An empirical investigation of the relationship between Six Sigma practices and organizational innovation: evidence from China

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Abstract
Purpose – The purpose of this paper is to explore the relationships between Six Sigma practices and different types of organizational innovation including product innovation, process innovation and administrative innovation.
Design/methodology/approach – Empirical data were collected from 249 firms in China which had implemented Six Sigma as a formal program in their organization. Structural Equation Modeling was used to test the hypothesized relationship between Six Sigma practices and innovation.
Finding – The results show that Six Sigma management, infrastructure, and core practices have a positive relationship with product, process and administrative innovation.
Originality/value – This study contributes to a better understanding of how firms can take advantage of the Six Sigma implementation to improve their capacity in
innovation.

**Keywords** Six Sigma practices, Organizational innovation, Structural equation model

**Paper type** Research paper

1. Introduction

Six Sigma is a process improvement program that is increasingly adopted in industry to pursue continuous improvement in process management and product development (Linderman et al., 2003; Schroeder et al., 2008; Shafer and Moeller, 2012). There have been debates about whether Six Sigma is beneficial for organizational innovation. Some researchers contend that Six Sigma serves as a foundation or a catalyst for organizational innovation (Antony et al., 2014; Byrne et al., 2007). In their opinion, Six Sigma helps organizations make a breakthrough in innovations that achieve far-reaching improvements in their business performance. Especially, Six Sigma enables companies to create an organizational climate where innovation has been expected (Byrne et al., 2007). Some researchers hold a neutral view, debating that although Six Sigma and innovation are different approaches, they can co-exist perfectly in a disciplined and comprehensive organization (Hoerl and Gardner, 2010; Rae, 2007). There are also criticisms that Six Sigma's emphasis on standardization and variation reduction will restrict the freedom required for innovation and even drag organizations down (Johnstone et al., 2011; Tushman, 2006). However, there lacks empirical research investigating the effect of Six Sigma on organizational innovation (Shafer and Moeller, 2012).

To fill the gap in the literature, this study seeks to examine the relationship between Six Sigma practices and different types of organizational innovation. This research collected empirical data from 249 firms in China which have implemented Six Sigma as a formal process improvement program in their organizations. The results show that Six Sigma management, infrastructure, and core practices have a positive relationship to all three types of innovation – product innovation, process innovation and administrative innovation. The results of this study provide insights to help organizations take advantage of their Six Sigma programs to facilitate organizational innovation.

2. Theoretical background

2.1. Organizational innovation

In general, organizational innovation refers to the creation or adoption of new ideas, knowledge, skills and methods that can create value and improve competitiveness of organizations (Daft, 1978; Kim et al., 2012). Organizational innovation can be categorized into three types: product innovation, process innovation and administrative innovation (Bon and Mustafa, 2013; Kim et al., 2012). Product innovation refers to changes at the end of providing products or services, including creating new products or services and improving on existing products or services (Bon and Mustafa, 2013). Process innovation is defined as the changes in the method of producing products or services, focusing on improvement on the effectiveness and efficiencies of production or service processes (Bon and Mustafa, 2013; Moura E Sá and Abrunhosa, 2007). Administrative innovation refers to application of new ideas to