Chapter 51
The Moderator of Innovation Culture and the Mediator of Realized Absorptive Capacity in Enhancing Organizations' Absorptive Capacity for SPI Success

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ABSTRACT

Software process improvement (SPI) is critical to information system development. In the context of successful SPI, this research focuses on a firm's dynamic learning ability to see how it facilitates an effective means of acquiring and utilizing external SPI knowledge in responding to changing software development environments. Specifically, the authors propose a research model to investigate how two mechanisms of absorptive capacity are incorporated with innovation culture as a contextual factor to enable successful software process improvement. A survey was conducted including 125 SPI certified firms in China and Taiwan to examine the model. The findings indicate that a firm's potential absorptive capacity significantly influences realized absorptive capacity, which has a significant impact on SPI success and acts as a partial mediator between potential absorptive capacity and SPI success. Moreover, the results suggest that the mediating effect of potential absorptive capacity on SPI success via realized absorptive capacity is amplified when innovation culture is imposed.

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1. INTRODUCTION

Software process improvement (SPI) is particularly important for firms and business units because it enhances and sustains their competitive advantage in the business market (Lee et al., 2016). Software development is knowledge intensive in innovation and mutual learning and often takes advantage of external sources to advance software development processes (Matusik and Heeley, 2005). Therefore, SPI implementation often relies on SPI knowledge, skills, expertise, experience, methodologies, technical support from external sources – e.g., external mediating institutions, such as SPI consulting firms and vendors – and external knowledge bodies, such as the Capability Maturity Model Integration (CMMI) and the International Standards Organization (ISO), to address challenges that arise during implementation (Feher and Gabor, 2006; Meehan and Richardson, 2002).

Based on organizational learning theory (March, 1991), SPI is commonly recognized as an organizational learning process because the exploration of external process knowledge and the exploitation of existing process knowledge in organizations play critical roles in SPI implementation (Rus and Lindvall, 2002; Dyba, 2005; Lee et al., 2017). However, successful SPI relies on how effectively a firm can internalize these external lessons (Mathiassen and Pourkomeylian, 2003; Alagarsamy et al., 2008). Furthermore, software processes are executed in dynamic development and turbulent business environments (Xu and Ramesh, 2007). Thus, SPI requires continual endeavours in order for firms to maintain their competence. However, the existing literature does not fully grasp how to address a firm's learning ability to internalize external SPI knowledge nor addresses how organizational learning continually supports changing SPI needs under dynamic environments.

This study focuses on dynamic capabilities theory to address continual learning ability in SPI. Dynamic capabilities refer to a firm's abilities to adapt, renew, and reconfigure internal and external competences to address rapidly changing environments (Teece et al., 1997; Zahra et al., 2006). Zahra and George (2002) extended dynamic capability to include absorptive capacity (AC), which represents a firm's dynamic ability to acquire, assimilate, and apply knowledge from external environments. AC enables a firm to renew or reconfigure its existing knowledge stock, creating new knowledge, processes, or products to better match rapidly changing environments (Jansenet al., 2005; Volberda et al., 2010). It can be considered a specific organizational learning process for learning, implementing, and disseminating external knowledge internally in order to strengthen, complement, or refocus the firm's knowledge mechanisms (Zahra and George, 2002; Lane et al., 2006; Volberda et al., 2010; Sun and Anderson, 2010; Roberts et al., 2012). Peng et al. (2014) showed that firms with greater AC can quickly and precisely recognize and assimilate the value of external knowledge and information, which then allows them to adopt ad hoc information technology more quickly.

To gain a better understanding of a firm's ability to acquire and utilize external SPI knowledge, this study adopts the two categories of AC developed by Zahra and George (2002) – potential AC (PAC) and realized AC (RAC) – and investigates how these types of AC influence SPI success. PAC represents a firm's ability to identify, acquire, embrace, and assimilate external knowledge, while RAC refers to its ability to leverage newly acquired knowledge and incorporate transformed knowledge into the development of innovation processes and operations (Fosfuri and Tribo, 2008). In the existing information systems (IS) literature, Saraf et al. (2013) indicated that PAC helps a focal firm acquire and understand external knowledge that is specific to the enterprise's information systems, such as enterprise resource planning (ERP), while RAC provides a firm with the ability to exploit the absorbed knowledge to facilitate greater ERP usage. In the context of SPI, a firm's AC is expected to be the enabler that continually