations need to be ambidextrous –

aligned and efficient in managing today's market demands, while adaptive enough to environmental changes coming tomorrow (Gibson and Birkinshaw, 2004). However, this does not seem to be an easy thing, as manifested by Toyota's recall crisis.

In the early 1990s, Toyota has earned itself the reputation for an amazing and unprecedented record of quality. Later, Toyota tried to move toward innovation by developing core technology, path-breaking vehicles and new routines of product development for 21st century (Nonaka and Peltokorpi, 2009). In 1997, Toyota launched the world's first commercialized hybrid car – Prius, which received numerous awards and orders. However, “Toyota's reputation for quality was tarnished by massive global recalls that started five years ago and ultimately encompassed almost every model in its lineup and totaled more than 10 million vehicles” (The Associated Press, 2013). Why does a firm with a strong quality focus have so many quality issues in such a short amount of time? Is it just because Toyota did not strongly focus on quality issues while pursuing innovation? Or, is any attempt to achieve both quality and innovation doomed to fail?

The recent Toyota crisis leads us to rethink about quality management (QM)'s value and role in securing other competitive

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advantages, particularly innovation, in future competitive environment. A practical management issue emerged: Does QM foster or hinder innovation? However, literature on this issue fails to provide a clear answer to this question since there are conflicting arguments pertaining to the relationship between QM and innovation (Prajogo and Sohal, 2001). Furthermore, there are only a few empirical attempts to test this relationship. Some studies use an integrated approach to consider QM as one single factor influencing innovation and empirically found the relationship between them to be positive (Sadikoglu and Zehir, 2010; Santos-Vijande and Álvarez-González, 2007; Prajogo and Sohal, 2003). Some studies analyze this issue in more depth by considering multidimensional aspects of QM (Prajogo and Sohal, 2004; Feng et al., 2006), but their scope is usually restricted to a specific region (e.g. Australia, Singapore). Martínez-Costa and Martínez-Lorente (2008) suggest that more studies are needed to analyze which QM dimensions have more effect on innovation and whether some of them could be a barrier to it. Following the suggestion, this study adopts a multidimensional view of QM to examine the impact of QM implementation on innovation performance in a more extensive context across eight countries.

Previous literature on QM has proposed different dimensions embodied by QM. As noted by Wilkinson (1992), the “hard” aspect of QM involves a range of production techniques, such as statistical process control and quality function deployment, reflecting the production orientation of the QM gurus. The “soft” aspect of QM is more concerned with the establishment of customer awareness and the management of human resources. Following this classification, we view QM from two dimensions, hard QM and soft QM, and use this view to solve the dispute over the relationship between QM and innovation. Nevertheless, the literature on quality has dispute over the relationships between these two dimensions of QM and their contribution to performance. It presents mixed results regarding whether soft QM has a direct or indirect impact on performance, and which dimension is more important to yield superior performance. Since our paper is grounded on the dichotomy view of QM, clarifying the relationship between hard QM and soft QM in linking them to quality performance is the prerequisite for further investigation on the QM–innovation relationship.

These opposing arguments also extend to the relationship between quality performance and innovation performance. A fundamental question remains about whether organizations can excel in both types of performance or have to achieve one at the expense of the other. Empirical studies have rarely investigated the mediating effect of quality performance on the relationship between QM practices and innovation performance. To further explore the direct and indirect relationship between quality and innovation, we examine the relationship between quality performance and innovation performance. In this paper, we particularly focus on product innovation, whose relationship with QM is more controversial and ambiguous, compared to process innovation, which is closely linked to QM’s concept of streamlining a process.

Above all, the purpose of this study is to empirically examine the relationships between two dimensions of QM (hard QM and soft QM) and quality/innovation performance on a global basis. It aims to answer the following questions:

1. How does hard QM relate to soft QM?
2. How does hard/soft QM relate to quality performance?
3. How does hard/soft QM relate to innovation performance?
4. How does quality performance relate to innovation performance?

A conceptual framework is developed in this study to postulate causal linkages across hard/soft QM, quality performance, and

innovation performance. This framework is examined at the operational level, as Flynn et al. (1994) have noted that QM is not always implemented at the firm level, but the plant level is the level at which QM is often implemented. Data for this study were collected from 283 plants in eight countries across three industries and the framework is tested using structural equation modeling (SEM). The findings indicate that, in general, QM can provide a fertile environment to foster innovation. The results also suggest the different ways of different dimensions of QM to affect innovation.

Our study contributes to a multidimensional view of QM in exploring different paths to innovation from different dimensions of QM. Also, by using a sample of eight industrialized countries, this study contributes to the generalization of the positive relationship between QM and innovation. Furthermore, the results regarding the different ways of different dimensions of QM to affect innovation can provide guidance for the organizations to adjust hard and soft QM to meet the quality and innovation needs.

The remainder of this paper is organized as follows. In the next section, we provide a literature review on the relationship between QM and innovation, which helps develop the research hypotheses. We then describe the research methodology, followed by presenting the results of hypotheses testing. Section five discusses the main findings and implications stemming from this research. Section six includes limitations of this study and future research. Finally, the conclusions are summarized in the last section.

## 2. Literature review and hypothesis development

This section includes a brief review of the literature that has examined relationships between QM and innovation as well as the two dimensions of QM. Following the literature review, we formulate our hypotheses.

### 2.1. QM–innovation relationship

There are conflicting arguments about the relationship between QM and innovation (Prajogo and Sohal, 2001). One group of arguments claims that philosophy and principles of QM are not compatible with innovation. QM advocates the philosophy of continuous improvement which aims at simplifying or streamlining a process. Continuous improvement focuses on incremental change and requires standardization or formalization in order to establish control and stability (Imai, 1986; Jha et al., 1996). This would yield rigidity and inhibit innovation by trapping people into focusing on the details of the current quality process rather than a new idea to change the current work system (Morgan, 1993; Glynn, 1996). Process management practices basically aiming at eliminating waste and improving efficiency could be detrimental to innovation, since it reduces slack resources that are necessary for fertilizing innovation (Sadikoglu and Zehir, 2010). Bennett and Cooper (1981) and Slater and Narver (1998) have criticized the customer focus itself as a source of innovation. These authors contend that customer focus could lead organization “narrow-minded” to current product and services rather than making breakthrough improvements to explore customers’ latent needs.

However, positive viewpoint contends that companies embracing QM in their system and culture can provide a fertile environment for innovation. McAdam et al. (1998) argue that “in many ways QM can be seen as laying the foundation of a culture environment that encourages innovation” (p. 141). Pfeifer et al. (1998) propose three subject areas of importance for innovation: customer orientation and service; flexible organizational structures; and creative staff, which are in agreement with the QM

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