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BRIDGING ROLE OF ABSORPTIVE CAPACITY FOR KNOWLEDGE MANAGEMENT SYSTEMS SUCCESS

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Abstract

This paper aims to gain a better understanding of KMS success. Based on the absorptive capacity theory, we develop a research model to explain how the use of KMS increases organizational performance by increasing the organizational absorptive capacity and the higher order capabilities. The absorptive capacity plays an important role in transforming KMS usage into agility and innovativeness and the sequent organizational performance. The model is empirically tested with a survey. The results support the mediation effect of absorptive capacity on the use of KMS and the two higher order organizational capabilities, the mediation effects of the two superior organizational capabilities on the relationship between KMS usage and organizational performance and the mediation effect on the link between absorptive capacity and performance.

Keywords: Knowledge management systems, Absorptive capacity, Agility, Innovativeness, Organizational performance.

1 INTRODUCTION

Knowledge has been recognized as a crucial resource of improving organizational performance. As a technological enabler, knowledge management systems (KMS) play a central role in managing knowledge from various sources, e.g., customers, partners, competitors, and internal employees. KMS include a broad class of information technologies for knowledge acquisition, creation, integration, transfer and application (Alavi & Leidner, 2001). KMS are supposed to enhance flexibility and adaptability, and thus to enhance the firm's long-term competitiveness and survival (Gold et al., 2001; Holsapple & Singh, 2001).

The positive relationship between KMS use and organizational performance has been investigated and reported in prior studies (Feng et al., 2004; Lee et al., 2005). However, such a relationship is simple while not revealing the necessary process that KMS should go through for improving the ultimate performance. The extent to which a firm can absorb the acquired or created knowledge by KMS should not be assumed. The absorptive capacity of a firm largely determines the degree to which the firm can assimilate KMS. Such an absorptive capacity influences how well the KMS derived outputs can be transformed into higher order organizational capabilities such as agility and innovativeness, thus allowing the firm to achieve the resultant superior performance.

Recently, Zack et al. (2009) demonstrate that the linkage between KM initiatives and ultimate organizational performance would be mediated by a set of organizational capabilities such as product innovation and operational excellence in agility, which are the direct sources of the achievement of superior performance. Amalia and Nugrohu (2011) also purport that KM initiatives including KMS is likely to bring benefits to organizations when they take innovation into account. In fact, KM initiatives matters to the success of contemporary organizations only when they can be effectively assimilated and as an interrelated innovation (Lee and Choi 2010). Hence, the relationship between KMS and organizational performance needs a deeper investigation.

According to the absorptive capacity theory (Cohen & Levinthal, 1990; Zahra & George, 2002), firms need not only recognize the directions of KMS use but also learn to utilize KMS for achieving the anticipated benefits. It is the absorbed knowledge that expands the superior organizational capabilities and further improves the organizational performance. Prior research conceptually and empirically demonstrates the importance of absorptive capacity in KM (Szulanski, 1996; Jansen et al., 2005). However, little attention has been paid to the question of whether and how the absorptive capacity or higher order capabilities can bridge the KM initiatives and applications and organizational performance. Little is known about how KMS influences a firm's absorptive capacity and how the absorptive capacity brings the firm even superior organizational capabilities for competition.

Thus, we rely on the absorptive capacity theory (Cohen & Levinthal, 1990; Zahra & George, 2002) to develop a model explaining the not yet unrevealed process of KMS impact on organizational performance. Specifically, we examine the indirect relationships between the use of KMS and organizational performance, revealing the mediating role of KMS enhanced organizational capabilities, i.e., potential absorptive capacity, agility and innovativeness. Such research entails important theoretical and practical contributions. On the theoretical side, we identify important contingencies between KMS and organizational performance. Practically, our empirical results underscore the relative importance of multiple KMS applications in contributing to different capabilities, providing managerial implications.

2 KNOWLEDGE MANAGEMENT SYSTEMS/APPLICATIONS

KMS are specific information systems that focus on organizational knowledge resources and processes. Alavi and Leidner (2001) summarize three functions of KMS, i.e., to build knowledge infrastructure, to proactively seek and offer knowledge, and to make knowledge visible and show the

role of knowledge in organizations. Sources of organizational knowledge are both internal and external. The major internal sources include business processes, databases and employees, while external sources consist of inter-organizational processes, customers, business partners, and market and competitive intelligence.

Relying on KMS-in-practice rationale and a thorough review of the literature, we identify four major existing systems/applications as KMS applications, i.e., enterprise portals, competitive intelligence systems (CIS), supply chain management systems (SCMS), and customer relationship management systems (CRMS). Although these existing systems have designed for special operations, they can also be used to capture KMS functions. Such identification is consistent with the practice lens to study the use of technologies which focuses on emergent technology structures enacted in practice rather than embodied structures fixed in technologies (Orlikowski, 2000). Regarding the illustrated central role of the above existing applications for knowledge management, this study tends to highlight the value of “cognition in practice” rather than “cognition in the head” as Lave (1988) has argued for.

Enterprise portals integrate knowledge from multiple functions or systems, provide access to the knowledge repertoire, and facilitate communication throughout the organization, enabling/supporting in this way important KM processes within the organization. While enterprise portals focus on internal knowledge, CIS support the management of external knowledge. They consist of systematic processes for the acquisition, analysis, interpretation, and exploitation of competitive information (Cody et al., 2002; Chung et al., 2005). Similarly, SCMS and CRMS support the management of knowledge embedded in inter-organizational processes and exchanged with the firm’s partners. More particular, SCMS enhance collaboration with partners by enabling knowledge sharing along the supply chain and CRMS strengthen relationships with customers through improved knowledge sharing.

3 THEORETICAL DEVELOPMENT

The IS success model (DeLone & McLean, 1992, 2003) has been widely applied to investigate the organizational impacts of IS usage. According to the IS success model, it is the actual use of the system that may lead to enhanced organizational performance. Unlike previous studies that proposed a direct link between KM infrastructure and organizational performance, our model (see Figure 1) stipulates that it is rather the usage of KM infrastructure that enhances organizational performance. Devaraj and Kohli (2003) have empirically demonstrated that it is actual system use that influences the efficiency and effectiveness of hospitals in the health industry.

We further argue that the pure usage of KMS does not necessarily lead to the anticipated benefits. According to absorptive capacity theory, it is the absorbed knowledge that determinate the consequences of knowledge management (Cohen & Levinthal, 1990; Szulanski, 1996; Zahra & George, 2002; Jansen, et al., 2005). Mere exposure of a firm to relevant external knowledge is insufficient unless an effort is made to internalize it (Pennings & Harianto, 1992; Kim, 1998). Szulanke (1996) highlights the importance of absorptive capacity in transferring best practices within a firm. Absorptive capacity thereby becomes the necessary channel for translating the use of KMS into the expected superior performance. Zahra and George (2002) also suggest that absorptive capacity influences a firm's ability to create and deploy knowledge to build other organizational capabilities. Thus, absorptive capacity potentially intermediates the relationship between KMS use and knowledge-intensive capabilities that allow the firm to stand in a competitive position in a particular industry.

Competitive advantages of firms over markets arise from their higher order capabilities in exploiting and exploring knowledge (March, 1991). The essence of exploitation is refinement and extension of existing competencies, technologies and paradigms while the essence of exploration is in pursuit for the new alternatives (March 1991, p.85). Relying upon such wisdom, agility and innovativeness have been recognized as important knowledge-intensive capabilities (Sambamurthy et al., 2003; Cho & Pucik, 2005). Agility refers to the ability to detect and seize continually and unpredictably changing

market opportunities by assembling requisite assets, knowledge, and relationship with speed and surprise (Goldman et al., 1995; Sambamurthy, et al., 2003). Innovativeness depicts the ability of the firm to initiate and implement innovations at a faster rate (Hurley & Hult, 1998). Thus, agility is associated with exploitation of knowledge for competition and innovativeness is associated with exploration of knowledge to obtain the sustainable competitive advantage. They are realized absorptive capacities.

We propose a research model show in Figure 1, in which the absorptive capacity is the mediator between the use of KMS and the agility and innovativeness, further, the two higher-order organizational capabilities are two contingencies mediating the effects of KMS usage on organizational performance as well as the absorptive capacity and performance.

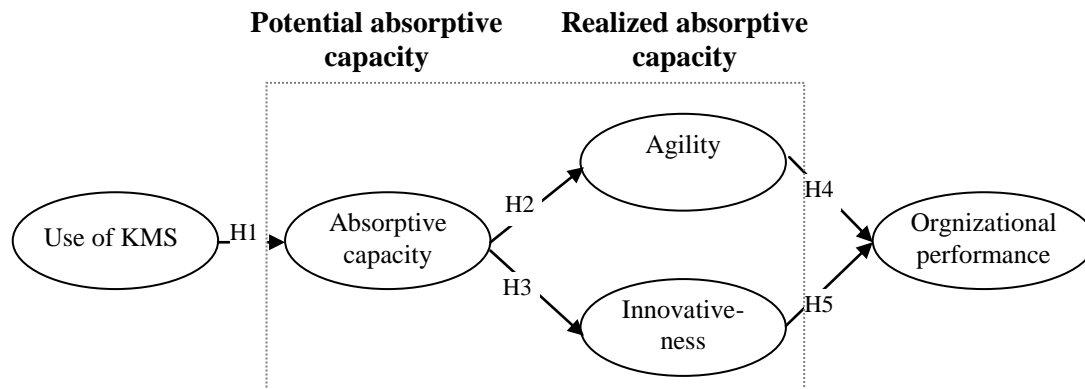


Figure1. Research model

3.1 Role of absorptive capacity

Cohen and Levinthal (1990) have offered the most widely cited definition of absorptive capacity, which is the ability to value, assimilate and apply new knowledge. Zahra and George (2002) further conceptualize absorptive capacity as a dynamic capability embedded in a firm's routines and processes, distinguishing the potential absorptive capacity (i.e., ability to acquire and assimilate knowledge) from the realized absorptive capacity (i.e., ability to transform and exploit knowledge). The distinction has been validated by Jansen et al. (2005). According to Zahra and George (2002), potential absorptive capacity makes the firm receptive to acquiring and assimilating knowledge from various sources, while realized absorptive capacity reflects the firm's capacity to leverage the knowledge that has been internalized. With regard of this distinction of absorptive capacities, we define absorptive capacity as knowledge acquisition and assimilation. Knowledge acquisition refers to a firm's capability to identify and acquire knowledge from multiple sources, internal and external, which is critical to its operations. Knowledge assimilation allows a firm to interpret and understand the new knowledge obtained (Szulanski, 1996). The realized absorptive capacity is a higher level capability, which encompasses deriving new insight and consequences from the combination of existing and newly acquired knowledge, and incorporating transformed knowledge into operations. Therefore, we suppose the superior organizational capabilities as the proxies of the realized absorptive capacity, since they are the externalization of absorptive capacity.

Absorptive capacity not only depends on the organization's direct interface with the external environment, but also depends on the transfer and sharing of knowledge within and across its subunits (Cohen and Levinthal, 1990). According to the functions of KMS we have described before, the use of KMS makes contribution in enhancing the absorptive capacity that captures efforts in evaluating and acquiring knowledge from diverse channels and in assimilating knowledge obtained. KMS enable a firm to achieve effective and efficient knowledge acquisition, because those KMS (e.g., Enterprise portal, CIS, SCMS, CRMS) are designed to process differential sources of knowledge, i.e. knowledge natured among its organizational members, knowledge from its competitors, business partners and

customers, etc. KMS also facilitate a firm well interpret and represent the acquired knowledge, so that knowledge can be transferred and diffused within the firm. Molhotra et al. (2005) investigate the enabler role of a firm's interpretation systems, as the subsystems of KMS, in supporting its absorptive capacity. Such knowledge interpretation is embedded in designate KMS as well as the use of KMS (DeSanctis & Poole, 1994; Orlikowski, 2000). Mahnke et al. (2003) examine the effect of a series of KM tools upon absorptive capacity that further contributes to organizational performance. Their empirical results illustrate that the community in practice and learning systems, whose functions fall into our concept of KMS, account for the salience in developing a firm's absorptive capacity defined as the ability of acquire new knowledge. Thus, we hypothesize that,

Hypothesis1: The use of KMS has a positive effect on the firm's absorptive capacity.

The consequence of absorptive capacity is expected to enhance the superior knowledge-intensive organizational capabilities and organizational performance in the end, because absorptive capacity provides greater leverage of knowledge from various sources. The greater absorptive capacity a firm has, the more knowledge it can appropriate from a given volume of total knowledge generated in the source. Zahra and George (2002) suggest that the effect of absorptive capacity on organization performance results from the evolution from the potential absorptive capacity to the realized absorptive capacity. Consistently, prior empirical research demonstrates the mediation effect of the further knowledge leverage between a firm's absorptive capacity in term of knowledge recognition and assimilation and its performance (Lane et al., 2001; Mahnke et al., 2003). Thus, a firm has to have absorptive capacity in place in order to build superior knowledge-intensive organizational capability. Specifically, Van den Bosch et al. (1999) point out the absorptive capacity provides two paths for the coming knowledge exploitation and exploration. Therefore, we propose that the effect of absorptive capacity on organizational performance is mediated by the superior knowledge-intensive organizational capabilities, i.e., agility and innovativeness.

Absorptive capacity opens new productive opportunities through knowledge acquisition and combination, thus it has the potential to enhance a firm's ability to exploit these opportunities, i.e., the agility of the firm. Knowledge acquisition and assimilation prepare a firm to exploit the obtained knowledge for fast response to the changing environment. Liao et al.'s (2003) empirical study in the context of small and medium-sized enterprises illustrates the positive influence of the potential absorptive capacity (defined as knowledge acquisition and assimilation) on organizational responsiveness, one aspect of agility. Ashrafi et al. (2006) explore the relationship among IT capability in managing knowledge, absorptive capacity, and agility with a survey, asserting that KM with its supporting technologies is a catalyst to build absorptive capacity and thus to expand a firm's agility.

Hypothesis2: Absorptive capacity of a firm has a positive effect on its agility.

On the other hand, acquiring knowledge often represents a fixed investment then enables the following knowledge creation (Arrow 1969), which is also natured the combination of knowledge (Nonaka, 1994), therefore, absorptive capacity provides a base for innovation, allowing a firm to be innovativeness. Cohen and Levinthal (1990) first develop and investigate the idea of absorptive capacity to appreciate knowledge for innovation. Relying on organizational learning theory, a number of empirical studies show that a firm's absorptive capacity predicts its level of innovativeness. For instance, Kim (1998) postulates absorptive capacity as the predictor of innovation, employing a case study at Hyundai motor to reveal the catching-up process of absorptive capacity building through the knowledge preparation for and acquisition, assimilation, and improvement of external knowledge. With a survey methodology, Yli-Renko et al. (2001) demonstrate that absorptive capacity has a substantial influence on new product development and technological distinctiveness. Thereby, we hypothesize that,

Hypothesis3: Absorptive capacity of a firm has a positive effect on its innovativeness.

3.2 Agility and Organizational Performance

For a company, to be agile is to be capable of operating profitably in a competitive environment of continually and unpredictably changing customer opportunities (Goldman, et al., 1995). The impact of KMS usage on agility can be direct or indirect. On the one hand, , the use of IT in general and KMS in particular allows a firm to response faster, due to the advantages of technologies. On the other side, the establishment of agility relies on the learned knowledge, i.e., the absorptive capacity.

To be agile is one way for organizations to compete in a turbulent environment. According to Sambamurthy et al. (2003), agility can contribute to organizational performance through three ways. First, by responding rapidly to changes in customer demand, an agile company can enhance the customer satisfaction and loyalty, and leverage the knowledge embedded in customers and take the advantage of the windows of opportunities that appear in the market from time to time(Kidd, 1994; Goldman, et al., 1995). Second, agility contributes to the organizational performance through building a network of extended partnership to leverage the assets, knowledge and competencies of suppliers, distributors, contract manufacturers, and logistics (Venkatraman & Henderson, 1998). Third, the effects of agility on organizational performance are also realized by rapidly redesigning and streamlining the firm's business processes to accomplish speed, accuracy and cost economy (Teece et al., 1997). Prior research has accumulated much evidence supporting the positive effects of agility on organizational performance. For instance, Reinartz et al. (2004) demonstrated that the enriched customer relationship would improve the organizational performance. Yusuf et al. (2004) conducted a study about supply chain agility study, their survey illustrated that the agile supply chain capability significantly determines the business performance. Thus, we hypothesize that,

Hypothesis4: The firm's agility has a positive effect on its performance.

3.3 Innovativeness and Organizational Performance

As we have defined, innovativeness refers to the capability to initiate and implement innovations in a faster rate (Hurley & Hult, 1998). Innovation is usually described as a knowledge-intensive activity, involving the search for, and the discovery, experimentation, and development of new technologies, new products and/or services, new production processes, and new organizational structures (Carneiro, 2000). The absorbed KM and KMS also aims to harness the intellectual and social capital of individuals and thus to realize an organization's innovative potential (von Krogh, 1998; Swan et al., 1999).

In innovation literature, the rationale behind innovativeness showing a strong, positive influence on organizational performance is ascribed to innovations serving to accommodate the uncertainties that the firm faces in its competitive environment (Schumpeter, 1934; D'Aveni, 1994). Such innovations could be administrative, e.g., formal strategic planning and customer information files, or technical, e.g., new products or services (Daft, 1978; Damanpour, 1992), which entails different characteristics and performance implications (Subramanian & Nilakanta, 1996). Both types of innovativeness interplay with each other and lead firms to achieve superior performance (Han et al., 1998). Much evidence supporting the positive effects of innovativeness has been documented. Subramanian and Nilakanta (1996) empirically examined both types of innovativeness and reported significant positive effects on organizational performance. Han et al. (1998) further demonstrate the significant positive correlation between technical innovativeness and administrative innovativeness. Without distinguishing between two types of innovativeness, Cho and Pucik (2005) empirically demonstrate the positive effect of organizational innovativeness on organizational performance in terms of the market growth and market value. Accordingly, we hypothesize that,

Hypothesis5: The firm's innovativeness has a positive effect on its performance.

4 RESEARCH METHOD

4.1 Samples and data collection

The model was tested with a survey study involving 114 Chinese firms that reside in multiple industries. Following several previous studies (Zahra, 1993; Moorman, 1995; Gatignon & Xuereb, 1997; Li & Atuahene-Gima, 2001), a single-informant method was used for data collection. Several precautions were taken to minimize the problems associated with this data collection method. First, care was taken to select measurement items that have proved to be valid and reliable in several previous studies. Second, all survey items, originally published in English, were adapted for this study in Chinese using Brislin's (1986) back translation method. The items were translated back and forth between English and Chinese by several bilingual researchers, and this process was repeated until both versions converged. Third, in-depth review of the respondents' profiles indicated that respondents were knowledgeable about their firm's KM initiatives and were able to provide informative responses. 44% of informants were senior managers who were involved in KM initiatives and 56% were managers responsible for KM initiatives. All four major KMS applications were widely used in these companies, providing content validity for our operationalization of KMS usage.

4.2 Measures

We relied on reflective measures for organizational performance, innovativeness and agility, and used formative measures for KMS use. The use of formative measurement items for KMS use enables the assessment of the significance and relative importance of the four typical KMS applications, i.e., enterprise portals, CIS, SCMS, and CRMS. The extent of KMS usage was measured with the self-reported data (1=very little extent; 5=great extent; 0=not applicable).

To insure measurement reliability and validity of other reflective measures, we chose the validated measures by previous research. For organizational performance, we adapted the instrument developed by Venkatraman (1989) and Powell and Dent-Micallef (1997). We measured the organizational performance in four aspects, including financial, market, supply chain and customer relationship performance. The subjects were asked to evaluate the relative firm performance on the above four aspects compared with the major competitors (1=Much worse, 5=Much Better). The potential absorptive capacity was measured with four items adapted from (Jansen, et al., 2005). Consistent with the conceptualization of the potential absorptive capacity proposed by Zahra and George (2002), we asked the subjects the extent to which the firm had understood the acquired knowledge from different sources and to extent to which the firm was able to well interpret the knowledge (1=to very little extent, 5= to very much extent). The measures for agility were adapted from Sambarmurthy et al. (2003) and Goldman et al.(1995). Agility was reflected in the extent to which a firm is able to leverage its available resources to exploit new opportunities, rapidly response to its customers, effectively coordinate with the partners, and fast transform new acquired knowledge or capabilities across units within the firm. The scale was also in a 5-point likert scale. Innovativeness was measured with the items adapted from Yeung et al.(1999). One sample statement was "our business is able to effectively implement innovative activities" (1=strongly disagree; 5=strongly agree)

5 RESULTS AND DISCUSSION

One potential issue in having a single respondent assess both independent and dependent variables is common method bias. Although specificity of the items adapted from prior validated instrument may reduce such bias, it probably would not eliminate it. We relied on Harman's single-factor to assess the common method variance that may threaten the internal validity (Podsakoff & Organ, 1986;

Podsakoff et al., 2003). The unrotated factor solution did not exhibit a single factor, but exact five factors whose initial eigenvalues were all over 1, indicating a low level of common-method bias.

To test our hypothesized model, we adopted the Partial Least Squares (PLS) with the bootstrap re-sampling procedure (Cotteman & Senn, 1992). We followed the recommended two-stage analytical procedure (Anderson & Gerbing, 1988; Hair et al., 1998) to assess the structural relationships after assessing the measurement model.

5.1 Measurement assessment

The measurement model was assessed by examining the reliability, convergent validity and discriminant validity (Hulland, 1999). As indicated in Table1, the composite reliability scores (ρ) of the reflective constructs exceeded the threshold of 0.70, indicating the good reliability and internal consistency of our reflective measures (Nunnally, 1978). For the convergent validity, all reflective items were significant at the 99% confidential level with high loadings (all above 0.60 and most above 0.70), providing evidence for the convergent validity of our measures (Barclay et al., 1995). In the case of formative measures, high loadings are not necessarily true and reliability assessments such as Cronbach's alpha and composite reliability are not applicable. Chin (1998) suggests that the weight of each item be used to assess how much it contributes to the overall factor. All the four types of KMS usage were found significantly contribute to the formation of the construct.

Constructs	Items	Weights	Loadings	Standard Error	T-value
Use of KMS	Enterprise portals	0.262		0.123	2.124
	CIS	0.318		0.133	2.402
	SCMS	0.513		0.147	3.487
	CRMS	0.231		0.128	1.807
Absorptive capacity ($\rho = 0.857$)	Acap1		0.741	0.056	13.135
	Acap2		0.781	0.036	21.512
	Acap3		0.774	0.062	12.435
	Acap4		0.800	0.040	20.200
Agility ($\rho = 0.844$)	Agi1		0.658	0.101	6.527
	Agi2		0.829	0.035	23.728
	Agi3		0.822	0.027	30.352
	Agi4		0.717	0.063	11.414
Innovativeness ($\rho = 0.862$)	Inn1		0.769	0.071	10.828
	Inn2		0.792	0.066	11.925
	Inn3		0.902	0.020	44.305
Organizational Performance ($\rho = 0.862$)	OP1		0.812	0.040	20.371
	OP2		0.780	0.053	14.672
	OP3		0.777	0.050	15.424
	OP4		0.755	0.056	13.408

Note: ρ is the composite reliability.

Table1. Assessment of reliability and convergent validity

Discriminant validity among the four latent variables was tested by comparison between the square roots of the AVE value of each construct and the correlation of the respective construct and other constructs. Table2 presents the discriminant validity statistics. The square roots of the AVE scores are all higher than the correlations among the constructs, demonstrating discriminant validity (Fornell, 1987).

Constructs	1	2	3	4
1. Organizational performance	0.782			
2. Absorptive capacity	0.429	0.775		
3. Agility	0.494	0.632	0.760	
4. Innovativeness	0.469	0.561	0.571	0.823
Remark: Diagonal elements are square roots of the AVE scores of constructs.				

Table2. Assessment of discriminant validity for reflective constructs

Furthermore, all items loaded higher on their respective constructs than on others (Table 3), providing additional support for discriminant validity (Chin 1998).

Items\Constructs	Absorptive capacity	Agility	Innovativeness	Organizational performance
Acap1	.787	.330	.337	.242
Acap2	.815	.383	.285	.303
Acap3	.768	.491	.337	.386
Acap4	.665	.553	.152	.254
Agi1	.344	.716	.180	.157
Agi2	.515	.730	.098	.460
Agi3	.476	.777	.261	.438
Agi4	.280	.738	.485	.402
Inn1	.325	.528	.762	.333
Inn2	.399	.156	.804	.260
Inn3	.413	.605	.734	.473
OP1	.283	.307	.251	.766
OP2	.228	.268	.055	.795
OP3	.306	.299	.432	.786
OP4	.331	.539	.248	.742

Table3. Cross-loadings of items of reflective constructs

5.2 Structural model assessment

Figure2 presents the results of the PLS analysis of the structural model, including the overall explanatory power (R^2), path coefficients (for relationships between latent variables) and weights (for formative measures). The model explains 35.0% of the variance of organizational performance with all path coefficients significant, providing a strong support to our research model.

We also performed formal tests by using the Sobel-Test (Sobel, 1982; Baron & Kenny, 1986) to check the significance of the mediating effects of potential absorptive capacity, agility and innovativeness. The result indicates that the potential absorptive capacity of a firm significantly mediates the impact of KMS usage on its agility ($t=5.172$) and innovativeness ($t=4.966$), validating hypotheses 1~3. The superior organizational capabilities including agility and innovativeness were found with significant influences on organizational performance, validating hypotheses 4&5. More importantly, agility was found with a full mediation effect on the relationship between the absorptive capacity and organizational performance ($t=1.813$) while with a significant partial mediation effect on the relationship between the use of KMS and organizational performance ($t=1.677$). Similarly, innovativeness acts as a partial mediator between KMS usage and organizational performance ($t=1.832$), while act as a full mediator between the absorptive capacity and firm performance.

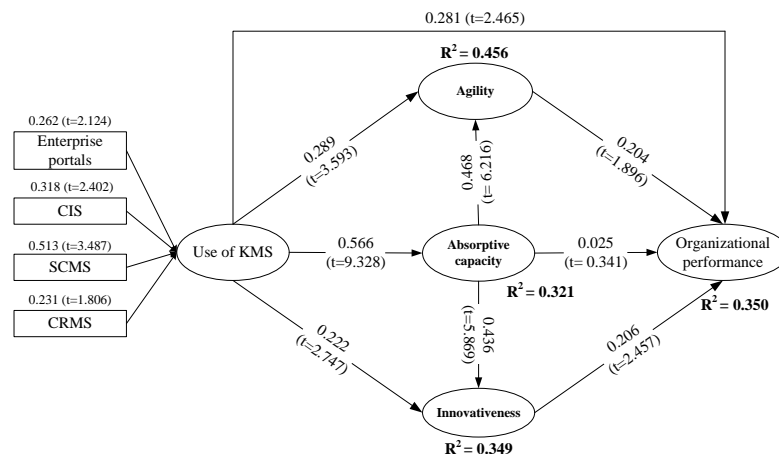


Figure2. Full structural model assessment

The empirical results strongly corroborate the enabler role of KMS use in supporting a firm to build its organizational capabilities, and the intervention effect of absorptive capacity between KMS usage and the realization of higher-ordered capabilities for superior performance. A comparison of the path coefficients shows that the use of KMS constitutes a salience in enabling a firm's absorptive capacity ($b=0.566$, $t=9.328$), and somehow allows the firm to directly gain agility ($b=0.289$, $t=3.593$) and innovativeness ($b=0.222$, $t=2.747$). This confirms the mediation role of absorptive capacity for a firm to establish high order organizational capabilities by using KMS. The further comparison of R^2 indicates that the use of KMS, incorporating with the absorptive capacity, contributes more on agility (45.6%) than on innovativeness (34.9%). One possible explanation is that the KMS usage in our sampled firms seems more focuses on improving efficiency to respond to the fast changes.

The results indicate an asymmetric focus of KMS usage on, i.e., the use of KMS together with the enabled absorptive capacity favours the agility. However, the path coefficients demonstrate the equal importance of the two higher order knowledge-intensive capabilities in improving the organizational performance. This implies that agility and innovativeness are complementary mode for competition and the firm should concern over the balance of them when it utilizes KMS applications for learning and establishment of capabilities. Organizations often strike the balance between the agility that can be reached in a short term and the innovativeness that is a knowledge cumulative process and may cost a longer term. It is consistent with March's (1991) argument that an organization should balance the exploitation and exploration of knowledge for competition. To survive in a short term, a firm needs to be efficient, to be able to lever on its present resources and capitals, which are the realm of exploitation. To be viable in the longer run, a firm also need be able to develop new capabilities, to create new concepts, which are the realm of exploration. By using survival analysis and "logit" model, Vermeulen and Barkema (2001) have strongly corroborated the concern of such a balance that can decrease the inertia wrapped in a firm and enhance its viability.

In addition, these two higher order capabilities do not fully mediate the effects of KMS. We found a significant direct effect of KMS use on organizational performance ($b=0.281$, $t=2.465$). This result adds additional supporting evidence for the IS success model in the context of KMS. It also implies the existence of other factors that could serve as mediators, e.g., branding effects. However, the insignificant effect of absorptive capacity on organizational performance ($b=0.025$, $t=0.341$) indicates the potential absorptive capacity is necessary but not a direct source of superior performance. The potential absorptive capacity must be transformed into higher order capabilities such as agility and innovativeness.

Finally, we examined the relative importance of specific KMS applications. All four typical KMS applications are significant. The use of SCMS exerts the greatest contribution with a weight of 0.513. The other three KMS applications do not show much difference in the magnitude of influences. The eminent role of SCMS could be attributed to the nature of the sampled firms. As most firms are in the manufacturing industry, and the relationship with supply chain partners play a key role in obtain the overall performance, the partnership oriented strategy is mostly emphasized in their KM initiatives. The profile of the samples also provides a possible explanation for the lowest contribution of CRMS as one popular KMS application, because the differential business strategies may result in the asymmetric effect, i.e., the influence of SCMS may crowd out that of CRMS.

6 CONCLUSION, IMPLICATIONS, AND LIMITATIONS

Based on the absorptive capacity theory, this study investigates how the potential absorptive capacity, the realized absorptive capacity (i.e., agility and innovativeness) bridge the link between KMS usage and the organizational performance. We identify four typical KMS applications that have been widely used to manage both internal and external knowledge processes. More importantly, we reveal the mediating role of absorptive capacity by translating KMS usage into the higher order organizational capabilities, i.e., agility and innovativeness. The potential absorptive capacity is the precondition of realizing those higher order capabilities, but the potential absorptive capacity itself cannot directly

bring firms superior performance. Achieving the superior organizational performance needs the establishment of higher order capabilities such as agility and innovativeness that realize the potential absorptive capacity into the operations in organizations.

The results of our study present significant theoretical and practical contributions. Theoretically, this research confirms the significant role of actual usage of KMS in achieving desirable organizational performance, which is consistent with the prior research (Devaraj & Kohli, 2003). More importantly, our findings suggest that the research on KMS success should take the firm's absorptive capacity into account. Our study reveals the effect of absorptive capacity in translating the use of KMS into certain knowledge-intensive capabilities, confirming the importance of absorptive capacity in KM. The firm needs to utilize KMS applications to learn the knowledge from various sources as well as to enable the superior capabilities that lead to organizational performance. In other words, the appropriate of KMS utilization, rather than simple usage, contributes to the organizational performance.

Practically, by identifying the intervention factors, the results shed lights on the strategic guidance for KMS implementation. It is important for managers to know the targets of specific IT applications before the implementation, since once institutionalized, the systems gain a life of their own and become extremely difficult to modify or supplant (Huber, 2001). Our study reveals that agility and innovativeness, as specific capabilities, should be the inspired visions for KMS implementation. Further, it is not sufficient for the firm to just recognize the purposes of KMS use. The firm should also understand the role of knowledge absorption in establishing superior organizational capabilities and achieving the anticipated benefits.

In addition, as suggested in our conceptualization of KMS, KMS should be considered as necessary extension of current systems and embedded in business processes and inter-organizational interactions. Firms may focus on certain type(s) of KMS applications based on their business strategies. For instance, market-oriented business may prefer to use CRMS and CIS to enhance customer agility and technical innovativeness, thereby, improve organizational performance. Partnership-oriented business may intend to use SCMS to enhance partnering agility and administrative innovativeness for superior performance. As for enterprise portals that have been widely built in business, practitioners should further consider use them to enhance internal agility and nurture innovative potentials so as to maximum their value, rather than simply regard them as fixed assets.

No research is perfect, although our current study identified absorptive capacity, agility and innovativeness as the important mediating factors. However, the significant direct link between KMS use and organizational performance suggests the existence of other potential contingencies, which should be explored in the future research. Such studies will deepen our understanding of KMS success in particular and IS success in general. The partial mediating effects of the absorptive capacity on the linkages between KMS usage and agility and innovativeness also imply the inadequacy of the intervention power of the mere potential absorptive capacity. It points to another future research direction. It is necessary to explore more about the first order capacities because such fundamental capacities are the preconditions of establishing the higher order capabilities such as agility and innovativeness.

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