How information systems help create OM capabilities: Consequents and antecedents of operational absorptive capacity

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ABSTRACT

In contemporary business environments, the ability to manage operational knowledge is an important predictor of organizational competitiveness. Organizations invest large sums in various types of information technologies (ITs) to manage operational knowledge. Because of their superior storage, processing and communication capabilities, ITs offer technical platforms to build knowledge management (KM) capabilities. However, merely acquiring ITs are not sufficient, and organizations must structure information system (IS) designs to leverage ITs for building KM capabilities. We study how technical and strategic IS designs enhance operational absorptive capacity (OAC) – the KM capability of an operations management (OM) department. Specifically, we use a capabilities perspective of absorptive capacity to examine potential absorptive capacity (POAC) and realized absorptive capacity (ROAC) capabilities – the two OAC capabilities that create and utilize knowledge, respectively. Our theory proposes that integrated IS capability, – an aspect of technical IS design – is an antecedent of POAC and ROAC capabilities, and business-IT alignment – an aspect of strategic IS design – moderates the relationship between integrated IS capability and ROAC capability. Combining data gleaned from a multi-respondent survey with archival data from COMPUSTAT, we test our hypotheses using a dataset from 153 manufacturing organizations. By proposing that IS design enables an OM department's KM processes, i.e., the POAC and ROAC capabilities, our interdisciplinary theoretical framework opens the "black box" of OAC and contributes to improved understanding of IS and OM synergies. We offer a detailed discussion of our contributions to the literature at the IS-OM interface and implications for practitioners.

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"The computer is merely a tool in the process. . .To put it in editorial terms, knowing how a typewriter works does not make you a writer. Now that knowledge is taking the place of capital as the driving force in organizations worldwide, it is all too easy to confuse data with knowledge and information technology with information."
– Peter F. Drucker in "The Post-Capitalist Executive," Managing in a Time of Great Change, Penguin, NY (1995)

1. Introduction

In modern business environments, knowledge management (KM) drives organizational performance (Cohen and Levinthal, 1990; Grant, 1996; Li et al., 2008; McEvily and Chakravarthy, 2002), and organizations are thus increasing their focus on managing knowledge (Malone et al., 2011). The successful KM endeavors of certain large organizations, such as British Petroleum, are

well known. In recognition of the potential of KM, many large corporations are setting-up senior C-level executive positions, such as Chief Learning Officer and Chief Knowledge Officer, to manage their operational knowledge (Earl and Scott, 1999; Prokesch, 1997; Pugh and Dixon, 2008). Because of their superior abilities to store, process and communicate knowledge, ITs are a *sine-qua-non* in managing KM activities. Firms with superior strategic postures make greater investments in ITs (Mithas et al., 2013) to champion their KM initiatives (Rao, 2012). However, managing knowledge is a complex activity and the outcomes of KM processes are often uncertain (Haas and Hansen, 2007). Although IT investments are required to create a robust digital infrastructure, investments in IT are only the first step and do not necessarily translate directly into higher performance (Brynjolfsson, 1993; Setia et al., 2013). Although organizations continue to acquire ITs to implement their KM initiatives, little is known about the types of IS design structures that enable superior KM.

Previous research emphasizes managing operations management (OM) knowledge to enhance organizational performance (Fugate et al., 2009), often with an emphasis on acquiring knowledge from outside the organization, e.g., through outsourcing

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arrangements (Li et al., 2008). Outside of OM research, a substantial body of work on KM has discussed acquiring knowledge through arrangements such as spillovers and acquisitions (Björkman et al., 2007; Girma, 2005). Knowledge management is particularly important for assessing operational risks in supply chains (Tazelaar and Snijders, 2013), and particularly, knowledge acquisition is necessary to lower operational losses (Hora and Klassen, 2013). However, there is a growing recognition of the complexity of KM and of the need to create organizational capabilities for managing knowledge (Lane et al., 2006; Roberts et al., 2012; Zahra and George, 2002). Across disciplines, researchers emphasize absorptive capacity as the capability to build knowledge, and OM researchers are beginning to use the capabilities perspective for studying operational absorptive capacity (OAC), – the OM capability for managing operations knowledge (Azadegan, 2011; Joshi et al., 2010; Lane et al., 2006; Malhotra et al., 2005; Roberts et al., 2012; Tu et al., 2006). Focusing on the capabilities of absorptive capacity marks a shift in the approach used by researchers to study KM. Specifically, studies examining OAC emphasize the internal dynamics that create and utilize knowledge instead of external arrangements for acquiring knowledge.

Internal dynamics related with IT use may help build operational KM capabilities because ITs are the backbone of operational activities (Alavi and Leidner, 2001). However, it is imperative to examine whether IT-enabled OAC capabilities have consequences for organizational performance. Although OM research has begun to focus on OAC capabilities (Azadegan, 2011; Tu et al., 2006), there is scant prior research that examines the performance impacts of these IT-enabled capabilities. Formal academic examination of such performance effects is necessary because IT-enabled capabilities represent intangible assets whose organizational influences are difficult to discern (Bharadwaj, 2000). Further, the effects of these capabilities may vary across organizations, but we do not know which organizations should prioritize capability-building. Therefore, we present a theory that examines the consequences of IT-enabled OAC capabilities for organizational performance. Following recent developments in research studying absorptive capacity, we use a capabilities perspective to propose potential operational absorptive capacity (POAC) and realized operational absorptive capacity (ROAC) as the two OAC capabilities that create and utilize OM knowledge, respectively. POAC capabilities characterize knowledge *creation* and represent OM processes that acquire and assimilate knowledge, and ROAC capabilities refers to knowledge *utilization* through OM processes that transform and exploit knowledge (Lane et al., 2006; Zahra and George, 2002). To assess performance effects of IT-enabled capabilities, IS research broadly examines organizational consequences of such capabilities across domains, such as new product development (Pavlou and El Sawy, 2006), manufacturing (Banker et al., 2006) and customer service (Setia et al., 2013). Following previous research that assesses the performance effects of capabilities, we assess whether POAC and ROAC capabilities enhance an organization's market valuation (Bharadwaj, 2000). Market valuations offer an objective metric to assess the performance effects of POAC and ROAC capabilities and reflect the long-term performance of an organization. Higher market valuation increases an organization's legitimacy and access to financial capital (Certo et al., 2001; D'Aveni, 1990; Davis and Mizruchi, 1999; Pfeffer and Salancik, 2003). Our theory, therefore, situates the two OAC capabilities in a nomological network by (i) studying the relationship between the two OAC capabilities and an organization's market valuations and (ii) assessing the type of business environments that enhance this relationship. By examining the consequences of these analyses, our study helps discern *if* and *when* organizations should engage in endeavors to build such IT-enabled OAC capabilities.

In addition, our theory shows *how* organizations use their ITs to build OAC capabilities. An interdisciplinary examination is necessary to assess ways to build IT-enabled OAC capabilities because using ITs to build OM capabilities requires OM departments that understand the dynamics of IT. Further, using IT to build organizational capabilities is a complex endeavor (Banker et al., 2006; Pavlou and El Sawy, 2010) and organizations leverage ITs only through carefully orchestrated mechanisms (Sambamurthy et al., 2003). For example, ITs enhance performance when organizations create appropriate IS designs to leverage their IT assets (Broadbent et al., 1999; Byrd and Turner, 2001a,b; Melville et al., 2004; Saraf et al., 2007). We use this IS design perspective to assess how ITs help build these two OAC capabilities. IS design represents how an organization structures its IS (Broadbent et al., 1999; Byrd and Turner, 2001a,b). Using the IS design perspective, we examine two IS design antecedents of OAC capabilities, integrated IS capability and business-IT alignment – a technical aspect of IS design and an aspect of strategic IS design, respectively.

By unraveling the interdisciplinary mechanisms involving IS and OM that build OAC capabilities, we present an interdisciplinary theoretical framework of IT-enabled OAC capabilities that focuses on the organizational *consequences* and IS design *antecedents* of an OM department's OAC capabilities. By studying the effects and antecedents of these two IT-enabled OAC capabilities, our theory extends previous interdisciplinary research linking the IS and OM disciplines (Banker et al., 2010; Malhotra et al., 2005). First, by assessing the relationship between IT-enabled POAC and ROAC capabilities and market valuations, we unravel how the two OAC capabilities mediate the strategic and financial value of IT. In previous research, OAC capabilities have been found to moderate the relationship between organizational capabilities, such as manufacturing flexibility and performance (Patel et al., 2012; Tu et al., 2006). We extend this body of work, which focuses upon the supporting role of OAC capabilities, by assessing *if* OAC capabilities directly enhance organizational performance and explaining *when* these effects are higher. Second, we extend the prior literature that studies the interdependencies between IS and OM capabilities (Banker et al., 2006, 2010; Malhotra et al., 2005). Our study uncovers the interdisciplinary dynamics that span the IS and OM domains and that are necessary to build OAC capabilities. Although researchers have begun to assess OAC capabilities, their antecedents are still not well examined (Tu et al., 2006). We extend the body of work studying OAC capabilities by unraveling *how* an organization's IS design structures build OAC capabilities by (i) identifying the technical and strategic IS design structures that are important for managing OM knowledge, and (ii) examining differences in the ways they influence OAC capabilities. This study presents an inducement for future research examining IT-enabled capability-building dynamics at the IS-OM interface by presenting the synergies between the IS and OM domains and by highlighting the broad principles of building capabilities.

2. Theoretical development and hypotheses

Our proposed theory examines two sets of relationships (see Fig. 1). The first set assesses whether IT-enabled POAC and ROAC capabilities have organizational consequences. Focusing on the consequential effects of the two capabilities, we examine whether ROAC capability influences an organization's market valuation, how environmental complexity moderates the relationship between ROAC capability and market valuations, and how POAC capability influences ROAC capability. In the second set of relationships, we assess how IS design enables POAC and ROAC capabilities. Specifically, we assess how integrated IS capability builds the two OM capabilities and how business-IT alignment moderates these relationships.