

Interactions among Factors Influencing Knowledge Management in Public-Sector Organizations: A Resource-Based View

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Abstract

In public administration, knowledge management (KM) is increasingly advocated for improving novelty and agility in policy development and service delivery. This study identifies factors influencing KM, theorizes their interaction effects based on the resource-based view, and assesses the impact of KM on organizational effectiveness. Physical resources invested specifically to promote KM (e.g., KM technology) are hypothesized to interact with organizational and human resources to influence public organizations' KM capability in capturing, sharing, applying, and creating knowledge. Data collected from 101 public organizations indicate that senior management championship, social capital, and employees' job expertise enhance the effectiveness of physical KM resources while organizational structure has a suppressing effect. Among them, senior management championship has the strongest enhancing effect. The findings also support the general expectation that developing a strong KM capability improves organizational effectiveness. Clarifying the interaction effects has important implications for the theoretical understanding of KM in public administration, while providing empirical evidence for the performance impact of KM informs public management.

Keywords: Knowledge Management Capability, Organizational Effectiveness, Resource-Based View, Knowledge Management Technology

Highlights:

- Physical KM resources interact with organizational and human resources
- KM capability enhances public organizations' effectiveness
- Physical KM resources are most strongly enhanced by senior management championship
- Organization structure suppresses the effect of physical KM resources

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1. Introduction

Knowledge is central to policy making and public services (Blackman et al. 2013; Kim and Lee 2006). Knowledge Management (KM) has been found to be instrumental in policy development (Riege and Lindsay 2006), law enforcement (Chen et al. 2003), crisis and disaster management (Yates and Paquette 2011), health and human services (Huang 2014), and electronic government (Metaxiotis and Psarras 2005), to name a few. As public organizations face increasing pressure to innovate in service delivery and improve performance (Hartley et al. 2013), KM is seen as potentially useful, especially for dealing with “wicked” public problems that are unstructured, lack one-off solutions, and require public managers to work, share, apply, and create knowledge across many agencies, organizations, and citizen groups (Dawes et al. 2009; Weber and Khademian 2008). In line with this, Wiig (2002) suggests that KM can enhance decision making within public services, aid the public to participate effectively in policy decision making, build competitive societal intellectual capital capabilities, and develop a knowledge-competitive work force. With many public administration tasks and services being knowledge-intensive in nature (Papavassiliou et al. 2003; Willem and Buelens 2007), excelling in KM can potentially enhance public organizations’ effectiveness.

Two trends in public administration highlight the relevance of developing strong KM capability in public organizations. First, the mounting human capital crisis in many public organizations due to downsizing, resignation, or retirement calls for more effective capturing of knowledge to minimize knowledge loss (Hu 2010; Liebowitz 2004; Rubenstein-Montano et al. 2001). For instance, a study of police work found that the mass retirement of baby boomers had led to the dissipation of critical knowledge (e.g., knowledge of services and

functions provided by specialized police groups and units), knowledge of processes, procedures, and policies of handling special assignments, and knowledge of navigating the organizational bureaucracy to obtain expeditious results (Hu 2010). Regular knowledge capture can retain intellectual capital, facilitate the training of new employees and their assimilation of institutional memory (Kim and Lee 2006), and minimize disruptions to the functioning of agencies. In some public services, disruptions can be catastrophic. For example, at United States' National Aeronautics and Space Administration agency, personnel cuts involving the elimination of one-third of a space shuttle's program staff affected the agency's ability to support shuttle flights safely (Liebowitz 2004). KM could help to mitigate some of the negative impact of employee turnover, which is often inevitable.

Second, as public organizations increasingly use information technology to collaborate with one another, there is a greater need to develop strong capabilities in sharing, applying, and creating knowledge. For instance, more and more transnational public-sector knowledge networks are being formed to facilitate knowledge sharing across national boundaries and collaboration on critical global issues. The success of these networks depends heavily on participating agencies' abilities in sharing and applying valuable knowledge (Dawes et al. 2012). These networks also accelerate the flow and generation of knowledge within and across agencies, which places a greater demand on an organization's KM capability.

Both researchers and practitioners agree that investing in KM technology and motivating employees' participation by providing KM incentives are crucial first steps in developing KM capability (Brown and Brudney 2003; Currie et al. 2008; Dawes et al. 2009; Kim and Lee 2006; Syed-Ikhsan and Rowland 2004). Nevertheless, it is increasingly recognized that the impact of these KM-specific investments may be contingent upon organizational and social contexts. For instance, Dawes et al. (2009) emphasize that

technology is necessary but not sufficient for the success of knowledge sharing in public-sector knowledge networks; Currie et al. (2008) observed in case studies of public hospitals that political considerations could inhibit knowledge transfer through KM systems; Seba et al. (2012) interviewed police officers and found that issues related to trust, leadership, and structure were frequently identified as barriers to knowledge sharing. Despite the anecdotal evidence, there is still a lack of theoretical explanation and empirical assessment of the magnitude of the interaction effects. This study addresses the gap by proposing a model based on the theory of resource-based view to clarify how KM-specific investments interact with organizational and social resources to influence the development of KM capability, and empirically assessing the model.

Although KM is gaining a foothold at different levels of public administration globally (Janowski and Ojo 2009), empirical evidence for the performance impact of KM is still limited. The growing investment of public resources into KM creates a pressing need to understand how the investments translate into performance improvement. This study proposes that investments in KM (e.g., technology) improve organizational effectiveness through enhancing KM capability. KM capability is conceptualized as the additive and formative aggregate of an organization's abilities in knowledge capture, sharing, application, and creation. Past studies have mostly focused on knowledge sharing (e.g., Amayah 2013; Currie et al. 2008; Seba et al. 2012; Willem and Buelens 2007). Our conceptualization is more encompassing and extends prior research by accounting for the reality that KM in organizations involves more than knowledge sharing. In sum, the objectives of this study are: 1) examine how KM-specific investments interact with organizational and social resources to influence the development of KM capability and 2) empirically assess the impact of KM capability on organizational effectiveness.

2. Conceptual Background

The theoretical basis of our proposed model, the resource-based view (RBV), will be described first. This is followed by a review of the literature to identify factors that are likely to influence KM and a categorization of the factors based on RBV. The conceptualization of KM capability is then discussed.

2.1 Resource-Based View

RBV highlights the importance of resources and capabilities in supporting organizational survival, growth, and overall effectiveness (Barney 1991; Wernerfelt 1984). Organizations build upon and exploit the pool of resources they own or have access to. Three important categories of resources identified in RBV are physical, organizational, and human resources (Barney 1991). Physical resources are typically tangible and consist of plant and equipment, raw materials, financial instruments, geographic location, and information technology (IT). Organizational resources include formal reporting structure as well as planning, controlling, coordination, and management systems. Human resources include experience, judgment, insights, and social relationships of employees.

Research adopting RBV also recognizes that resources rarely act independently in creating value. For example, Wade and Hulland (2004) concluded that the performance effects of resources related to information systems depend on how well they are integrated with and complemented by organizational and human resources. Black and Boal (1994) note that resources can have enhancing or suppressing effects on one another: an enhancing relationship exists when one resource magnifies the impact of another resource. A suppressing relationship exists when the presence of one resource diminishes the impact of another.

RBV suggests that resources are transformed into outputs of greater value through various capabilities in deploying resources (Barney 1991; Grant 1991) Capabilities are

repeatable patterns of actions in the use of resources to create value in the forms of products and services. Capability subsumes the notion of organizational competency and is rooted in skills and processes (Prahalad and Hamel 1990). It can include skills such as managerial ability or processes such as knowledge sharing. Overall, RBV posits that resources contribute to the development of capabilities and strong capabilities are likely to improve organizational effectiveness.

RBV originated from the private sector but it is increasingly being applied as a theoretical basis for studying public organizations, which also rely on resources and capabilities to deliver public value to key stakeholders (Piening 2013). For example, drawing upon RBV, Melián-González et al. (2010) identified key resources in a state university to be information technology, classrooms, information resources, networks with other organizations, and educational materials. The key capabilities include capturing the needs of the society, communicating the university's offer of training, and managing the university's teaching facilities. In a study of a public health care service provider, Pablo et al. (2007) found that the capability of learning through experimenting is developed in response to the need for continual performance improvement in spite of reduced financial resources. RBV emphasizes the use of internally available resources and is clearly relevant to the public sector, which focuses on internal resources rather than competitive market behavior (Pablo et al. 2007). The inside-out perspective is especially appropriate for understanding how value is created from entities within public organizations.

2.2 Key Resources in Knowledge Management

To identify resources that influence the success of KM, we reviewed prior studies of organizations in the public as well as private sectors. As summarized in Table 1, factors that have been found to influence KM in private organizations include KM technology, non-IT KM investment to promote KM (e.g., KM incentives, KM training), organizational structure,

senior management championship, social capital, and job expertise. Among them, KM technology and KM training are acquired financially through purchases while KM incentives are typically offered in financially valuable forms (e.g., rewards, bonus, gifts). They are therefore considered as physical resources according to RBV. Organizational structure and senior management championship relate to the reporting structure and management mechanisms and are therefore organizational resources. Social capital and job expertise focus on interpersonal relationships and human capital and are clearly human resources.

Table 1. Review of Key Factors Influencing KM in the Private Sector		
KM Factor and Studies	Definition	Nature of Factor
KM Technology (Chuang 2004; Gold et al. 2001; Tanriverdi 2005)	The availability of information and communication technology facilitating various KM activities	Physical Resources
Non-IT KM investment (Bock et al. 2005; Kankanhalli et al. 2005; Kulkarni et al. 2006-2007)	Non-technology-related financial investments to promote KM (e.g., incentives, training, and support)	
Organizational Structure (Chuang 2004; Gold et al. 2001; Lee and Choi 2003; Zheng et al. 2010)	The formal allocation of work roles and administrative mechanisms to control and integrate work activities	Organizational Resources
Senior Management Championship (Chuang 2004; Kulkarni et al. 2006-2007)	The extent to which an organization's senior management advocates the adoption of KM tools and practices	
Social Capital (Chuang 2004; Gold et al. 2001; Lee and Choi 2003)	The sum of actual and potential resources embedded within, available through, and derived from the network of relationships in an organization	Human Resources
Job Expertise (Kankanhalli et al. 2005; Kulkarni et al. 2006-2007)	The level and range of specialized knowledge and skills of employees	

KM technology is a physical KM resource that refers to the availability of information and communication technology facilitating the capture, sharing, application, and creation of knowledge (Lee and Choi 2003). Technology is a key enabler of KM and modern KM initiatives typically involve the implementation of technologies such as electronic knowledge repositories, expert directories, and discussion forums. Technology can provide a virtual platform for KM to take place (Gold et al. 2001) and affords efficiency in a way that is not easily substitutable by other physical resources such as paper-based file

repositories. The other physical KM resource, *non-IT KM investment*, refers to non-technology-related financial investments in promoting KM, such as rewards, training, and helpdesk support (Holsapple and Joshi 2000). Rewards can kick-start KM by motivating employees to share knowledge (Bock et al. 2005), while training and helpdesk support ensure that employees have the relevant skills to participate in KM (Jennex and Olfman 2001).

Organizational structure is an organizational resource that relates to the formal allocation of work roles and administrative mechanisms for controlling and integrating work activities (Child 1972). Organizational structure dictates the formal channels through which knowledge flows in an organization and a rigid structure can hinder the flow of knowledge. *Senior management championship* refers to the extent to which an organization's senior management advocates the adoption of KM technologies and practices (Purvis et al. 2001). It can provide the political impetus for employees to participate in KM.

Social capital is a human resource that refers to the sum of actual and potential resources embedded within, available through, and derived from the network of interpersonal relationships in an organization (Nahapiet and Ghoshal 1998). Key aspects of social capital are shared understanding, trust, norm of collaboration, norm of reciprocity, and identification (Kankanhalli et al. 2005). Interpersonal relationship is a key channel through which knowledge flows among employees formally or informally. Another human resource important to KM is *job expertise*, which refers to the level and range of employees' knowledge and skills (Wiig 1993). Deep and diverse expertise is a critical factor of production determining the success of KM (Lee and Choi 2003).

Prior studies of the private sector have improved our understanding of the key resources affecting KM. However, there have been some indications that findings from the private sector may not directly apply to the public sector. Specifically, Currie et al. (2008) observed that

political considerations in public-sector organizations inhibited knowledge transfer through technology and rendered the generic replication of KM technology from the private sector ineffective. Similarly, Butler et al. (2008) suggests that KM technologies should be designed to align with the needs of public-sector organizations. Public organizations differ fundamentally from private organizations in that they are often owned collectively by political entities, funded largely by taxation, and constrained by political demands and regulations rather than competitive forces (Bozeman 1987). Public-sector organizations may be constrained by their specificities to focus on resources that are more available and amenable to active management to them. It is therefore necessary to study public organizations in their own right.

The key findings of studies that examined KM in public-sector organizations are summarized in Table 2. The review shows that while the resources pertinent in the private sector are also relevant in the public sector, senior management championship is frequently identified as an important resource. It can be observed that prior studies have mostly focused on knowledge sharing or transfer, and examined the direct effects of resources. This study seeks to extend the research on KM in public organizations by 1) integrating various physical, organizational, and human resources in a single model and studying them simultaneously to assess their relative importance in KM, 2) employing an augmented conceptualization of KM capability that comprises knowledge sharing as well as knowledge capture, application, and creation to capture the reality that KM involves more than sharing, and 3) examine how physical KM resources interact with organizational and human resources.

Table 2. Review of Key Factors Influencing KM in the Public Sector			
Study	Key Findings Related to KM	Resources Identified	Method and Sample
Amayah (2013)	<i>Reward</i> is negatively related to knowledge sharing, while <i>social interaction</i> is positively related	- Non-IT KM investment - Social capital	Survey of 461 employees at an academic institution
Brown and Brudney (2003)	<i>IT</i> offers knowledge benefits that are useful for deterring crime	KM technology	Survey of 314 officers in a police department
Currie et al. (2008)	<i>Political considerations</i> in a public hospital inhibited knowledge transfer through technology and rendered the generic replication of KM systems from the private sector ineffective	Senior management championship	Case study of a KM system in a public hospital
Dawes et al. (2009)	<ul style="list-style-type: none"> - <i>Technology</i> is necessary but not sufficient for successful sharing in public-sector knowledge networks (PSKN) - Project success depends on <i>leadership</i> and management practices, and a culture that provides <i>incentives and rewards</i> for knowledge sharing - Acquiring legal authority for a PSKN is a necessity. Regardless of structure, mobilizing <i>political support</i> really helps - Lack of sufficient <i>trust</i> can be a powerful inhibitor to PSKNs - Barriers related to diverse organizations with different missions, priorities, and goals are serious, but amenable to creative management such as establishing <i>relationships and among key individuals</i> with a shared vision 	<ul style="list-style-type: none"> - KM technology - Non-IT KM investment - Senior management championship - Social capital 	“Baker's dozen” of lessons the authors culled from research and their own action research on the building of public sector knowledge networks over 15 years
Handzic (2011)	<i>Leadership</i> is positively related to activities that generate new or transfer existing knowledge	Senior management championship	Survey of 185 European senior civil servants
Kim and Lee (2006)	<ul style="list-style-type: none"> - <i>IT usage</i> and performance-based reward system were positively related to public and private employees' knowledge sharing capabilities - <i>IT usage</i> had the strongest effect in public organizations - Public employees perceived lower levels of <i>IT usage</i> and performance-based reward system 	<ul style="list-style-type: none"> - KM technology - Non-IT KM investment 	Survey of 322 employees in five public-sector and five private-sector organizations in South Korea
Seba et al. (2012)	Organizational <i>structure, leadership, and trust</i> were frequently identified as barriers to knowledge sharing by interviewee	<ul style="list-style-type: none"> - Organizational structure - Senior management championship - Social capital 	Interviews of 15 police officers at Dubai Police Force
Syed-Ikhsan and Rowland (2004)	<i>ICT</i> infrastructure and <i>directives from politicians</i> are positively related to individual employees' performance of knowledge transfer	<ul style="list-style-type: none"> - KM technology - Senior management championship 	Survey of 204 public employees in Malaysia
Willem and Buelens (2007)	<i>Formal systems</i> (e.g., formal procedures, rules, procedures) is negatively related to the effectiveness of interdepartmental knowledge sharing, while <i>incentive and trust</i> are positively related	<ul style="list-style-type: none"> - Non-IT KM investment - Organizational structure - Social capital 	Survey of 358 Belgian public sector workers

2.3 KM Capability

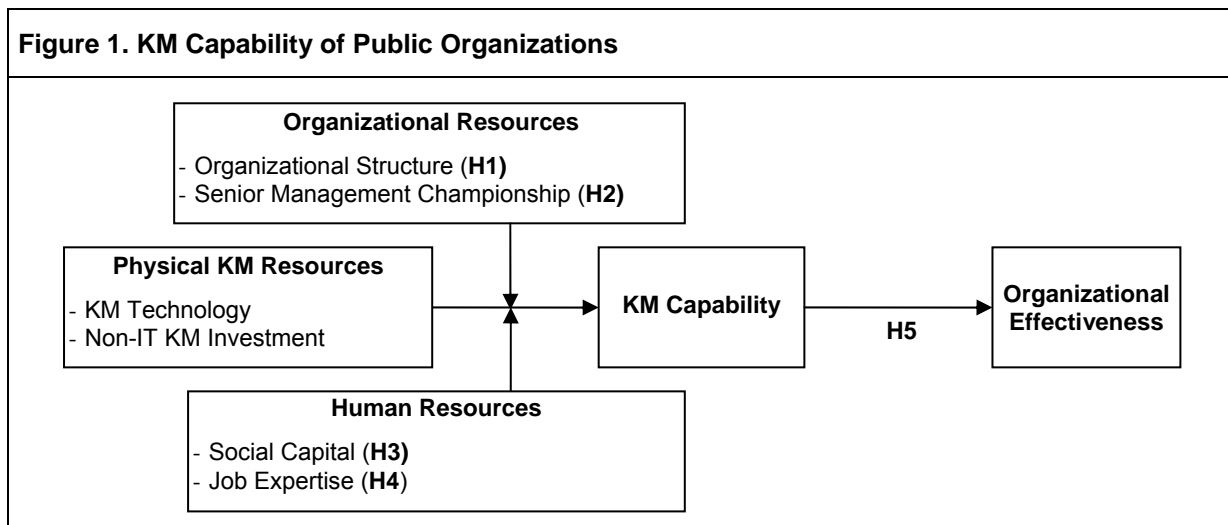
Based on the concept of capability in RBV, KM capability can be viewed as an organization's ability in exploiting and deploying resources to improve the management of knowledge. At the organization level, KM capability can be viewed as an additive or formative aggregate of an organization's ability in capturing, sharing, applying, and creating knowledge (Alavi and Leidner 2001; Gold et al. 2001; Tanriverdi 2005). *Knowledge capture* involves the collection, organization, and storage of knowledge for future retrieval. Explicit knowledge may be captured in electronic knowledge repositories and document management systems, while tacit and less codifiable knowledge can be distributed among employees using expert directories that connect knowledge seekers to experienced employees. Knowledge can also be captured from external sources, such as public forums and social networking websites. *Knowledge sharing* is concerned with the flow of knowledge among employees. It can be facilitated formally through implementing discussion forums and mentorship programs, or informally through fostering social networks in an organization. *Knowledge application* focuses on the utilization of existing knowledge to create value. It involves bringing existing knowledge to bear on organizational problems at hand or leveraging existing knowledge assets to improve products and services. *Knowledge creation* refers to the generation of new knowledge. The conversion between explicit and tacit knowledge through socialization, externalization, combination, and internalization are important mechanisms through which knowledge is created in organizations (Nonaka and Takeuchi 1995). Interpersonal interactions and relationships are instrumental in generating the openness, critical thinking, and awareness of past experiences necessary for knowledge creation.

Although different organizations may place different emphasis on the capture, sharing, application, and creation of knowledge, these activities should be viewed as synergistic rather

than competing at the organization level (Tanriverdi 2005). For example, knowledge sharing is likely to be more successful in organizations that regularly capture and store knowledge; knowledge sharing can stimulate knowledge application and creation. These activities typically occur concurrently rather than sequentially and independently in organizations. Organizations that excel in all four activities are likely to benefit from the super-additive value synergies and perform better than others. Therefore, KM capability should be conceptualized in a way that takes the synergy into account.

3. Research Model and Hypotheses

Based on RBV and our review of prior KM studies, we propose that the physical resources invested specifically to promote KM interact with organizational and human resources to influence KM capability. KM capability, in turn, is hypothesized to improve the organizational effectiveness of public organizations. The research model is shown in Figure 1.



As identified previously, key physical KM resources include KM technology and non-IT KM investment. KM can be supported by a variety of technology, such as knowledge repositories, expert directories, lessons learned systems, and communities of practice. *KM technology* enables knowledge capture, sharing, application, and creation by providing mechanisms for storing and retrieving knowledge (Alavi and Leidner 2001). Technology

offers unparalleled capacity for accumulating and organizing knowledge and greatly improves the efficiency of knowledge flow in organizations. The importance of KM technology is well established in prior studies of public as well as private organizations (e.g., Chuang 2004; Gold et al. 2001; Kim and Lee 2006; Lee and Choi 2003; Tanriverdi 2005).

To promote KM, organizations also undertake *non-IT KM investment* that includes rewards, KM training, and helpdesk support. Rewards can extrinsically motivate employees to overcome the tendency to hoard knowledge and share knowledge more actively (Bartol and Srivastava 2002; Kulkarni et al. 2006-2007), especially in the initial stages of KM initiatives (Bock et al. 2005). Investments in providing KM training and helpdesk support can familiarize employees with KM technologies and practices and equip them with the skills necessary to participate in knowledge sharing, application, and creation. Prior studies found that these non-IT KM investments significantly improve the success of KM (e.g., Kim and Lee 2006; Kulkarni et al. 2006-2007; Lin 2007).

While it is clear that physical KM resources are necessary for the development of KM capability, there has been less understanding on how they interact with the other resources. KM requires the active participation of employees, whose actions are embedded in the culture, values, and social norms of their organizations. Physical KM resources are therefore likely to interact with (i.e., enhance or suppressed by) organizational and human resources in the development of KM capability. The potential interaction effects are discussed next.

3.1 Interactions between Physical and Organizational Resources

Our review indicates that organizational structure and senior management championship are the salient organizational resources that can influence KM. *Organizational structure* varies in the degree of centralization and formalization (Chen and Huang 2007; Lee and Choi 2003). Centralization refers to the locus of decision authority and control in an organization (Lee and Choi 2003). Centralization of decision making often increases communication complexity

and time needed, which may introduce distortion and discontinuity of ideas and knowledge as they are passed along multiple levels of authority (Lee and Choi 2003; Pertusa-Ortega et al. 2010; Zheng et al. 2010). In contrast, a more permeable structure has been found to facilitate knowledge flow (Symon 2000). Formalization is the degree to which decisions and working relationships are governed by formal rules, standard policies, and prescribed procedures (Lee and Choi 2003). It is the main mechanism through which organizations supervise the behavior of employees and coordinate employees and functions. In a structure loaded with formal rules and procedures, the need to check and ensure adherence may discourage employees from participating in cross-boundary KM activities such as knowledge sharing and creation (Lee and Choi 2003).

Although public organizations are typically more centralized and formalized compared to private organizations (Rainey and Bozeman 2000), the movement towards new public management has prompted some public organizations to adopt new modes of control that are less centralized and formalized (Hoggett 2007). It is therefore relevant to assess whether the development of KM capability varies with the degree of centralization and formalization. We hypothesize that the impact of physical KM resources is weaker in organizations with a more rigid structure. In highly centralized and formalized organizations, bureaucratic control, rules, and procedures may manifest as restrictive functions in KM technology, such as access control and filtering; the time and effort involved in verifying compliance with decision makers and rules may outweigh the perceived benefits associated with KM incentives, training, and helpdesk support, thwarting employees' participation in KM. Therefore, physical KM resources may be less effective in driving the development of KM capability in highly structured organizations.

H1a: The positive effect of KM technology on KM capability is suppressed in public organizations with a highly centralized and formalized organizational structure.

H1b: The positive effect of non-IT KM investment on KM capability is suppressed in public organizations with a highly centralized and formalized organizational structure.

Senior management championship for KM is commonly expressed through articulating a KM vision, assigning knowledge champions, and encouraging employees to share, apply, and create knowledge (Desouza 2003). Through these, senior managers send strong signals regarding an organization's emphasis on KM. Studies of public organizations have identified the support of leaders as pivotal in the success of KM (e.g., Dawes et al. 2009; Handzic 2011; Seba et al. 2012; Syed-Ikhsan and Rowland 2004). Senior management championship creates the political impetus for employees to engage in KM, and they are likely to be more motivated to make use of the physical KM resources provided to demonstrate their compliance with managerial expectations. In other words, the effects of physical KM resources are likely to be stronger in organizations with strong senior management championship.

H2a: The positive effect of KM technology on KM capability is enhanced in public organizations with strong senior management championship.

H2b: The positive effect of non-IT KM investment on KM capability is enhanced in public organizations with strong senior management championship.

3.2 Interactions between Physical and Human Resources

Social capital and job expertise are the salient human resources related to KM, as identified in our review. *Social capital* manifests in terms of shared understanding, generalized trust (benevolence and integrity) among employees, social norms of openness, collaboration, and reciprocity, and organizational identification (Nahapiet and Ghoshal 1998). Social capital is important in KM because social relationships and interactions among employees are important passages through which knowledge flows. In organizations with strong social

capital, physical KM resources are likely to be utilized more to exchange knowledge within and across networks of social relationships and therefore more effective in the development of KM capability compared to when they are underused. In organizations with weak social capital, even when physical KM resources are abundant, knowledge flow is likely to be arduous and the physical resources are therefore less effective.

H3a: The positive effect of KM technology on KM capability is enhanced in public organizations with strong social capital.

H3b: The positive effect of non-IT KM investment on KM capability is enhanced in public organizations with strong social capital.

Job expertise is an important source of knowledge in organizations (Lee and Choi 2003). Employees accumulate expertise through formal education, training provided by their organizations, on-the-job experience, and knowledge acquired from informal sources such as special interest groups. Other than specific knowledge about one's own job area, employees often need to have some understanding of other related areas to complete their job tasks. Deep and diverse expertise can promote synergistic interactions in knowledge sharing, application, and creation (Madhavan and Grover 1998). With strong job expertise as input, the use of physical KM resources is likely to result in more successful knowledge capture, sharing, application, and creation.

H4a: The positive effect of KM technology on KM capability is enhanced in public organizations where employees generally have strong job expertise.

H4b: The positive effect of non-IT KM investment on KM capability is enhanced in public organizations where employees generally have strong job expertise.

3.3 Effect of KM Capability on Organizational Effectiveness

A central tenet underlying the development of KM capability is its potential in improving

organizational effectiveness (Syed-Ikhsan and Rowland 2004; Wiig 2002). Organizational effectiveness is multi-dimensional and more appropriate for understanding the impact of KM capability than aggregated measures, which may be confounded by many uncontrollable economic, social, and environmental factors (Gold et al. 2001). Public organizations are also less concerned with financial return and objective performance measures are not always available in the public sector (Kim 2005). In an extensive cluster analysis of performance measures used in studies of public and private organizations, Baruch and Ramalho (2006) identified operational efficiency, success in obtaining budget, customer orientation, and service quality to be the key dimensions of organizational effectiveness. Kim (2005) emphasizes the importance of assessing public organizations' ability in accomplishing their core mission or institutional mandate. It is important to consider all these relevant dimensions in the measurement of organizational effectiveness.

While studies of private organizations have shown that KM capability improves organizational effectiveness (e.g., Lee and Choi 2003; Tanriverdi 2005), there has been a lack of empirical evidence of its impact in public organizations. KM capability helps private organizations identify means to improve organizational effectiveness, and provides competitive advantage by driving innovation and the development of differentiated products and services (Hsu and Sabherwal 2011). It is believed that KM can also improve the effectiveness of public organizations. Given that many public administration tasks are knowledge intensive in nature (Papavassiliou et al. 2003; Willem and Buelens 2007), developing a strong KM capability should improve the effectiveness of public organizations. Specifically, KM is seen as valuable in supporting public administration tasks and problems that require public managers to work and share knowledge across multiple agencies, organizations, and citizen groups (Dawes et al. 2009; Weber and Khademian 2008). KM is also potentially useful in policy development, implementation, and public service delivery

(Blackman et al. 2013). Public organizations that possess a strong KM capability should also experience a learning effect which enhances its ability to create value and respond to demands over time, leading to improved organizational effectiveness.

H5: KM capability is positively related to the organizational effectiveness of public organizations.

4. Research Method

Data for assessing the proposed model were collected through a survey of public organizations. This section describes the development of survey instrument and data collection. Following the recommendation of Lee et al. (2012) for survey research in public administration, we report the questionnaire development, survey design type, target population, sampling frame, sampling method, sample size, response rate, response mode, and strategies for addressing nonresponse.

4.1 Survey Instrument Development and Pilot Study

The survey instrument was developed meticulously in three steps: First, survey questions that could be used to measure the constructs were identified from prior studies. Second, conceptual validation of the preliminary survey instrument was conducted using the sorting routine recommended by Moore and Benbasat (1991). Third, the refined survey instrument was tested in a pilot study to identify further improvements to the instrument as well as data collection procedure. The pilot study recruited 124 part-time postgraduates pursuing the Master in Public Administration, Master of Business Administration, and Master of Computing degrees in a large public university. They were employed in organizations that have KM programs. Statistical results indicate that the survey instrument has good reliability as well as convergent validity and discriminant validity.

The operational definition of constructs is summarized in Table 3. All constructs in

the proposed model were measured with questions adapted from prior studies. Questions that were developed for private-sector organizations were reworded slightly to suit the context of public organizations. For example, terms such as customers, strategic alliances, and profit were reworded to citizens and businesses, strategic partners, and income and/or budget respectively. The final survey questions are listed in Appendix A.

Table 3. Operational Definition of Constructs	
Construct	Operational Definition
KM technology	The degree to which technology for sharing, search and access, systematic storage, and retrieval/gathering of knowledge is available in an organization
Non-IT KM investment	The degree to which monetary rewards, bonus, and gifts are awarded to employees for participating in KM activities and the extent to which training and helpdesk support are provided
Organizational structure	The need to consult or seek approval from senior management in decision making and the degree to which rules and procedures are detailed and referred
Senior management championship	The extent to which senior management articulates the vision and goals of KM, supports the development of KM, and is actively involved in the promotion of KM
Social capital	The level of shared understanding, trust (benevolence and integrity), norm of collaboration, norm of reciprocity, and identification among organizational members
KM capability	The extent to which an organization is able to capture, share, apply, and create knowledge related to citizens, organizational performance, services, and work processes
Organizational effectiveness	The level of financial success, citizen orientation, service quality, and ability to accomplish core mission

4.2 Data Collection and Sample Demography

The target population of this study is public-sector organizations that had formal KM programs. Our sampling frame consists of 367 public organizations listed in a government directory in Singapore. All the organizations were contacted and received a survey package containing the cover letter, survey questionnaire, and postage-paid reply envelop. The cover letter explained the potential value of KM in public organizations and described the survey as part of a study that sought to understand KM in public organizations. Recipients of the survey package were asked to complete the survey or forward it to a senior manager who was responsible for KM. To minimize nonresponse error, we encouraged response by sending an email reminder four weeks after mailing the survey package (second wave) and a phone call reminder another four weeks later (third wave). We received a total of 101 responses,

amounting to a response rate of 27.5 percent. To assess nonresponse bias, we compared the demographic profiles of respondents in different waves and did not observe any significant difference between the early and late respondents.

Most of the organizations in the final sample provided services related to trade/economic development (15.8%), education (13.9%), environment/land development (13.9%), and healthcare (13.9%). Most organizations had 50-199 employees (49.5%) and 18.8% had 200-599 employees. All of the organizations were using more than one type of KM technology, with the popular ones being knowledge repository (83.2%), document management system (71.3%), learning management system (35.6%), workflow management system (29.7%), communities of practice (26.7%), and expert directories (22.8%). Most organizations had adopted KM tools and practices for two years or more (73.3%) and had appointed at least two employees to oversee KM (69.3%). The nature of service, organization size, number of employees overseeing KM, and number of years KM had been implemented were included as control variables in the proposed model.

5. Data Analysis

Partial Least Squares (PLS) analysis was conducted to assess the proposed model because some constructs were measured formatively (Chin 1998). Formative measures have items that tap into different themes and they are neither interchangeable nor expected to covary. For example, KM technology is formative because it is possible for an organization to provide extensive technology for storing knowledge (item KT3 in Appendix A) but little technology for knowledge sharing among employees (item KT1). Other than KM technology (KT), non-IT KM investment (NI), knowledge capture, sharing, application, creation, and organizational effectiveness (OE) were measured formatively. Other constructs were measured reflectively, that is, their measurement items have a common theme and are likely to covary. PLS has the additional advantage of allowing the simultaneous assessment of both measurement and

structural models (Chin 1998; Götz et al. 2010).

In the data analysis, the multi-dimensional constructs of organizational structure, social capital, and KM capability were modeled as second-order constructs. *Organizational structure* (OS) comprises the first-order constructs of centralization (CT) and formalization (FM); *Social capital* (SC) is composed of shared understanding (SU), benevolence (BN), integrity (IT), norm of collaboration (NM), norm of reciprocity (RE), and identification (ID); *KM capability* (KC) consists of knowledge capture (CP), sharing (SH), application (AP), and creation (CR).

5.1 Measurement Model Analysis

Reflective and formative measurement models were analyzed differently (Chin 1998). Reflective measures were assessed for reliability, convergent validity, and discriminant validity. Reliability was estimated using Cronbach's Alpha and composite reliability (see Table 4). All constructs achieved scores above the recommended value of 0.70. Convergent validity was assessed by calculating item loading and average variance extracted (AVE). All item loadings were significant at 0.001 level (see Table 4) and all AVEs exceeded 0.5, indicating satisfactory convergent validity. Discriminant validity was assessed through factor analysis and a comparison of AVEs with construct correlations. The result of factor analysis was favorable as all items loaded highly on their stipulated constructs but not on other constructs. Comparison of AVE and construct correlations indicated that none of the construct correlations exceeded the corresponding square root of AVE (see Table 5). The few correlations exceeding 0.60 were between independent and dependent variables (e.g., between KM technology and knowledge sharing). There was no significant multicollinearity among independent variables (Blalock 1963). Overall, discriminant validity was satisfactory.

Table 4. Psychometric Properties of Reflective Constructs			
Construct		Item	Loading*
Organizational Structure (OS)	Centralization (CT) $\alpha=0.89$, CR=0.93, AVE=0.82	CT1	0.78
		CT2	0.93
		CT3	0.94
	Formalization (FM) $\alpha=0.79$, CR=0.88, AVE=0.71	FM1	0.73
		FM2	0.90
		FM3	0.89
Senior Management Championship (SM) $\alpha=0.90$, CR=0.93, AVE=0.83		SM1	0.80
		SM2	0.95
		SM3	0.93
Social Capital (SC)	Shared Understanding (SU) $\alpha=0.87$, CR=0.92, AVE=0.79	SU1	0.91
		SU2	0.92
		SU3	0.86
	Benevolence (BN) $\alpha=0.88$, CR=0.94, AVE=0.89	BN1	0.95
		BN2	0.96
	Integrity (IT) $\alpha=0.94$, CR=0.97, AVE=0.94	IT1	0.97
		IT2	0.98
	Norms (NM) $\alpha=0.80$, CR=0.88, AVE=0.72	NM1	0.91
		NM2	0.73
		NM3	0.90
	Reciprocity (RE) $\alpha=0.90$, CR=0.93, AVE=0.83	RE1	0.94
		RE2	0.88
		RE3	0.91
	Identification (ID) $\alpha=0.93$, CR=0.96, AVE=0.88	ID1	0.93
		ID2	0.93
ID3		0.94	
α : Cronbach's Alpha Coefficient; CR: Composite Reliability; AVE: Average Variance Extracted; *All item loadings are significant at $p<0.001$			

For formative constructs, significance of item weight was examined to determine the relative contribution of items constituting each construct (see Table 6). All items were significant at $p<0.05$, indicating that the formative constructs had satisfactory content validity (Chin 1998).

We also assessed the extent of common method bias with Harman's one-factor test (Harman 1976). The test involves entering all constructs into an unrotated principal components factor analysis and examining the resultant variance. The threat of common method bias is high if a single factor accounts for more than 50% of the variance. The bias was not observed in our data.

	KT	NI	CT	FM	SM	SU	BN	IT	NM	RE	ID	CP	SH	AP	CR	OE
KT	N.A.															
NI	0.12	N.A.														
CT	0.28	0.20	0.90													
FM	0.15	-0.05	0.22	0.84												
SM	0.32	0.10	0.14	-0.22	0.91											
SU	0.13	0.03	-0.34	0.35	0.10	0.89										
BN	0.37	0.04	-0.39	-0.41	0.43	0.39	0.94									
IT	0.25	0.09	-0.31	-0.14	0.39	0.14	0.41	0.97								
NM	0.25	0.05	-0.43	-0.27	0.39	0.41	0.30	0.38	0.85							
RE	0.37	0.06	-0.44	-0.26	0.37	0.44	0.40	0.26	0.43	0.91						
ID	0.25	0.02	-0.42	-0.28	0.23	0.41	0.48	0.40	0.40	0.33	0.94					
CP	0.11	0.12	0.42	0.12	0.14	0.17	0.28	0.10	0.21	0.13	0.16	N.A.				
SH	0.58	0.02	-0.19	-0.45	0.37	0.51	0.48	0.40	0.33	0.24	0.34	0.10	N.A.			
AP	0.37	0.00	-0.35	-0.28	0.25	0.31	0.57	0.60	0.40	0.42	0.23	0.42	0.17	N.A.		
CR	0.36	0.10	0.20	-0.48	0.52	0.50	0.48	0.56	0.54	0.39	0.14	0.12	0.21	0.33	N.A.	
OE	0.32	0.03	-0.29	-0.38	0.41	0.34	0.32	0.32	0.32	0.45	0.31	0.04	0.40	0.37	0.34	N.A.
Mean	5.25	3.50	4.84	5.00	4.59	5.52	4.89	5.26	5.29	4.77	5.50	4.98	5.32	5.51	5.09	4.94
SD	1.06	1.17	0.91	0.93	1.35	0.69	0.90	0.85	0.68	0.89	0.85	0.92	0.81	0.75	1.07	0.90

*Bold diagonals represent the square root of average variance extracted for reflective constructs
N.A.: AVE (and its square root) is not calculated for formative construct; SD: Standard Deviation

Construct	Item	Weight [#]	T Value	Construct	Item	Weight [#]	T Value
KM Technology (KT)	KT1	0.35	3.30	Knowledge Capture (CP)	CP1	0.43	5.72
	KT2	0.19	2.18		CP2	0.21	1.69
	KT3	0.49	1.68		CP3	0.26	2.39
	KT4	0.37	2.78		CP4	0.34	1.98
Non-IT KM investment (NI)	NI1	0.38	1.74	Knowledge Sharing (SH)	SH1	0.28	1.76
	NI2	0.13	2.36		SH2	0.37	1.66
	NI3	0.12	2.42		SH3	0.25	1.81
	NI4	0.35	4.65		SH4	0.51	1.99
	NI5	0.21	2.51	Knowledge Application (AP)	AP1	0.39	3.03
Organizational Effectiveness (OE)	OE1	0.34	2.34		AP2	0.50	4.50
	OE2	0.13	2.51		AP3	0.22	2.20
	OE3	0.44	4.16		AP4	0.15	1.70
	OE4	0.15	2.27	Knowledge Creation (CR)	CR1	0.10	1.73
	OE5	0.27	2.42		CR2	0.29	1.81
			CR3		0.59	4.34	
			CR4		0.25	2.61	

[#]All item weights are significant at p<0.05

5.2 Structural Model Analysis

The hypotheses were tested through structural model analysis. Interaction effects were assessed using the latent variable modeling approach (Chin 1998). The results are shown in Table 7. Supporting our hypotheses, KM technology significantly interacted with

organizational structure (H1a), senior management championship (H2a), and social capital (H3a) to influence KM capability. Contrary to our expectation, KM technology did not interact with job expertise (i.e., H4a was not supported). Non-IT KM investment significantly interacted with senior management championship (H2b), social capital (H3b), and job expertise (H4b). However, it did not interact with organizational structure (i.e., H1b was not supported). KM capability, in turn, had a significant positive effect on organizational effectiveness (H5).

Among the organizational and human resources, senior management championship had the strongest interaction effect. None of the control variables had significant effect. The resources and their interactions accounted for 64% of the variance in KM capability, which in turn explained 39% of the variance in public organizations' effectiveness. Overall, there was considerable support for the proposed model.

Table 7. Result of Hypothesis Testing			
Relationship	Path Coefficient	T Value	Test of Hypothesis
Effects related to only Physical KM Resources			
KM Technology (KT) → KM Capability	0.14*	1.83	N.A.
Non-IT KM investment (NI) → KM Capability	0.11*	1.97	
Effects related to Organizational Resources			
Organizational Structure (OS) → KM Capability	-0.21**	2.70	N.A.
Senior Management Championship (SM) → KM Capability	0.13*	1.65	
KT*OS → KM Capability	-0.14*	1.75	H1a is supported
NI*OS → KM Capability	-0.03	0.31	H1b is not supported
KT*SM → KM Capability	0.23**	2.99	H2a is supported
NI*SM → KM Capability	0.30**	2.98	H2b is supported
Effects related to Human Resources			
Social Capital (SC) → KM Capability	0.16*	2.38	N.A.
Job Expertise (JE) → KM Capability	0.28***	3.78	
KT*SC → KM Capability	0.12**	2.45	H3a is supported
NI*SC → KM Capability	0.21**	2.53	H3b is supported
KT*JE → KM Capability	0.08	0.73	H4a is not supported
NI*JE → KM Capability	0.21**	2.56	H4b is supported
Effects of KM Capability			
KM Capability → Organizational Effectiveness	0.34***	3.60	H5 is supported
*Significant at p<.05; **p<.01; ***p<.001			

6. Discussion and Implications

The objectives of this study are: 1) examine how KM-specific investments interact with

organizational and social resources to influence the development of KM capability and 2) empirically assess the impact of KM capability on organizational effectiveness. In this section, we first discuss the findings with respect to our hypotheses and prior literature. Limitations of this study and implications for theoretical development, future research, and practice are then identified.

The organizational resource of organizational structure suppressed the effect of KM technology but not non-IT KM investment. This suggests that rewards, training, and helpdesk support are as effective in organizations with formalized and centralized structures as in those with a less rigid structure. When attractive rewards and adequate technical support are provided, individuals may be willing to expend extra effort to transcend barriers imposed by a restrictive organizational structure to participate in KM. A plausible explanation may be that the accrued benefits of KM rewards, learning about KM tools through KM training, and increase in individual and organizational competencies through participation in KM are believed to outweigh the inconvenience associated with organizational structure.

The other organizational resource of senior management championship provides the political drive for employees to participate in KM and had significant enhancing effects as hypothesized. It had the strongest combined interaction effects among the organizational and human resources, suggesting that public employees are strongly motivated by the desire to comply with senior management. This is in line with our review of prior studies, which have emphasized the importance of senior management championship or leadership (e.g., Currie et al. 2008; Dawes et al. 2009; Handzic 2011; Seba et al. 2012; Syed-Ikhsan and Rowland 2004). This is one of the earliest organization-level studies to provide empirical evidence for the salience of senior management championship. More importantly, our findings extend prior research by looking beyond the direct effect of senior management championship to examine its interactions with physical KM resources. This clarifies the theoretical mechanisms through

which senior management championship influences KM capability. The strong enhancing effect calls for further research on the strategies of championship. Prior studies suggest that common strategies include articulating a KM vision, assigning knowledge champions, and encouraging employees to share, apply, and create knowledge (Desouza 2003). It may be useful to compare the strategies to assess their relative effectiveness or identify the contextual factors (e.g., organizational culture) influencing their effectiveness.

The human resource of social capital also had significant enhancing effects as hypothesized. Recall that social capital provides the basis (e.g., shared understanding, trust, reciprocity) for knowledge flow among employees. Although the direct effect of social capital had been assessed in studies of private organizations (e.g., Alavi and Tiwana 2002; Bock et al. 2005; Inkpen and Tsang 2005; Kankanhalli et al. 2005; Lee and Choi 2003; Wasko and Faraj 2005), there is still a lack of empirical studies on its effect in public organizations. Public administration research has mostly focused on trust (an aspect of social capital) (e.g., Dawes et al. 2009; Seba et al. 2012; Willem and Buelens 2007). This study not only provides empirical evidence for the effect and relevance of social capital in public organizations, but also indicates a direction to extend KM studies of trust in public organizations. Future research could examine trust in relation to other aspects of social capital and augment our understanding of social factors in public organizations' KM. There has been some evidence that social factors in public organizations differ and findings from the private sector may not be applicable. For example, employees in public organizations have been found to place less trust in co-workers (Kim and Lee 2006) and perceive a lower level of identification with their organizations (Willem and Buelens 2007). Related to the norm of collaboration, it has been observed that public organizations have a weaker collaborative climate in general (Sveiby and Simons 2002). These suggest that more understanding of the specific nature of social capital in public organizations is necessary.

The other human resource of job expertise was found to enhance the effect of non-IT KM investment but not KM technology. This unexpected finding may be attributable to the fact that valuable job expertise is often tacit and difficult to codify and the current KM technology offers only limited support to the capture, sharing, application, and creation of such knowledge. KM technology can capture the codifiable part of job expertise or indirectly facilitate the sharing, application, and creation of tacit knowledge by connecting employees through personalization. Yet, even with KM technology in place, the flow of tacit knowledge still depends largely on employees' willingness to share. This may explain why KM technology is not more effective in organizations where employees generally have a higher level of job expertise.

The results indicate that KM technology and non-IT KM investment may interact with different resources. KM technology is suppressed by organizational structure but non-IT KM investment is not; Non-IT KM investment is enhanced by job expertise but KM technology is not. These differences suggest the need to clearly distinguish these physical resources in future research and further examine their differential effects. For example, based on the findings of this study, it may be fruitful to investigate whether KM technology and non-IT KM investment influence knowledge capture, sharing, application, and creation differently. KM technology may play a more significant role in knowledge capture. For knowledge sharing (especially tacit knowledge), application, and creation where KM technology provides less direct support, non-IT KM investment may have a stronger effect.

KM capability was found to significantly improve organizational effectiveness, as hypothesized. This provides empirical evidence for the performance impact of KM, which is still rare but much needed given the increasing KM investment in public organizations. Although KM has been shown to improve the performance of private organizations (Lee and Choi 2003; Tanriverdi 2005), public organizations are fundamentally different (Bozeman

1987) and findings from private organizations therefore may not be applicable. Studying KM in the unique context of public sector is both timely and necessary.

6.1 Implications for Theoretical Development and Future Research

This study contributes to research by clarifying how physical KM resources interact with organization and human resources in public-sector organizations in the development of KM capability. As reviewed earlier, prior studies have mainly focused on direct effects and this study is one of the earliest to conceptualize and assess the interaction effects. Omitting significant interaction effects could lead to biased estimates of physical resources' effects. Looking beyond direct and independent effects leads to a more comprehensive and accurate theoretical understanding of how various resources simultaneously influence KM. The interaction effects also offer an explanation of why the effectiveness of physical KM resources may vary in different organizations. For instance, based on our findings, KM technology will be less effective in organizations with a centralized and formalized structure. It may be fruitful to further explore other interrelationships among the resources, such as substitution effects and three-way interactions among physical, organizational and human resources.

In addition to the interaction effects, this study also clarifies that physical KM resources influence organizational effectiveness through improving KM capability. This sheds light on the mechanism through which investments in KM translate into performance improvement. The organization-level conceptualization of KM capability in our model extends that in prior research by accounting for the synergy among knowledge capture, sharing, application, and creation rather than focusing only on one of them. Employing the multi-dimensional construct of organizational effectiveness, this study shows that KM capability improves both financial and non-financial aspects of performance. It is especially important to consider the non-financial impact of KM capability since most public

organizations are not profit driven.

The proposed model can serve as a basis for future studies of KM in public organizations. For example, the model can be expanded by considering other organizational resources such as strategic planning and inter-organizational partnerships, and human resources such as relationships with external entities (e.g., citizens, businesses). The hypotheses can be assessed with data collected from other countries or geographical regions to determine their generalizability. Measures of the model's constructs (e.g., knowledge application, organizational effectiveness), which were carefully developed and pilot-tested to ensure reliability and validity, may be useful in future studies examining similar constructs.

Given the salience of KM technology in development of KM capability, more understanding of its roles and evolution is necessary. We observed that most public organizations in our sample adopted KM technology that facilitates knowledge capture (e.g., knowledge repository and document management system). In the private sector, organizations tend to begin KM by adopting technology for capturing knowledge, and move gradually to technology that facilitates interpersonal social interactions as KM gains traction (e.g., Garud and Kumaraswamy 2005). It will be interesting to examine whether public organizations increase their adoption of other KM technologies as KM matures and whether the change influences the relative importance of various resources related to KM.

6.2 Limitations and Suggestions for Improvement

The findings of this study should be interpreted in light of several limitations, which could be addressed in future studies. First, data were collected from Singapore. Like other countries, Singapore has its own specific characteristics such as political stability and strong government support for the development of IT. Therefore, the findings may not be generalizable to other countries. We found Singapore to be an excellent context for this study since KM was rapidly adopted by public organizations in the country, albeit to varying

degrees. Nevertheless, more studies in other countries are needed to establish the robustness of the findings.

Second, the survey was cross-sectional rather than longitudinal. Since attrition is a chronic problem of longitudinal studies and our sampling frame is not large, we opted to conduct a cross-sectional survey, as with much survey research in public administration (Lee et al. 2012). While RBV provides a sound theoretical basis for hypothesizing the causal relationships among resources, KM capability, and organizational effectiveness, future studies could obtain stronger evidence for the causal effects by collecting longitudinal data.

Third, RBV focuses on resources within an organization rather than the external environment. Similarly, the proposed model based on RBV has an internal focus. The model might be augmented by accounting for environmental factors such as dynamism. Some researchers believe that public organizations experience less environmental dynamism because they rarely face direct competition and their services seldom become obsolete (Warner and Bel 2008). Others argue that public organizations often experience a more rapidly changing environment than private organizations due to regular changes in policies as a result of election cycles (Rainey 2009); changes in the environment are also tied to political considerations and are therefore less predictable (Boyne and Meier 2009; Nutt 2005). With arguments for both sides, it is interesting to examine whether including environmental factors increases the variance explained by the proposed model, and whether KM capability enhances public organizations' response to changes in the environment.

6.3 Implications for Practice

We found that physical KM resources help organizations build stronger KM capability when there are favorable organizational and human resources. Among them, senior management championship has the strongest enhancing effect. It is important to garner the support of senior public officials and ensure that their support for KM is visible to employees. Support

can take the forms of managerial participation in KM planning and implementation, communication of the expectation of employees' participation in KM, and public acknowledgment of significant contributors to KM. To gain the support of senior public officials, the potential short- to mid- term benefits of KM should be identified. Some examples of the benefits include facilitating cross-agency knowledge sharing, application, and creation in policy making, better integration of requirements from disparate stakeholders, and improvement in policy outcomes.

We found that physical KM resources are less effective in a centralized and formalized organization. Rather than changing the organizational structure to facilitate KM, we recommend a less radical approach. In some public organizations, centralization and formalization may be necessary to reduce the risks of corruption and abuse (Dunleavy and Hood 1994) and it may not be desirable to reshape organizational structure for the sake of KM. To ease the flow of knowledge through a rigid structure, organizations may opt to add some degree of flexibility instead. A formal hierarchical structure can be combined with a more self-organizing structure to promote knowledge flow (Nonaka and Takeuchi 1995). For instance, the matrix structure, where employees have dual membership in the organization's hierarchical structure and any number of cross-department or cross-agency teams at the same time, can foster cross-boundary relationships and stimulate the sharing, application, and creation of knowledge.

Social capital enhances both physical KM resources and should therefore be actively fostered. Regular social gatherings provide opportunities for employees to establish contact and mingle with others sharing common interests. The social interactions allow employees to build shared understanding, trust, and norms as they engage in conversations and exchanges. On the other hand, downsizing and contingent employment are likely to be detrimental to the formation and maintenance of social relationships. Adopting employment practices that

promote long-term rather than short-term relationships also allows social capital to develop in both depth and breadth. Promotion and compensation policies that simultaneously encourage stable job tenure and reinforce collaboration are likely to increase social capital than systems that focus exclusively on individual contributions.

Job expertise is an important input to KM and enhances the effectiveness of non-IT-KM investment. Employees' learning can be continuously nurtured through training programs. Developing an effective training program requires a thorough need analysis to identify instructional objectives and training criteria (Tannenbaum et al. 1992). Different training methods (e.g., behavior modeling, simulations) can be applied to support different needs and suit the characteristics of different trainees in terms of ability, motivation, attitude, and expectation. After training, evaluations should be conducted to assess the effectiveness of training and generate feedback for revising the training program.

7. Conclusion

The enhancing or suppressing effects of organizational and human resources should be taken into consideration when public organizations invest in physical KM resources to strengthen their KM capability. Accounting for the interaction effects prompts public managers to avoid taking an overly linear and simplistic view and adapt KM implementation to the inherent characteristics and political milieu of their organizations. This is likely to increase the success of KM, which largely originated from the private sector, in public organizations.

Given the knowledge-intensive nature of public administration, the value of developing a strong KM capability has been much anticipated and is demonstrated in this study. As KM continues to proliferate in the public sector, more studies assessing its impact are needed to establish the value of KM. Other than improving organizational effectiveness, KM is also well suited to tackle some challenges of public administration, such as human capital loss due to employee turnover and increased knowledge stock and flow due to

advances in IT. The need to better manage knowledge is likely to intensify as public organizations increasingly seek to engage citizens and businesses in co-creating public policies. Our proposed model of KM resources, KM capability, and organizational effectiveness, along with the measures, serve as a basis for further inquiry into whether KM is effective in addressing the current and future knowledge-related challenges.

References

- Alavi, M. and Leidner, D.E. 2001. "Review: Knowledge Management and Knowledge Management Systems: Conceptual Foundations and Research Issues," *MIS Quarterly* (25:1), pp. 107-136.
- Alavi, M. and Tiwana, A. 2002. "Knowledge Integration in Virtual Teams: The Potential Role of Knowledge Management Systems," *Journal of the American Society for Information Science and Technology* (53:12), pp. 1029-1037.
- Amayah, A.T. 2013. "Determinants of Knowledge Sharing in a Public Sector Organization," *Journal of Knowledge Management* (17:3), pp. 454-471.
- Barney, J. 1991. "Firm Resources and Sustained Competitive Advantage," *Journal of Management* (17:1), pp. 99-120.
- Bartol, K.M. and Srivastava, A. 2002. "Encouraging Knowledge Sharing: The Role of Organizational Reward Systems," *Journal of Leadership & Organizational Studies* (9:1), pp. 64-76.
- Baruch, Y. and Ramalho, N. 2006. "Communalities and Distinctions in the Measurement of Organizational Performance and Effectiveness across For-Profit and Nonprofit Sectors," *Nonprofit and Voluntary Sector Quarterly* (35:1), pp. 39-65.
- Black, J. and Boal, K. 1994. "Strategic Resources: Traits, Configurations and Paths to Sustainable Competitive Advantage," *Strategic Management Journal* (15:Special Issue), pp. 131-148.
- Blackman, D., Kennedy, M., Burford, S., and Ferguson, S. 2013. "Introduction to the Special Symposium on Knowledge Management and Public Administration: Good Bedfellows or Potential Sparring Partners," *International Journal of Public Administration* (36:3), pp. 151-154.
- Blalock, H.M.J. 1963. "Correlated Independent Variables: The Problem of Multicollinearity," *Social Forces* (42:2), pp. 233-237.
- Bock, G.W., Zmud, R.W., Kim, Y.G., and Lee, J.N. 2005. "Behavioral Intention Formation in Knowledge Sharing: Examining the Roles of Extrinsic Motivators, Social-Psychological Forces, and Organizational Climate," *MIS Quarterly* (29:1), pp. 87-111.
- Boyne, G.A. and Meier, K.J. 2009. "Environmental Turbulence, Organizational Stability, and Public Service Performance," *Administration & Society* (40:8), pp. 799-824.
- Bozeman, B. (ed.) 1987. *All Organizations Are Public: Bridging Public and Private Organizational Theories*. London: Jossey-Bass.
- Brown, M.M. and Brudney, J.L. 2003. "Learning Organizations in the Public Sector? A Study of Police Agencies Employing Information and Technology to Advance Knowledge," *Public Administration Review* (63:1), pp. 30-43.
- Butler, T., Feller, J., Pope, A., Emerson, B., and Murphy, C. 2008. "Designing a Core IT Artefact for Knowledge Management Systems Using Participatory Action Research in a

- Government and a Non-Government Organisation," *The Journal of Strategic Information Systems* (17:4), pp. 249-267.
- Chatterjee, D., Grewal, R., Sambamurthy, V., and Zigurs, I. 2002. "Shaping Up for E-Commerce: Institutional Enablers of the Organizational Assimilation of Web Technologies," *MIS Quarterly* (26:2), pp. 65-89.
- Chen, C.-J. and Huang, J.-W. 2007. "How Organizational Climate and Structure Affect Knowledge Management—the Social Interaction Perspective," *International Journal of Information Management* (27:2), pp. 104-118.
- Chen, H., Schroeder, J., Hauck, R.V., Ridgeway, L., Atabakhsh, H., Gupta, H., Boarman, C., Rasmussen, K., and Clements, A.W. 2003. "COPLINK Connect: Information and Knowledge Management for Law Enforcement," *Decision Support Systems* (34:3), pp. 271-285.
- Child, J. 1972. "Organizational Structure, Environment and Performance: The Role of Strategic Choice," *Sociology* (6:1), pp. 1-22.
- Chin, W.W. 1998. "Issues and Opinion on Structural Equation Modeling," *MIS Quarterly* (22:1), pp. vii-xv.
- Chuang, S.H. 2004. "A Resource-Based Perspective on Knowledge Management Capability and Competitive Advantage: An Empirical Investigation," *Expert Systems with Applications* (27:3), pp. 459-465.
- Currie, G., Waring, J., and Finn, R. 2008. "The Limits of Knowledge Management for UK Public Services Modernization: The Case of Patient Safety and Service Quality," *Public Administration* (86:2), pp. 363-385.
- Dawes, S.S., Cresswell, A.M., and Pardo, T.A. 2009. "From "Need to Know" to "Need to Share": Tangled Problems, Information Boundaries, and the Building of Public Sector Knowledge Networks," *Public Administration Review* (69:3), pp. 392-402.
- Dawes, S.S., Gharawi, M.A., and Burke, G.B. 2012. "Transnational Public Sector Knowledge Networks: Knowledge and Information Sharing in a Multi-Dimensional Context," *Government Information Quarterly* (29:Supplement 1), pp. S112-S120.
- Desouza, K.C. 2003. "Facilitating Tacit Knowledge Exchange," *Communications of the ACM* (46:6), pp. 85-88.
- Dunleavy, P. and Hood, C. 1994. "From Old Public Administration to New Public Management," *Public Money & Management* (14:3), pp. 9-16.
- Garud, R. and Kumaraswamy, A. 2005. "Vicious and Virtuous Circles in the Management of Knowledge: The Case of Infosys Technologies," *MIS Quarterly* (29:1), pp. 9-33.
- Gold, A.H., Malhotra, A., and Segars, A.H. 2001. "Knowledge Management: An Organizational Capabilities Perspective," *Journal of Management Information Systems* (18:1), pp. 185-214.
- Götz, O., Liehr-Gobbers, K., and Krafft, M. 2010. "Evaluation of Structural Equation Models Using the Partial Least Squares (PLS) Approach," in *Handbook of Partial Least Squares*. Springer, pp. 691-711.
- Grant, R.M. 1991. "The Resource-Based Theory of Competitive Advantage: Implications for Strategy Formulation," *California Management Review* (33:3), pp. 114-135.
- Hage, J. and Aiken, M. 1967. "Program Change and Organizational Properties: A Comparative Analysis," *The American Journal of Sociology* (72:5), pp. 503-519.
- Handzic, M. 2011. "Integrated Socio-Technical Knowledge Management Model: An Empirical Evaluation," *Journal of Knowledge Management* (15:2), pp. 198-211.
- Harman, H.H. 1976. *Modern Factor Analysis*. Chicago: University of Chicago Press.
- Hartley, J., Sørensen, E., and Torfing, J. 2013. "Collaborative Innovation: A Viable Alternative to Market Competition and Organizational Entrepreneurship," *Public Administration Review* (73:6), pp. 821-830.

- Hoggett, P. 2007. "New Modes of Control in the Public Service," *Public Administration* (74:1), pp. 9-32.
- Holsapple, C.W. and Joshi, K.D. 2000. "An Investigation of Factors that Influence the Management of Knowledge in Organizations," *The Journal of Strategic Information Systems* (9:2-3), pp. 235-261.
- Hsu, I.-C. and Sabherwal, R. 2011. "From Intellectual Capital to Firm Performance: The Mediating Role of Knowledge Management Capabilities," *IEEE Transactions on Engineering Management* (58:4), pp. 626-642.
- Hu, L.-T. 2010. "Same Bed, but Different Dreams? Comparing Retired and Incumbent Police Officers' Perceptions of Lost Knowledge and Transfer Mechanisms," *Crime, Law and Social Change* (53:4), pp. 413-435.
- Huang, K. 2014. "Knowledge Sharing in a Third-Party-Governed Health and Human Services Network," *Public Administration Review* (74:5), pp. 587-598.
- Inkpen, A.C. and Tsang, E.W.K. 2005. "Social Capital, Networks, and Knowledge Transfer," *Academy of Management Review* (30:1), pp. 146-165.
- Jain, H., Ramamurthy, K., Ryu, H.S., and Yasai-Ardekanim, M. 1998. "Success of Data Resource Management in Distributed Environments: An Empirical Investigation," *MIS Quarterly* (22:1), pp. 1-23.
- Janowski, T. and Ojo, A. 2009. "Transforming Government through Knowledge Management and Communities of Practice," in: *China E-Government Forum*. Beijing, China.
- Jarvenpaa, S., Knoll, K., and Leidner, D. 1998. "Is Anybody Out There? The Antecedents of Trust in Global Virtual Teams," *Journal of Management Information Systems* (14:4), pp. 29-64.
- Jennex, M.E. and Olfman, L. 2001. "Development Recommendations for Knowledge Management/Organizational Memory Systems," in *Contemporary Trends in Systems Development*. Springer, pp. 209-222.
- Kankanhalli, A., Tan, B.C.Y., and Wei, K.K. 2005. "Contributing Knowledge to Electronic Knowledge Repositories: An Empirical Investigation," *MIS Quarterly* (29:1), pp. 113-143.
- Kim, S. 2005. "Individual-Level Factors and Organizational Performance in Government Organizations," *Journal of Public Administration Research and Theory* (15:2), pp. 245-261.
- Kim, S. and Lee, H. 2006. "The Impact of Organizational Context and Information Technology on Employee Knowledge Sharing Capabilities," *Public Administration Review* (66:3), pp. 370-385.
- Kulkarni, U.R., Ravindran, S., and Freeze, R.A. 2006-2007. "Knowledge Management Success Model: Theoretical Development and Empirical Validation," *Journal of Management Information Systems* (23:3), pp. 309-347.
- Lai, H. and Chu, T. 2000. "Knowledge Management: A Review of Theoretical Frameworks and Industrial Cases," in: *Proceedings of the 33rd Hawaii International Conference on System Sciences*. Maui, Hawaii.
- Lee, G., Benoit-Bryan, J., and Johnson, T.P. 2012. "Survey Research in Public Administration: Assessing Mainstream Journals with a Total Survey Error Framework," *Public Administration Review* (72:1), pp. 87-97.
- Lee, H. and Choi, B. 2003. "Knowledge Management Enablers, Processes, and Organizational Performance: An Integrative View and Empirical Examination," *Journal of Management Information Systems* (20:1), pp. 179-228.
- Liebowitz, J. 2004. *Addressing the Human Capital Crisis in the Federal Government: A Knowledge Management Perspective*. Routledge.
- Lin, H.-F. 2007. "Effects of Extrinsic and Intrinsic Motivation on Employee Knowledge Sharing Intentions," *Journal of Information Science* (33:2), pp. 135-149.

- Madhavan, R. and Grover, R. 1998. "From Embedded Knowledge to Embodied Knowledge: New Product Development as Knowledge Management," *Journal of Marketing* (62:4), pp. 1-12.
- Mayer, R.C., Davis, J.H., and Schoorman, F.D. 1995. "An Integrative Model of Organizational Trust," *Academy of Management Review* (20:3), pp. 709-734.
- Melián-González, A., Batista-Canino, R.M., and Sánchez-Medina, A. 2010. "Identifying and Assessing Valuable Resources and Core Capabilities in Public Organizations," *International Review of Administrative Sciences* (76:1), pp. 97-114.
- Metaxiotis, K. and Psarras, J. 2005. "A Conceptual Analysis of Knowledge Management in E-Government," *Electronic Government, An International Journal* (2:1), pp. 77-86.
- Moore, G.C. and Benbasat, I. 1991. "Development of an Instrument to Measure the Perceptions of Adopting an Information Technology Innovation," *Information Systems Research* (2:3), pp. 192-222.
- Nahapiet, J. and Ghoshal, S. 1998. "Social Capital: Intellectual Capital and Organizational Advantage," *Academy of Management Review* (23:2), pp. 242-266.
- Nonaka, I. and Takeuchi, H. 1995. *The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation*. New York: Oxford University Press.
- Nutt, P. 2005. "Comparing Public and Private Sector Decision-Making Practices," *Journal of Public Administration Research and Theory* (16:1), pp. 289-318.
- Pablo, A.L., Reay, T., Dewald, J.R., and Casebeer, A.L. 2007. "Identifying, Enabling and Managing Dynamic Capabilities in the Public Sector," *Journal of Management Studies* (44:5), pp. 687-708.
- Papavassiliou, G., Ntioudis, S., Abecker, A., and Mentzas, G. 2003. "Supporting Knowledge-Intensive Work in Public Administration Processes," *Knowledge and Process Management* (10:3), pp. 164-174.
- Pertusa-Ortega, E.M., Zaragoza-Sáez, P., and Claver-Cortés, E. 2010. "Can Formalization, Complexity, and Centralization Influence Knowledge Performance?" *Journal of Business Research* (63:3), pp. 310-320.
- Piening, E.P. 2013. "Dynamic Capabilities in Public Organizations: A Literature Review and Research Agenda," *Public Management Review* (15:2), pp. 209-245.
- Prahalad, C.K. and Hamel, G. 1990. "The Core Competence of the Corporation," *Harvard Business Review* (68:3), pp. 79-91.
- Purvis, R.L., Sambamurthy, V., and Zmud, R.W. 2001. "The Assimilation of Knowledge Platforms in Organizations: An Empirical Investigation," *Organization Science* (12:2), pp. 117-135.
- Rainey, H.G. (ed.) 2009. *Understanding and Managing Public Organizations*. San Francisco, CA: Jossey-Bass.
- Rainey, H.G. and Bozeman, B. 2000. "Comparing Public and Private Organizations: Empirical Research and the Power of the a Priori," *Journal of Public Administration Research and Theory* (10:2), pp. 447-470.
- Riege, A. and Lindsay, N. 2006. "Knowledge Management in the Public Sector: Stakeholder Partnerships in the Public Policy Development," *Journal of Knowledge Management* (10:3), pp. 24-39.
- Rubenstein-Montano, B., Buchwalter, J., and Liebowitz, J. 2001. "Knowledge Management: A U.S. Social Security Administration Case Study," *Government Information Quarterly* (18:3), pp. 223-253.
- Seba, I., Rowley, J., and Delbridge, R. 2012. "Knowledge Sharing in the Dubai Police Force," *Journal of Knowledge Management* (16:1), pp. 114-128.
- Sveiby, K.E. and Simons, R. 2002. "Collaborative Climate and Effectiveness of Knowledge Work-An Empirical Study," *Journal of Knowledge Management* (6:5), pp. 420-433.

- Syed-Ikhsan, S.O.S. and Rowland, F. 2004. "Knowledge Management in a Public Organization: A Study on the Relationship between Organizational Elements and the Performance of Knowledge Transfer," *Journal of Knowledge Management* (8:2), pp. 95-111.
- Symon, G. 2000. "Information and Communication Technologies and the Network Organization: A Critical Analysis," *Journal of Occupational and Organizational Psychology* (73), pp. 389-414.
- Tannenbaum, S.I., Beard, R.L., and Salas, E. 1992. "Team Building and Its Influence on Team Effectiveness: An Examination of Conceptual and Empirical Developments," in *Issues, Theory, and Research in Industrial/Organizational Psychology*, K. Kelley (ed.), pp. 117-153.
- Tanriverdi, H. 2005. "Information Technology Relatedness, Knowledge Management Capability and Performance of Multibusiness Firms," *MIS Quarterly* (29:2), pp. 311-334.
- Uhl-Bien, M. and Maslyn, J. 2003. "Reciprocity in Manager-Subordinate Relationships: Components, Configurations, and Outcomes," *Journal of Management* (29:4), pp. 511-532.
- Wade, M. and Hulland, J. 2004. "Review: The Resource-Based View and Information System Research: Review, Extension, and Suggestions for Future Research," *MIS Quarterly* (28:1), pp. 107-142.
- Warner, M.E. and Bel, G. 2008. "Competition or Monopoly? Comparing Privatization of Local Public Services in the Us and Spain," *Public Administration* (86:3), pp. 723-735.
- Wasko, M.M. and Faraj, S. 2005. "Why Should I Share? Examining Social Capital and Knowledge Contribution in Electronic Networks of Practice," *MIS Quarterly* (29:1), pp. 35-57.
- Weber, E.P. and Khademian, A.M. 2008. "Wicked Problems, Knowledge Challenges, and Collaborative Capacity Builders in Network Settings," *Public Administration Review* (68:2), pp. 334-349.
- Wernerfelt, B. 1984. "A Resource-Based View of the Firm," *Strategic Management Journal* (5:2), pp. 171-180.
- Wiig, K.M. 1993. *Knowledge Management Foundations: Thinking About Thinking: How People and Organizations Create, Represent, and Use Knowledge*. Arlington: Schema Press.
- Wiig, K.M. 2002. "Knowledge Management in Public Administration," *Journal of Knowledge Management* (6:3), pp. 224-239.
- Willem, A. and Buelens, M. 2007. "Knowledge Sharing in Public Sector Organizations: The Effect of Organizational Characteristics on Interdepartmental Knowledge Sharing," *Journal of Public Administration Research and Theory* (17:4), pp. 581-606.
- Yates, D. and Paquette, S. 2011. "Emergency Knowledge Management and Social Media Technologies: A Case Study of the 2010 Haitian Earthquake," *International Journal of Information Management* (31:1), pp. 6-13.
- Zheng, W., Yang, B., and McLean, G.N. 2010. "Linking Organizational Culture, Structure, Strategy, and Organizational Effectiveness: Mediating Role of Knowledge Management," *Journal of Business Research* (63:7), pp. 763-771.

Appendix A. Construct Operationalization

<p>KM Technology (KT) (Chuang 2004; Lee and Choi 2003) - Formative Our organization provides employees with technology that strongly supports ... KT1: the sharing of information and knowledge among members. KT2: the search and access of information and knowledge. KT3: the systematic storage of knowledge. KT4: the retrieval/gathering of knowledge about its services and work processes.</p>	<p>Social Capital (SC) – Second Order consisting of Shared Understanding (SU), Benevolence (BN), Integrity (IT), Norms (NM), Reciprocity (RE), and Identification (ID) (Kankanhalli et al. 2005; Mayer et al. 1995; Nahapiet and Ghoshal 1998; Uhl-Bien and Maslyn 2003) In general, members of our organization ... SU1: understand each other very clearly when they discuss work. SU2: share very similar understanding about how work is done. SU3: use very similar jargons and terminologies at work. BN1: are very concerned about each other's welfare. BN2: always act in each other's best interests. IT1: are always honest. IT2: are always genuine and sincere. NM1: There is a strong norm of cooperation in our organization. NM2: There is a strong norm to value diversity in our organization. NM3: There is a strong norm of collaboration in our organization. In general, when members of our organization offer assistance to one another, ... RE1: we always want to return them so that we do not feel indebted to one another. RE2: we always expect others to return it. RE3: In general, members of our organization feel a strong obligation to give back the help that was given. In general, members of our organization ... ID1: are very proud to be employees of the organization. ID2: feel a strong sense of belonging to the organization. ID3: strongly identify themselves with the organization</p>
<p>Non-IT KM Investment (NI) (Bock et al. 2005; Jain et al. 1998; Kankanhalli et al. 2005) - Formative NI1: Highly attractive monetary reward is given to employees who participate in KM activities such as creation, sharing, and application of knowledge. NI2: Highly attractive bonus is given to employees who participate in KM activities such as creation, sharing, and application of knowledge. NI3: Highly attractive gifts are given to employees who participate in KM activities such as creation, sharing, and application of knowledge. NI4: Highly effective training/workshops related to the participation in KM activities such as creation, sharing, and application of knowledge is provided to employees. NI5: Strong helpdesk support related to the participation in KM activities such as creation, sharing, and application of knowledge is provided to employees.</p>	
<p>Organizational Structure (OS) – Second Order consisting of Centralization (CT) and Formalization (FM) (Hage and Aiken 1967; Lee and Choi 2003) CT1: In this organization, decision making always happen at the senior managerial level. CT2: Members of this organization always need to seek approval from their supervisors before they make decisions. CT3: Members of this organization always need to refer to their supervisors before they act. FM1: Whatever situation arises in our organization, members of our organization are always expected to deal with it exactly according to written procedures. FM2: Rules and procedures are specified to very great detail in our organization. FM3: Key activities/processes in our organization are governed by very detailed rules.</p>	
<p>Senior Management Championship (SM) (Chatterjee et al. 2002; Purvis et al. 2001) Senior management of our organization... SM1: articulates the vision and goals for our organization's use of KM very frequently. SM2: strongly supports the development of KM in our organization. SM3: is very actively involved in the promotion of KM in our organization.</p>	
<p>Job Expertise (JE) (Chuang 2004; Jarvenpaa et al. 1998) In general, members of our organization... JE1: are highly knowledgeable in both their own job tasks and other related job tasks. JE2: are very well qualified for their job. JE3: are very capable of performing their job tasks.</p>	

Appendix A. Construct Operationalization (Continued)

Knowledge Management Capability (KC) – Second Order consisting of Knowledge Capturing (CP), Sharing (SH), Application (AP), Creation (CR) (Gold et al. 2001; Lai and Chu 2000; Tanriverdi 2005) - **Formative**

Our organization has strong ability in...

CP1: obtaining, organizing, and storing knowledge about citizens and businesses.

CP2: acquiring, organizing, and storing knowledge about improving organizational performance.

CP3: collecting, organizing, and storing knowledge about services.

CP4: acquiring, organizing, and storing knowledge about our work processes.

SH1: sharing knowledge about citizens and businesses when necessary.

SH2: sharing knowledge about improving organizational performance when required.

SH3: sharing knowledge about services when necessary.

SH4: sharing knowledge about our work processes when required.

AP1: applying existing knowledge to meet citizens' and businesses' needs.

AP2: using existing knowledge to improve organizational performance.

AP3: applying existing knowledge to improve services.

AP4: using existing knowledge to improve work processes.

CR1: producing new knowledge about improving citizens' and businesses' satisfaction.

CR2: creating original ideas about improving organizational performance.

CR3: generating original ideas for improving services.

CR4: creating original ideas for improving work processes.

Organizational Effectiveness (OE)[#] (Baruch and Ramalho 2006) - **Formative**

OE1: Over the past two years, the cost of providing services and/or products by our organization has reduced significantly.

OE2: Over the past two years, our organization's responsiveness to citizens' and businesses' requests has significantly improved.

OE3: Over the past two years, the quality of our services and/or products has significantly improved.

OE4: Over the past two years, income and/or budget allocated to our organization has significantly increased.

OE5: Over the past two years, our organization's ability to accomplish its core mission has improved significantly.