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Build Up Organizational Innovativeness: An Integrated View

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Abstract

Innovativeness has been regarded as an important organizational capacity to secure long-run competitive position and bottom-line performance. Prior research from different disciplines has shed some light on the capability-building process for innovativeness. However, an integrated understanding is still missing. This study is aimed to address this void. Based on resource-based view, this study integrates the strategic, process, technological factors to explain the development of innovativeness and further examines their interactive relationships. The research model was tested with 114 organizations that have implemented KMS applications. The empirical results provide strong support for our research model. The theoretical and practical implications are discussed.

1. Introduction

With the globalization and the development in information technologies, companies are challenged by the shortened product life-cycle, fast changing customers' demands and preferences, and blurred industrial boundaries. To respond to these challenges, practitioners turn to innovations, e.g., new products, technologies and/or processes, which have been recognized as the important sources for future growth and profit [1]. Innovativeness, a firm's capability to initiate and implement innovations in a faster rate [2], is therefore critical to secure its long-run competitive position and bottom-line performance [3, 4]. Much investment has been made with an expectation to nurture innovativeness. According to the report by National Science Foundation, companies spent \$204

billion on R&D performed in the United States during 2003 compared with \$193.9 billion in 2002. However, investment by itself can not guarantee the development of innovativeness. It is necessary to elaborate the internal processes and organizational factors required to translate investment into capabilities.

Given the importance of innovativeness, great attention has been drawn from researchers in areas such as strategic management, marketing, organizational theory, and information systems. A review of prior literature on organizational innovativeness suggests three categories of drivers. Proponents of the strategic choice theory argue that capability building, as a strategic action, is the consequence of strategic initiatives proactively pursued by decision makers in the organization [5]. Following this line, much research in strategic management and marketing has examined the influence of strategic orientations on innovativeness, e.g., market-oriented strategy [4, 6] and entrepreneurial orientation [7]. Differently, the second stream, focusing on the internal processes, argues that the reduction of organizational inertia and strengthened innovative capacity are achieved by means of acquiring new knowledge to organizations, sense-making and interpreting, sharing and encoding the knowledge [8]. Accordingly, organizational processes in general and organizational learning activities in particular are emphasized in building up innovativeness [9]. Finally, as information technologies (IT) are increasingly applied in organizations, the IS research sheds light on the virtue of IT and suggest that the use of IT plays an important role in enhancing innovativeness [10, 11].

Although insightful, most prior research only provides partial views towards the development of

organizational innovativeness by emphasizing on one or two perspectives. We still lack an integrated understanding of how different factors interact to affect organizational innovativeness. As suggested by Makadok [12], capability building requires the integration of different complementary resources, e.g., infrastructure and processes. Furthermore, prior research on IT value demonstrates the need to align business strategies, organizational processes and technological infrastructure [13]. Thus, it is necessary to develop an integrated view towards organizational innovativeness.

Based on the resource-based view, we develop a research model by integrating the different resources for capability building suggested in prior studies, i.e., strategic choice, organizational learning and technological resources, and further elaborating the interrelationships among these factors. More specifically, three factors are identified as antecedents of innovativeness, i.e., proactive strategic orientation, organizational learning processes, and the use of knowledge management systems (KMS). Furthermore, we argue that, although innovativeness is driven by certain strategic choices that provide visions and rationales, e.g., to address external changes and/or internal demands for growth, the effect of strategic choices is mediated through the capability building processes, i.e., organizational learning processes and use of KMS. The model is tested with a survey study involving 114 companies that have adopted KMS applications.

Our research presents important theoretical and practical contributions. On the theoretical side, we build and validate an integrated model explaining the roles of business strategies, organizational processes, and IT applications in enhancing innovativeness. Our model addresses an important theoretical gap – to reveal the interactions among these factors for building organizations' innovative capacity. On the practical side, we identify the main drivers of innovativeness and clarify their relationships. These results should help practitioners to well manage the capability-building process accordingly.

In the next section, we discuss the theoretical foundation of this study and develop the hypotheses. This is followed by a description of the empirical study and result discussion. In conclusion, we present the theoretical and practical implications of our findings.

2. Theoretical Development

The resource-based view of the firm provides an important insight on how firms can leverage the

internal resources to compete in the market. Resources that are valuable and costly-to-copy will provide the firm with a temporary competitive advantage. Miller and Shamsie [14] distinguish between property-based resources and knowledge-based resources based on the barriers for imitation. They demonstrate that knowledge-based resources are more fundamental values for firms' adaptation, renewal and therefore their survival in an uncertain environment. Similarly, Grant [15] distinguish between resources and capabilities and argue that, in order to obtain competitive advantages, firms need create capabilities to assemble, integrate, and deploy valued resources. Innovativeness refers to the organizational capability to initiate and implement innovations in a faster rate [2]. It consists of not only the ability to generate new combination of existing knowledge, but also the ability to exploit the knowledge of unexplored potential of innovation [16]. As an important knowledge-intensive capability, innovativeness requires the integration of heterogeneous resources and knowledge as prerequisites.

Relying on the resource-based view of firms, researchers have identified various resources that serve as potential sources for organizational capabilities building. In the IS field, IT related resources have been intensively examined (e.g., IT infrastructure, IT skills and intangible IT-enabled resources) [17]. Meanwhile, it is necessary to incorporate the complementary process resources in the drive of desired capability-building [18]. Finally the resource-based view also highlights the role of strategic orientation in organizational capability building [4, 6, 7]. Built upon previous studies, we identify the strategic, technological, and process resources that are relevant for developing organizational innovativeness. In particular, they are proactive strategic orientation, the use of KMS and organizational learning processes and their relationships in the capability-building process are further elaborated.

2.1 Knowledge Management Systems

KMS are specific information systems that focus on organizational knowledge resources and processes. They are used to build knowledge infrastructure, to proactively seek and offer knowledge, and to make knowledge visible and show the role of knowledge in organizations [19]. 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. KMS include

a variety of applications to capture, manage and leverage the knowledge associated with these diverse sources.

Relying on the 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 proposed by Orlikowski [20], focusing on emergent technology structures enacted in practice rather than embodied structures fixed in technologies. Literature has highlighted the central role of these existing applications in knowledge management (KM) through complementarily processing internal and external knowledge. Moreover, these applications comprise both integrative and collaborative modes of KM in processing explicit and tacit knowledge. Thus, it is appropriate to use the typical applications to form the KMS concept in this study.

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. Firestone [21] explains the role of enterprise portals in knowledge management. 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 [22]. Similarly, SCMS and CRMS support the management of knowledge embedded in inter-organizational processes and exchanged with the firm's partners. Fahey et al. [23] explain the role of KM in customer relationship management and supply chain management processes. SCMS enhance collaboration with partners by enabling knowledge sharing along the supply chain, while CRMS strengthen relationships with customers through improved knowledge sharing.

KMS, designed with a purpose to support and enable knowledge-intensive processes, has the direct anticipated benefit to enhance organizational innovativeness. Specifically, enterprise portals facilitate new ideas generation by enabling ubiquitous collaboration and interaction [21]. CRMS contributes to products or services innovation by enabling a closer connection between the firm and its customers and

facilitating their interaction with the firm [24]. SCMS enables a close inter-organizational collaboration, facilitates knowledge creation and sharing among supply partners, and subsequently enhances innovativeness [25]. CIS supports innovation processes by systematic managing the competitive intelligence and tracking the fast changes in markets [26]. Accordingly, we hypothesize that:

Hypothesis 1: The use of KMS in the firm has a positive effect on its innovativeness.

2.2. Organizational learning processes

Organizational learning represents the organizational efforts to harness the intellectual and social capital of individuals in order to realize an organization's innovative potential [27]. It consists of four processes: knowledge acquisition, knowledge distribution, shared interpretation, and organizational memory [6, 28, 29], which have been demonstrated to strengthen the creativity and innovativeness [9, 30].

Knowledge acquisition is to identify and acquire internally and externally generated knowledge that is critical to the firm's operations [31]. Knowledge acquisition plays an important role in renewing a firm's knowledge base and skills necessary to compete in a changing environment. It also provides potentially useful ideas related to external and internal opportunities and threats that are relevant to formulating innovation. *Knowledge distribution* represents the extent to which the newly acquired knowledge is shared throughout the firm [6]. The distribution of knowledge ensures that more individuals are aware of the precise nature of knowledge and are able to provide feedback on its adequacy and potential alternatives, thereby contributes to the achievement of shared understanding of new knowledge. *Interpretation* is the process through which events are translated and shared understandings and conceptual schemes are developed [32]. *Shared interpretation* enables knowledge obtained from the diverse sources to be organized, rearranged, and processed, and ensures that all activities are related to strategic priorities [33]. Thus, shared interpretation helps clarify purpose and avoid ambiguity of knowledge, and therefore facilitates translating the agreement of new knowledge into concerted organizational innovations. *Organizational memory* is the repository where shared interpretation is committed through articulating, exchanging and sharing knowledge [34]. As the fundamental outcome of organizational learning, organizational memory provides a foundation for developing the innovative

capacity. The organizational memory affects innovations by influencing the managerial cognition of new knowledge, the acquisition of relevant knowledge, the interpretation of incoming knowledge, and innovative actions upon it [31, 35]. Accordingly, we hypothesize that,

Hypothesis 2: The level of organizational learning has a positive effect on its innovativeness.

The use of KMS and organizational learning are not independent processes but interdependent. KMS applications not only support but also enable organizational learning activities, as demonstrated in numerous studies (e.g., [29]). Meanwhile, organizational learning can increase the extent of KMS usage by creating internal needs for technological support and facilitating the assimilation of KMS in the organization.

2.3. Proactive strategic orientation

Business strategies can be classified along the continuum ranging from reactive to proactive [36]. A reactive strategy is usually a response to environmental changes and institutional pressures; while a proactive posture is presented with anticipating marketing changes and engaging in initiatives to prevent negative implications [37]. Different from the reactive strategies driven by external pressures, proactive strategies involve firm initiatives that constantly seek for the new business opportunities and introduce technical and administrative innovativeness, which brings the first-mover competitive advantage and subsequent long-term survival [36]. Therefore, the proactive strategic orientation is more relevant for initiating and developing organizational innovativeness.

However, the effect of proactive strategic orientation on innovativeness is not simply direct. According to Chatterjee et al. [38], the role of the strategic rationale is to signal the importance of certain initiatives, legitimate the resource commitment and guide the managerial attention toward appropriate ways of IT assimilation. Similarly, Khalifa and Liu [39] argue that strategies are important constituents for the institutional infrastructure that align knowledge management activities with objectives to ensure the expected outcomes. As a knowledge-intensive capability, innovativeness results from assimilation and learning processes. Therefore, we hypothesize that the effect of the proactive strategic orientation on innovativeness is realized through activating the capability-building process, i.e., the use of KMS and learning processes.

Research on the association between strategic orientations and organizational perceptions and activities provides support for our argument. According to Henderson and Venkatraman [40], the strategic orientation, which has been articulated in the organization, acts as the driver of both organizational design and the IT infrastructure design and usage. Empirically, Sharma and Vredenburg [34] report that, under a proactive strategic orientation, firms are more likely to perceive the environmental responsiveness as opportunities rather than detraction, and therefore take an open mind and commit resources to explore the opportunities, e.g., continuous higher-order learning and continuous innovation. Accordingly, we hypothesize that:

Hypothesis 3: The proactive strategic orientation will have a positive effect on the use of KMS.

Hypothesis 4: The proactive strategic orientation will have a positive effect on the level of organizational learning.

3. Research method

3.1 Sample and data collection

To test our hypotheses, we conducted a survey study involving Chinese firms that acquired KMS applications. Out of the 160 distributed questionnaires 114 valid responses were returned, implying a response rate over 71%. The demographics of the respondents are presented in Table 1. T-tests indicated no significant differences between industries.

Following several previous studies [41, 42], the single-informant method was used for data collection. Several precautions were taken to minimize the problems associated with such a method. First, care was taken to select measurement items that have proven to be valid and reliable in several previous studies. Second, we rely on Harman's single-factor, a widely used method, to control for common method variance that may be derived from a single informant method and threaten the internal validity [43]. According to this approach, common method variance is present if a single factor accounts for the majority of the covariance in the dependent and independent variables. The result did not exhibit a single factor, indicating a low level of common-method variance. Thirdly, all survey items, originally published in English, were adapted for this study in Chinese using Brislin's [44] 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. Finally, in-depth review of the respondents' profiles indicated that the respondents were knowledgeable about their firm's organizational learning and KMS initiative so that they were able to provide informed responses. As indicated in table 1, 44% of the informants were senior managers who were involved in KM initiatives and 56% were managers responsible for KM initiatives. All four major KMS applications investigated in this study were widely used in most of the surveyed firms, providing face validity for our operationalization of use of KMS.

Table 1. Demographic information

Items	Percent (%)
Industry type	
Manufacturing industry	42.11
Information industry	15.79
Retailing industry	7.02
Real estate industry	7.02
Transportation industry	6.14
Finance/securities	5.26
Consulting industry	2.63
Others	14.04
Job titles	
CEO/CIO/other top management	43.86
Senior managers	41.23
Professional technologist	6.14
Marketing specialist	3.51
Others	5.26
KMS usage	
Enterprise portals	92.98
Competitive intelligence systems	64.03
Supply chain management systems	68.42
Customer relationship management	82.46

3.2 Measures

We relied on reflective measures for proactive strategic orientation, and innovativeness, and formative measures for KMS usage on a five-point Likert scale. With reflective items, the underlying latent construct causes the observed variation in the measures [45], implying the co-variation of items and assuming the direction of causality to be from the latent variable to its measures. The items are congeneric indicators tapping into a latent first-order factor. In contrast, formative measurement assumes causality flowing from the measures to the latent construct, where the indicators jointly determine the conceptual and empirical meaning of the construct [45]. The items form the emergent first-order factor. The use of formative measurement items for KMS usage

enables the assessment of the significance and relative importance of the four typical KMS applications, i.e., enterprise portals, CIS, SCMS, and CRMS. To account for the different scales of the sampled firms, we measured the KMS usage with self-reported data (1=very little extent; 5=great extent; 0=not applicable).

For the proactive strategic orientation, we adapted the measures developed by Venkatraman [46]. One sample statement was like "My firm intends to formally track the industrial trends (1=strongly disagree to 5=strongly agree)". Innovativeness was measured with the items adapted from Yeung et al. [47]. One sample statement was like "Our business is able to effectively implement innovative activities (1=strongly disagree to 5=strongly agree)".

Organizational learning was operationalized as a second-order construct formed by the four first-order constructs, i.e., acquisition, distribution, interpretation, and organizational memory. The measures for each process of organizational learning were adapted from Trippins and Sohi [29] and Yeung et al. [47]. Then the factor scores were computed and used to measure the second-order construct [48]. According to the causal priority [49] and the direction of change of one item compared with others [50], we treated the indicators of organizational learning as formative, which was also supported by the discriminant analysis of these four first-order constructs (see Table 3). This method has been also used in Bock et al.'s empirical study [51]. Before administering the survey, we conducted a pilot test followed by in-depth interviews to reduce potential ambiguity.

3.3 Data Analysis

The data analysis was done in a holistic manner using the Partial Least Squares (PLS) with the bootstrap re-sampling procedure [52], because it allows for the simultaneous use of reflective and formative measurements and is able to model latent constructs under conditions of non-normality [50]. Following the recommended two-stage analytical procedure [53], we tested the structural relationships after assessing the measurement model.

4. Results and discussion

The measurement model for reflective constructs was assessed by examining internal consistency, and convergent and discriminant validities [54]. As shown in Table 2, the composite reliability scores (ρ) of the reflective constructs exceed the threshold of 0.70, indicating the scale reliability [55]. All reflective items

are significant at the 99% level with high loadings (all above 0.70), providing the evidence for convergent validity [56]. In the case of formative measures, high loadings are not necessarily true and reliability assessments such as Cronbach's alpha and ρ are not applicable. Chin [50] suggests that the weight of each item be used to assess how much it contributes to the overall factor, as indicated in Figure 1.

Discriminant validity was tested by comparison between the square roots of average variance extracted (AVE) value of each construct and the correlation of the respective construct and other constructs. Table 3 presents the discriminant validity statistics. The square roots of the AVE scores (diagonal elements of Table 3) are all higher than the correlations among the constructs, demonstrating discriminant validity [57]. Furthermore, all items loaded higher on their respective constructs than on others, providing additional support for discriminant validity [50].

Figure 1 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 34.6% of the variance in innovativeness with all path coefficients significant, providing a strong support to our research model. The mediation of usage of KMS and organizational learning processes were confirmed by a series formal tests by using the Sobel-Test [58]. More specifically,

no significant link was observed from the proactive strategic orientation and innovativeness.

Table 2. Assessment of internal consistency and convergent validity

Constructs	Loading	Stand error	T-value
Acquisition	$\rho = 0.831$, AVE = 0.622		
	0.830	0.029	29.014
	0.758	0.068	11.138
	0.775	0.055	14.005
Distribution	$\rho = 0.858$, AVE = 0.668		
	0.858	0.026	33.512
	0.827	0.037	22.388
	0.764	0.040	19.001
Interpretation	$\rho = 0.853$, AVE = 0.659		
	0.844	0.032	26.826
	0.812	0.060	13.498
	0.779	0.044	17.596
Memory	$\rho = 0.798$, AVE = 0.569		
	0.723	0.066	10.989
	0.802	0.036	22.606
	0.737	0.046	16.144
Proactive orientation	$\rho = 0.860$, AVE = 0.672		
	0.820	0.033	25.227
	0.830	0.032	25.805
	0.811	0.033	24.552
Innovativeness	$\rho = 0.859$, AVE = 0.669		
	0.828	0.039	21.499
	0.813	0.057	14.346
	0.813	0.052	15.771

Table 3. Assessment of discriminant validity

Constructs	1	2	3	4	5	6
1. Acquisition	0.789					
2. Distribution	0.343	0.817				
3. Interpretation	0.619	0.318	0.812			
4. Memory	0.411	0.413	0.461	0.754		
5. Proactive orientation	0.505	0.420	0.485	0.348	0.820	
6. Innovativeness	0.454	0.298	0.473	0.410	0.357	0.818
Diagonal elements are the square roots of the AVE scores						

The use of KMS and organizational learning processes constitute two important resources to build up the organizational innovativeness, validating the hypotheses H1&2. The proactive strategic orientation had a significant impact on both KMS usage and organizational learning, and therefore, H3&4 were supported. We also found a significant correlation between KMS usage and organizational learning processes ($r=0.561$). Our results demonstrate a strategic-driven capability-building process resulting from the integration of different resources.

We further examined the relative importance of the specific KMS applications and organizational learning processes. All four typical KMS applications were found significant with roughly same weights. Relatively, the weight of enterprise portals seemed lower than that of CIS, SCMS and CRMS. This could be attributed to the importance of external knowledge in developing innovativeness. Scanning the external changes and constantly learn from their customers, competitors, and partners are emphasized in the sample firms.

All the four processes of organizational learning were found significantly as well, but with different magnitudes of weights. Knowledge acquisition (magnitude=0.427) and interpretation (magnitude=0.395) are more important in developing innovativeness. Organizations need to constantly acquire new knowledge from diverse sources, which is the pre-requisite for innovation. Knowledge interpretation, on the other hand, ensures learning activities to be aligned with strategic priorities and enables the translation from the consensus on new knowledge into actual actions [33]. Knowledge

distribution was also significant with a weight of 0.285. Frequent communication increases the wide awareness of new knowledge and strategic rationale. Finally, organizational memory, although significant, had the lowest contribution with a weight of 0.190. In literature, the contribution of memory is still mixed. Organizational memory is the means by which the prior knowledge is brought to bear on present activities, therefore it may result in higher or lower levels of organizational effectiveness [34].

Figure 1. Results of Structural model

5. Conclusion and implications

Innovativeness has been regarded as an important organizational capability to secure long-run competitive position and bottom-line performance. Prior research from different disciplines has shed some light on the capability-building process for innovativeness. However we still lack an integrated understanding of how different resources, i.e., strategic, process and technological, are mobilized and interacted to nurture innovativeness. Drawing upon the resource-based view and prior studies on innovativeness, we identify and empirically demonstrate three resources that are important for the development of innovativeness. They are proactive strategic orientation, the use of KMS and organizational learning processes. The proactive strategic orientation acts as a mobilizer to trigger the internal activities and to provide guidance for the capability-building process, while the

use of KMS and organizational learning are two important resources that complement to each other to facilitate the capability-building process in which the strategic choice is translated into the organizational innovativeness. Moreover, the identified KMS applications, i.e., CRMS, SCMS, CIS and enterprise portals, and the organizational learning processes, i.e., knowledge acquisition, knowledge distribution, shared interpretation and organizational memory, are found to be significant in contributing to the innovativeness development.

Our results entail important theoretical and practical implications. On the theoretical side, we offer an integrated understanding towards enhancing organizational innovativeness. Although different resources for innovativeness development have been investigated, most prior research only provides a partial view by examining those factors separately. Our research attempts to consider heterogeneous resources simultaneously and to elaborate how these factors jointly affect organizational innovativeness. Our

results also clarify the role of different resources in developing innovativeness. Capability building should be considered as a strategic action which is aimed to address the interface between the organization and its environment, and guided by the strategic choice. Meanwhile such a process involves systematic internal activities to substantiate the objectives. The proper use of KMS is able to speed up the cycle of organizational learning. In turn, the learning processes lead the firms to improve their level of using KMS for innovation. Moreover, the use of KMS and the complementary learning processes potentially translate the strategic choice into the organizational innovativeness.

On the practical side, our results provide valuable guidance for firms to develop innovativeness. More specifically, this study highlights two important integrations. Firstly, firms need to integrate KMS usage with organizational learning activities so that these two complementary resources can enhance each other, resulting in a magnified effect on innovativeness. Secondly, the internal processes should be integrated with business strategic orientations. The mobilization of internal resources needs to be aligned with the business strategic choices. A well-developed strategic rationale should also be regarded as an integral part in capability building processes as it provides a strong power to trigger the organizational change and mobilize the required resources to achieve.

6. References

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