



# Mediation effect of business process and supply chain management capabilities on the impact of IT on firm performance: Evidence from Chinese firms<sup>☆</sup>



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## ABSTRACT

Motivated by the seeming presence of the productivity paradox in China, this research revisits the question of how information technology (IT) affects firm performance. Leveraging the process-based view of IT, we establish a theoretical framework for the mediation factors for the relationship between IT capabilities and performance. Based on a survey of 127 companies in China, we find that a firm's management capabilities to manage both its internal and external business processes fully mediate the impact of IT on firm performance. The two management capabilities in this study are business-process management capability and supply-chain management capability. Our results show that only the coherent integration of IT capability with firm's ability to optimize business processes and to improve management of supply chains can enhance firm performance. Firms should avoid the fallacy that IT investments are solely responsible for better firm performance. Based on our findings, we discuss the implications for research and practice.

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## 1. Introduction

In recent years, Chinese firms have invested heavily in IT. After all, prevalence of information technology (IT) applications provides new opportunities for Chinese firms to improve their management capabilities. A survey by *CCW Research (2010)* found that IT investments by small and medium-sized enterprises (SMEs) in China approached 200 billion RMB Yuan (approximately US\$30 billion); however, the improvements in their operational performance and competitiveness had been minimum. Therefore, a key management issue is whether the so-called “productivity paradox” of information systems, which refers to the contradiction between “the enormous improvements in the underlying technology” and lack of benefits from technology investments (*Brynjolfsson & Hitt, 1996*), exists in China.

The business process view of IT argues that much of the business value of IT stems from its complementarities with business processes (*Barua, Kroeber, & Mukhopadhyay, 1995*). Specifically, IT affects business processes—such as product development, quality management, manufacturing, and supply chain management—that, in turn, affect firm performance. *Lewis and Byrd (2003)* established a framework to study the mediation effect of business processes on the relationship between IT and firm performance. They argued that IT provides the infrastructure upon which other business functions and processes depend. Recent advancement of information systems (IS) research has identified business process management capabilities as crucial mediators between IT capability and firm performance (*Mithas, Ramasubbu, & Sambamurthy, 2008; Mithas, Ramasubbu, & Sambamurthy, 2011*). Using game theory, *Peng (2009)* demonstrated the conditions for the optimal match between IT application level and management capabilities in order for IT to influence performance. As such, too much or too little IT capability is an inefficient use of firm resources.

Research on the business value of IT in developed countries has reached a certain level of maturity (*Constantinides, Chiasson, & Introna, 2012; Grover & Kohli, 2012*). Empirical work on this topic in developing countries—such as China—though, is in its nascent stage. Whether findings in a developed-country context are

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generalizable to a developing-country domain is unknown and may be questionable. After all, differences in the stage of economic development, organizational structures, and culture between developed and developing nations may have an impact on the business value of IT. Sun, Xing, and Wang (2010, p. 397) stated, “Although the issues related to information technology investment and organizational performance have been the focus of attention of academics and practitioners, similar empirical study in China is relatively limited and the results from the few existing studies are inconsistent.” For example, Lin, Madu, Kuei, and Lu (2004) analyzed the return of IT investment in China’s manufacturing industry and found that it increases firm performance. In addition, a study of foreign and local electronics firms in Malaysia by Rasiah and Malakolunthu (2009) showed that technology intensity and productivity were positively correlated. However, Zhu (2004) used the internal data of a state-owned commercial bank in China and ascertained that the investment in IT assets has a negative impact on the marginal productivity of the bank. In addition, Li, Feng, and Xie (2003) showed that the impact of IT investment on firm performance is not significant for publicly listed companies in China. Furthermore, Sun et al. (2010) demonstrated that IT investment and organizational performance are negatively correlated for publicly listed companies in the IT industry in China. The foregoing findings exhibit characteristics of the IT productivity paradox. Because China is the largest developing country in the world, research designed to pinpoint the causes for the IT productivity paradox will likely have important implications for companies in China—and possibly for those in other developing countries—as they strive to create business value from their IT investments.

Motivated by the seeming presence of the productivity paradox in China, this research adopts four new foci in an attempt to address whether and how IT creates business value for Chinese firms. First, it enhances the process-based view of IT (Barua et al., 1995; Soh & Markus, 1995) in which business processes mediate the impact of IT on performance by emphasizing the mediation role of business process management capabilities.

Second, this research categorizes the concept of business management capability into two distinct types: internal business process and supply chain management capabilities. These two capabilities describe both the internal and external activities of firms. Zairi (1997) defines business process management (BPM) as a “structured approach to analyze and continually improve fundamental activities such as manufacturing, marketing, communications and other major elements of a company’s operation.” Therefore, business process management capability is essential to a company’s operations. Previous studies have often treated BPM as a single component (Mithas et al., 2011), despite the wide coverage of different business processes the concept can convey. We start to address this over-simplification by categorizing business processes into internal processes and external supply chain processes. Supply chain management capability embodies how firms manage their relationships with their suppliers and control the quality in the supply chain. In fact, firms must interact and coordinate with external suppliers and customers for raw material procurement and product distribution. As a result, how they manage the supply chain relationships is critical for business performance. On the other hand, all the other internal business processes are also important to firm performance.

Third, this research sheds further light on the linkage between IT capability and firm performance. The process-based view proposes that performance differential depends on differences in IT capabilities, not on differences in IT spending (Stoel & Muhanna, 2009). However, empirical test results regarding this linkage are inconsistent. For example, Bharadwaj (2000) showed that firms with higher IT capabilities tend to have better performance. Soto-Acosta and Meroño-Cerdan (2008) found that, although Internet resources are

not directly correlated with e-business value, e-business capabilities are key drivers of e-business value. Santhanam and Hartono (2003), however, found no association between performance and IT capability.

Finally, the present study should advance understanding of the relationship between IT and firm performance in China. The existing research in China has obtained inconsistent results and evidence of the IT productivity paradox (Sun et al., 2010; Zhu, 2004). The current study proposes that the impact of IT capabilities on organizational performance is mediated by a firm’s internal business process and supply chain management capabilities. The investigation extends the research of IT business value by examining the issue in a Chinese context. The study’s China-specific findings may well provide a foundation for firms in developing countries vis-à-vis designing and implementing appropriate strategies to maximize return on IT spending.

## 2. Literature review

Business value of IT has been a popular focus in the MIS literature. For example, Brynjolfsson and Hitt (1996), Dewan and Min (1997), Hitt and Brynjolfsson (1996), Lehr and Lichtenberg (1999), and Siegel (1997) proposed that IT investments create excess return over other types of capital investments in production processes. Barua et al. (1995), Mooney, Gurbaxani, and Kraemer (1996), Soh and Markus (1995), argued that IT creates business value by improving operational efficiency of intermediary business processes. Bharadwaj (2000), Clemons and Row (1991), Mata, Fuerst, and Barney (1995), Powell and Dent-Micallef (1997), Sambamurthy, Bharadwaj, and Grover (2003) proffered that IT improves firm performance by creating unique, immobile, and path-dependent strategic resources and capabilities. Benaroch and Kauffman (2000), Dos Santos (1991), Sambamurthy et al. (2003), and Taudes, Feurstein, and Mild (2000) averred that the value of IT lies in its ability to provide options and flexibility for firms in increasingly competitive and uncertain market environments. Santhanam and Hartono (2003) promulgated that a company can increase the efficiency of its IT investments by developing IT capabilities. Indeed, they discerned that performance of firms with higher IT capabilities is greater and more sustainable than in those with lower IT capabilities. Using the “prisoner’s dilemma” in game theory, Chanchai (2008) posited that IT vendors actually make it difficult for firms to benefit from their IT investments by taking advantage of the dynamic interactions among firms, competitors, and vendors themselves. Byrd and Byrd (2010) showed evidence that different dimensions of IT capability may have different effects on performance measures.

One of the most popular theories proposed to explain how IT contributes to firm performance is the process-based view (Barua et al., 1995; Soh and Markus, 1995). The view asserts that IT investments create positive impact on performance and productivity through enhancing existing business processes, enabling new business processes, and creating new business capabilities. It postulates that IT has first-order effects on operational-level variables in the functional areas, and these intermediary variables in turn affect higher-level factors, such as productivity and profitability (Barua et al., 1995). Using the concept of IT asset, Soh and Markus (1995) argued that IT investment cannot achieve its desired results if a firm does not manage its IT assets properly and that the impact of IT on firm performance is the result of the interaction between IT and business processes. Hu and Quan (2005) promulgated that information intensities of value chain and products mediate the impact of IT on business processes. Using data collected from 60 business units in 20 large firms, Mitra and Chaya (1996) performed a firm-level analysis of the relationship between IT investment and

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