INFORMATION TECHNOLOGY EXPLOITATION AND EXPLORATION IN A FAST GROWING ECONOMY

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Abstract

Organizational agility has recently received a great deal of attention as it is seen as a significant business capability which allows firms to respond flexibly to today’s rapidly changing business environment. In particular, this capability deems essential under a fast growing economy, such as China. However, it is still unclear as to how and why specific information technology (IT) investments can enable this capability. Drawing upon the idea of organizational IT exploitation and exploration, this study investigates how firms can create IT-enabled organizational agility. The study also identifies various types of IT resources by adopting two well-established IT resource classification schemes in the literature. A model was developed with several predictions about the relationships among IT resources, IT capabilities, and organizational agility. The proposed model was tested through a large-scale field survey with multiple respondents in Chinese enterprises. The results of structural equation model analyses indicate that specific IT resources are significant driving forces behind each type of IT capability, leading to organizational agility.

Keywords: Organizational Agility, IT Capability, IT Resources, Exploration, Exploitation
1 INTRODUCTION

Since the competitive environment of contemporary business has become more intensive, firms possessing the capability to respond to environmental dynamics, which is known as organizational agility, are likely to produce better outcomes (Sambamurthy & Bharadwaj & Grover 2003). This will be more true for fast growing economies when considering their high speed of environmental change. Given that information technology (IT) is a significant business platform for today’s digitized economies (Sambamurthy et al. 2003), the role of IT in creating organizational agility has become a critical issue of interest to both academics and practitioners.

In the literature, several researchers have pointed out that IT may enable firms to react quickly to changes in market conditions by helping them to undertake strategic changes when necessary (e.g., Bharadwaj 2000; Powell and Dent-Micallef 1997; Sambamurthy et al. 2003). While they provide a strong foundation for understanding the relationship between IT and agility, the underlying mechanisms by which specific IT investments can enable organizational agility still need to be clarified. To address the current gap in the literature, this study aims to investigate what IT resources are required and how they can be managed to create organizational agility.

Drawing upon the idea of organizational exploitation and exploration, this study identifies two distinctive types of organizational IT capability, i.e., exploitative IT capability and explorative IT capabilities. In addition, adopting well-established IT resource classification schemes in the literature, the study also identifies two groups of IT resources, i.e., internally-oriented and externally-oriented, each of which consists of specific technology, IT human, and intangible IT resources. Based on these conceptualizations of IT capabilities and IT resources, the specific roles of IT resources within the two types of IT capability are investigated. Furthermore, the study suggests that both types of IT capability are the significant driving forces of organizational agility.

2 LITERATURE REVIEW AND CONCEPTUAL DEVELOPMENT

Drawing from the following three theoretical perspectives, (1) the resource-based view, (2) organizational exploration and exploitation, and (3) the IT-enabled dynamic capability view, a consolidative theoretical framework explaining IT-enabled agility creation is suggested.

2.1 Organizational IT Resources

In examining organizational IT value, researchers have investigated the strategic value of IT by drawing from the tenets of the resource-based view (RBV) (Bharadwaj 2000; Mata & Fuerst & Barney 1995; Wade and Hulland 2004). According to RBV, resources that are valuable, rare, inimitable, and non-substitutable are viewed as the potential source of organizational competitive outcomes (Barney 1991). Based on this perspective, researchers have considered organizational IT resources as strategic sources for superior firm performance (Davenport and Short 1990; Wade and Hulland 2004). Studies that investigate IT resources focus on inherent characteristics that create strategic value.

In line with this perspective, many classification schemes for IT resources have been suggested in the literature. This study first adopts an IT resource classification scheme consisting of technology, human, and intangible IT resources (e.g., Bharadwaj 2000; Ross & Beath & Goodhue 1996). This scheme is based on simple yet widely accepted methods of defining organizational resources, i.e., tangible, personnel-based, and intangible resources (Grant 1991). Second, to develop a richer and more functional classification, this study also takes into account Wade and Hulland’s (2004) classification scheme which focuses on the orientation of various IT resources, such as internally-oriented and
externally-oriented. Combining the two existing classification schemes, this study proposes the following IT resources classification as shown in Table 1.

<table>
<thead>
<tr>
<th>Technology Resources</th>
<th>Internally-Oriented</th>
<th>Externally-Oriented</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shared Service Infrastructure</td>
<td>Development Skills</td>
<td>Procurement Skills</td>
</tr>
<tr>
<td>Specialized Applications</td>
<td>Internal Relationship</td>
<td>External Relationship</td>
</tr>
</tbody>
</table>

**Table 1. New Classification of Various IT Resources**

Technology resources consist of physical or tangible IT components (Bharadwaj 2000). They include IT service platforms and application systems (Ross et al. 1996; Wade and Hulland 2004; Weill & Subramani & Broadbent 2002). In particular, *shared service infrastructure* means a firm’s sharable technical platform (Bharadwaj 2000; Ross et al. 1996). This includes IT commodities, e.g., computer and printers, and shared IT services, e.g., management of large-scale data processing, networking, and management of a firm-wide database (Broadbent and Weill 1997). The resources in this category are internally-oriented because they focus on streamlining data and communications within a firm. On the other hand, *specialized applications* aim to support a firm’s specific business activities beyond its common and stable processes that are supported by the shared service infrastructure. They have highly specialized purposes to support the specific tasks for a firm’s supply and demand issues, e.g., purchasing and customer retention (Broadbent and Weill 1997). Hence, they are externally-oriented resources that respond to environmental dynamics.

Human IT resources include the resources possessed by IT personnel, such as technical skills and IT managerial skills. In particular, *development skills* are a firm’s internal IT personnel skills for building and supporting its IT infrastructure and applications (Ross et al. 1996; Wade and Hulland 2004). This skill set includes a knowledge of programming languages, experience with operating systems, and an understanding of communication protocols and products (Mata et al. 1995). On the other hand, *procurement skills* are a managerial and technical skill set for acquiring appropriate information systems and/or services from external suppliers, such as IT vendors, service providers, and outsourcing companies (Feeny and Willcocks 1998; Wade and Hulland 2004). While development skills are thought to be internally-oriented, procurement skills are thought to be externally-oriented.

Intangible IT resources can be investigated in terms of IT-based relationship (e.g., Bharadwaj 2000; Ross et al. 1996). In particular, *internal relationship* means an intensive relationship between the IT unit and other business units within a firm (Ravichandran and Lertwongsatien 2005). This relationship is based on the IT unit’s ability to communicate, coordinate, and negotiate quickly and effectively with the users of its services. On the other hand, *external relationship* refers to a firm’s partnership with its key IT vendors, service providers, consultants, and outsourcing companies (Ravichandran and Lertwongsatien 2005). The strength of this relationship depends on the open communications, trusts, and cooperation with external partners (Powell and Dent-Micallef 1997).

### 2.2 Organizational IT Capability

While traditional RBV studies highlight the strategic value of IT resources, more recent studies also highlight *organizational IT capability*, a firm’s IT-specific capability to deliver IT services and products to the firm by deploying and utilizing IT resources (Bharadwaj 2000; King 2002; Mata et al. 1995). They contend that technologies *per se* do not provide competitive value to a firm, because individual IT resources can be easily duplicated by competitors. Instead, they posit that a firm’s IT capability, which is formed based on specific combinations of individual IT resources (Ross et al. 1996), is an idiosyncratic source of organizational IT value. Hence, a firm’s distinguishable ways in managing its IT activities can be thought of as a source of organizational competitiveness. In line with this perspective, the study suggests that, in studying the value of organizational IT, rather than merely investigating the effect of IT resources, it is important to investigate the area of IT capability.
Drawing from the theoretical perspective on organizational exploitation and exploration (March 1991), this study conceptualizes two distinctive types of IT capability, i.e., *exploitative IT capability* and *explorative IT capability*. According to March (1991), exploitation can be thought of as the use and development of opportunities already known through refinement and extension of existing resources. Hence, exploitative IT capability involves the ability to increase the productivity of *existing IT resources* to support business needs. On the other hand, exploration can be thought of as an organizational experimentation with new alternatives and pursuit of knowledge about unknown opportunities. Hence, explorative IT capability involves the ability to find *new IT resources* to support business needs. While the former capability refines and improves upon the current IT support, the latter capability pursues new ways of providing IT support, such as with organizational IT innovations. Both types of IT capability will be essential for organizational IT activities.

### 2.3 IT-Enabled Dynamic Capability View and Organizational Agility

While IT has been recognized as a strategic resource for contemporary business competition (Ross et al. 1996; Tippins and Shoi 2003), there is an ongoing controversy regarding whether or not investing in IT actually leads to better firm performance (Brynjolfsson 1993; Carr 2003). To address this issue, several researchers attempt to examine organizational dynamic capability as an intermediate outcome of IT (Sambamurthy et al. 2003; Tippins and Shoi 2003; Wheeler 2002). They have pointed out that IT is a potential enabler of organizational dynamic capability. Recently, the strategic role of an organizational dynamic capability that enables a firm to respond rapidly and flexibly to environmental dynamics is becoming of greater interest because contemporary firms need to detect and seize market opportunities with speed and surprise. This organizational high-level capability, known as *organizational agility*, enables a firm to detect environmental changes and rapidly respond to the changes by assembling requisite assets, knowledge, and business relationships (Goldman & Nagel & Preiss 1995; Sambamurthy et al. 2003). In the literature, it is argued that IT is a digitized platform that creates this capability. For example, the increased involvement of customers with a firm’s network and communication technologies can allow a deeper relationship with its customers, thus helping the firm quickly respond to customers’ specific needs (Sambamurthy et al. 2003). In addition, by utilizing IT which provides personalized and customized products and services, such as Internet-based customer relationship management and business intelligence solutions, a firm can become agile in responding to the specific needs of its customers. Such digitized platforms also enable firms to form value-chain collaborations with partners to rapidly develop emerging and untapped market niches (Sambamurthy et al. 2003).

### 3 RESEARCH MODEL AND HYPOTHESES

Figure 1 shows the research model of the study.

![Research Model](image-url)
3.1 The Roles of IT Resources in Forming IT Capability

Based on the new classification of various IT resources within contemporary firms, this study posits that a firm’s *internally-oriented IT resources*, including shared service infrastructure, development skills, and internal relationship, lead to exploitative IT capability. First, shared service infrastructure, as a sharable technical platform, aims mainly to streamline internal IT integration by providing networks, data management, and security management services (Weill et al. 2002). Hence, this internally-oriented technology resource may lead to better IT exploitation processes by facilitating the utilization of existing IT resources. Second, since development skills are an IT personnel skill set for building the firm’s proprietary IT products and services, this human IT resource may be positively related to the part of the firm’s exploitative IT capability that focuses on the idiosyncratic utilization of the firm’s existing resources. Third, a strong internal relationship implies a high quality of relationship between the IT unit and other business units (Ravichandran and Lertwongsatien 2005). Such a strong relationship can increase a firm’s dependency on its internal IT unit because the IT unit may have deep understanding of the business environments of its IT users and their specific needs. Hence, this internally-oriented relationship may also be positively related to the firm’s internal exploitation of existing IT resources to support the current IT needs of other business units. Moreover, based on the conceptualization of internally-oriented IT resources in terms of tangible, human, and intangible resources, it is believed that the three types of internally-oriented IT resources in combination affect a firm’s IT capability (Bharadwaj 2000). Thus, they can be modeled using a second-order construct approach. Therefore, the first hypothesis H1 is formulated as follows:

- **H1. A higher level of internally-oriented IT resources, which consist of shared service infrastructure, development skills, and internal relationship, will lead to a higher level of exploitative IT capability.**

This study also posits that a firm’s *externally-oriented IT resources*, including specialized applications, procurement skills, and external relationship, leads to explorative IT capability. First, specialized applications are designed to support a firm’s specific tasks. Instead of supporting internally-oriented common business processes, specialized applications are mainly deployed to support demand- or supply-side business processes (Weill et al. 2002), which are frequently changing to respond to market dynamics. Hence, utilizing these applications, a firm can capture changes in requirements from its demand or supply sides, and thus detect new opportunities or needs for IT innovation. Second, procurement skills involve IT vendor evaluation, contract management, and outsourcing project management skills (Feeny and Willcocks 1998). Hence, this skill set could be positively related to a firm’s explorative IT capability by enabling the firm to quickly deploy new IT resources from external sources and thus achieve innovations. Third, a firm’s strong relationship with external IT partners may provide more information about emerging technologies and future IT innovations, and thus help the firm to rapidly acquire new IT resources (Ravichandran and Lertwongsatien 2005). Hence, this IT-based external relationship will positively relate to explorative IT capability to deploy and utilize external resources. Therefore, based on the conceptualization of externally-oriented IT resources in terms of tangible, human, and intangible resources, the second hypothesis H2 is formulated as follows:

- **H2. A higher level of externally-oriented IT resources, which consist of specialized applications, procurement skills, and external relationship, will lead to a higher level of explorative IT capability.**

In addition to externally-oriented IT resources, internally-oriented IT resources may also be vital for a firm’s exploration of new IT resources. First, flexibility and scalability of shared service infrastructure has been thought to be vital for a firm’s new IT initiatives (Weill et al. 2002). Ravichandran and Lertwongsatien (2005) also pointed out that IT infrastructure, as a set of shared technology resources, can provide a foundation enabling both present and future business applications. Second, the possession of system development skills may also be vital for a firm’s exploration of new IT resources as well as its exploitation of existing IT resources. A deep understanding of IT development methods and project management is a very critical factor in both internal system development and IT
outsourcing (Bassellier & Benbasat & Reich 2003). This implies that the internal development skill set is also an important resource for successful external IT exploration. In addition, internal development personnel can be the source of a firm’s experimentation with new technologies through the appropriate update of emerging technologies and implementation techniques (Bharadwaj 2000). Third, a firm’s internal relationship may be vital for a firm’s external exploration of new IT resources. According to Rogers (1995), the internal relationship between IT unit and other business units may be an important factor in the successful diffusion of new IT innovations. This is because organizational adaptation for an IT innovation is an iterative process of user acceptance and final infusion. Therefore, based on these arguments, the third hypothesis H3 is formulated as follows:

- **H3. A higher level of internally-oriented IT resources will lead to a higher level of explorative IT capability.**

3.2 The Roles of IT Capabilities in Forming Organizational Agility

According to Sambamurthy et al. (2003), the appropriate integration of existing IT resources with key business processes improves the speed of a firm’s response to the market’s specific needs. This enables the firm to seize new opportunities by improving its existing ways of doing business (Goldman et al. 1995). Therefore, through effective resource utilization and process coordination, exploitative IT capability can create organizational agility. Therefore, the fourth hypothesis H4 is formulated as follows:

- **H4. A higher level of exploitative IT capability will lead to a higher level of organizational agility.**

On the other hand, innovative and fast implementation of IT support by deploying new IT resources from external sources can enable a firm to capture novel market opportunities (Lyytinen and Rose 2003). Further, emerging technologies or radically innovative business applications can enable a firm to reshape its business scope (Venkatraman 1994) and business nature (Lyytinen and Rose 2003), thus making the firm more flexible and adaptable to market change. Therefore, explorative IT capability enables a firm to rapidly procure and flexibly integrate emerging IT resources and thus create agility. Therefore, the fifth hypothesis H5 is formulated as follows:

- **H5. A higher level of explorative IT capability will lead to a higher level of organizational agility.**

4 RESEARCH METHOD

A large-scale cross-sectional survey to collect firm-level data was conducted in the People’s Republic of China. Since China is an emerging economy, firms in the Chinese market are experiencing rapid changes and fast growth in their business environment.

4.1 Measurement Development

The measurement development process involved five stages: (1) operationalization of research constructs, (2) item development, (3) validity tests, (4) expert review, and (5) measurement translation. First, research constructs were operationalized based on the definition of each construct as well as of relevant constructs in the literature. Second, every attempt was made to make use of existing measurements. Modifications of the existing items were also made to suit the context of the study. However, in cases where there were no measurements appropriate to the context under study, new measurements were developed based on relevant theoretical bases. Table 2 shows the sources or relevant constructs of the measurement items used in this study.
<table>
<thead>
<tr>
<th>Constructs</th>
<th>Measurement Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organizational Agility</td>
<td>Organizational effectiveness: high-level organizational capability for innovation, market response, anticipation of surprises, etc. (Gold &amp;Malhotra &amp; Segars 2001)</td>
</tr>
<tr>
<td>Explorative IT Capability</td>
<td>Exploration of new IT resources for future IT services and business models (Brown &amp;Davidsson &amp; Wiklund 2001; Karimi &amp; Somers &amp; Gupta 2001) and new IT experimentation (Nambisan &amp; Agarwal &amp; Tanniru 1999)</td>
</tr>
<tr>
<td>Exploitative IT Capability</td>
<td>Utilizing existing IT resources for current IT services and business models (Brown et al. 2001) and existing IT reuse (Ravichandran and Lertwongsatien 2005)</td>
</tr>
<tr>
<td>Shared Service Infrastructure</td>
<td>Network and data sophistication: network speed and quality, data accessibility, and data sharing among business units (Ravichandran and Lertwongsatien 2005)</td>
</tr>
<tr>
<td>Specialized Applications</td>
<td>Specialized application systems to support specific tasks for demand and supplier sides (Weill et al. 2002)</td>
</tr>
<tr>
<td>Development Skills</td>
<td>IT personnel skill set for developing customized applications, controlling and establishing development process, and adopting new development methodologies (Ravichandran and Lertwongsatien 2005; Tippins and Shoi 2003)</td>
</tr>
<tr>
<td>Procurement Skills</td>
<td>IT personnel skill set for vendor development (Feeny and Willcocks 1998) and IT outsourcing (Willcocks &amp; Feeny &amp; Olson 2006)</td>
</tr>
<tr>
<td>Internal Relationship</td>
<td>Partnership with other business units in terms of mutual understanding, high trust, degree of conflict, and conflict resolution (Ravichandran and Lertwongsatien 2005)</td>
</tr>
<tr>
<td>External Relationship</td>
<td>Partnership with IT vendors, consultants, and outsourcing providers (Ravichandran and Lertwongsatien 2005)</td>
</tr>
<tr>
<td>Firm Size</td>
<td>Organizational size (Armstrong and Sambamurthy 1999)</td>
</tr>
</tbody>
</table>

Table 2. Measurement Sources for Research Constructs

Third, to ensure the construct validity of the modified and self-developed items, the conceptual validation procedure as described by Moore and Benbasat (1991) was carried out. Based on the sorting results, necessary changes were made to the survey instrument. The final item placement score (IPS) reached over 90%. Fourth, to ensure the face validity and construct validity of the instrument, the items were distributed to three well-known academics who have expertise in the specific research area of organizational IT value. After achieving the original English instrument, finally, it was translated to Chinese for data collection in China. For this, a translation committee approach was utilized. According to van de Vijver and Leung (1997), the committee approach for measurement translation is good for linguistic and psychological equivalence via the sense-making process between committee members.

4.2 Research Design

To avoid single respondent bias, such as common method variance, survey questionnaires were sent separately to multiple key informants within a firm who represent different areas of concern and expertise (Podsakoff and Organ 1986). The questionnaire for examining a firm’s IT resources and IT capabilities was sent to IT executives, such as the chief information officer (CIO), chief technical officer (CTO), and management information systems (MIS) manager. The questionnaire designed to study business capability, i.e., organizational agility, was sent to business executives, such as the chief executive officer (CEO), chief operating officer (COO), and Sales/Marketing manager.

A series of criteria in selecting the target samples were applied due to the specific context of the study. First, this study targeted the industries which have a potential of market growth to an extent. Second, this study focused on industries which require IT support to a significant extent for their business operations. Finally, target sample’s firm size was also limited to medium to large.

The main survey was conducted using both telephone and direct interviews in order to increase the response rate and the respondents’ understanding of the survey concepts. Around 1,000 firms near three major cities in China, including Beijing, Shanghai, and Guangzhou, were targeted by referring to industry directories within these regions. Finally, a total of 205 complete data samples were achieved after removing incomplete data, outliers, and inappropriate industries. The final samples had an
average of 1,806 employees, an average of RMB 2,198 million total assets, and an average of RMB 2,860 million annual sales during the last three years.

5 RESULTS AND ANALYSES

Partial least squares (PLS), a structural equation modeling technique, were used to analyze the data. This technique does not require multivariate normal distribution (Fornell and Bookstein 1982). In addition, it is appropriate for early stages of theory development (Howell and Higgins 1990). Given that this study is an early attempt to develop a theoretical model that explains how various IT resources and IT capabilities enable organizational agility and that the data set of this study does not meet the assumption of normal distribution, PLS was considered to be appropriate for this study.

5.1 Measurement Model Evaluation

The validity of the measurement model was established prior to testing the structural model (Byrne 1998). The convergent validity of the reflective measures is determined in three ways: (1) Cronbach’s alpha, (2) the composite reliability of the construct, and (3) the average variance extracted (AVE) by the construct. Based on the results reported in Table 3, it was concluded that all the items demonstrated adequate convergent validity.

<table>
<thead>
<tr>
<th>Construct</th>
<th>Items</th>
<th>Range of Item Reliability</th>
<th>Composite Reliability</th>
<th>Cronbach’s Alpha</th>
<th>AVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organizational Agility (AGI)</td>
<td>8 Items</td>
<td>.713 -.792</td>
<td>.910</td>
<td>.886</td>
<td>.559</td>
</tr>
<tr>
<td>Exploitative IT Capability (EIC)</td>
<td>6 Items</td>
<td>.807 -.867</td>
<td>.935</td>
<td>.915</td>
<td>.704</td>
</tr>
<tr>
<td>Explorative IT Capability (ERC)</td>
<td>6 Items</td>
<td>.772 -.862</td>
<td>.928</td>
<td>.903</td>
<td>.682</td>
</tr>
<tr>
<td>Shared Service Infrastructure (SRVI)</td>
<td>4 Items</td>
<td>.785 -.891</td>
<td>.905</td>
<td>.858</td>
<td>.705</td>
</tr>
<tr>
<td>Specialized Applications (SAPP)</td>
<td>4 Items</td>
<td>.887 -.910</td>
<td>.943</td>
<td>.920</td>
<td>.807</td>
</tr>
<tr>
<td>Development Skills (DEVS)</td>
<td>4 Items</td>
<td>.837 -.915</td>
<td>.936</td>
<td>.905</td>
<td>.785</td>
</tr>
<tr>
<td>Procurement Skills (PRCS)</td>
<td>4 Items</td>
<td>.817 -.894</td>
<td>.917</td>
<td>.879</td>
<td>.735</td>
</tr>
<tr>
<td>Internal Relationship (INTR)</td>
<td>4 Items</td>
<td>.786 -.886</td>
<td>.903</td>
<td>.857</td>
<td>.699</td>
</tr>
<tr>
<td>External Relationship (EXTR)</td>
<td>3 Items</td>
<td>.859 -.888</td>
<td>.902</td>
<td>.837</td>
<td>.755</td>
</tr>
</tbody>
</table>

Table 3. Result of Convergent Validity Test

Table 4 shows that the square root of the AVE for each construct was larger than the correlations between itself and the other constructs. This implies that each of the constructs shared greater variance with its own block of measures than with other constructs representing a different block of measures (Chin 1998). Therefore, this result demonstrates that there is good discriminant validity for the items used in this study.

<table>
<thead>
<tr>
<th>AGI</th>
<th>EIC</th>
<th>SRVI</th>
<th>DEVS</th>
<th>INTR</th>
<th>ERC</th>
<th>SAPP</th>
<th>PRCS</th>
<th>EXTR</th>
<th>SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>.748</td>
<td>.839</td>
<td>.437</td>
<td>.698</td>
<td>.472</td>
<td>.522</td>
<td>.690</td>
<td>.532</td>
<td>.657</td>
<td>1.000</td>
</tr>
<tr>
<td>.478</td>
<td>.482</td>
<td>.504</td>
<td>.694</td>
<td>.325</td>
<td>.522</td>
<td>.472</td>
<td>.690</td>
<td>.532</td>
<td>1.000</td>
</tr>
<tr>
<td>.437</td>
<td>.713</td>
<td>.504</td>
<td>.504</td>
<td>.325</td>
<td>.522</td>
<td>.472</td>
<td>.690</td>
<td>.532</td>
<td>1.000</td>
</tr>
<tr>
<td>.647</td>
<td>.592</td>
<td>.407</td>
<td>.504</td>
<td>.325</td>
<td>.522</td>
<td>.472</td>
<td>.690</td>
<td>.532</td>
<td>1.000</td>
</tr>
</tbody>
</table>

Table 4. Result of Discriminant Validity Test
5.2 Structural Model Analyses

The estimated path effects and the associated t-values were calculated using the Bootstrapping routine in PLS-Graph (version 03.00 build 1126). Since the internally- and externally-oriented IT resources were formulated as second-order constructs, the latent scores for each of the first-order constructs were calculated and used as measures for each group of the IT resources (Chin and Gopal 1995). Results showed significant second-order loadings. Figure 2 shows the results of the model analysis.

As shown in Figure 2, all paths were significant; the group of internally-oriented IT resources ($\beta = .793, t = 27.417$) was found to be a significant determinant of exploitative IT capability at the .01 level; the group of externally-oriented IT resources ($\beta = .235, t = 3.755$) was found to be a significant determinant of explorative IT capability at the .01 level; the group of internally-oriented IT resources ($\beta = .644, t = 10.324$) was found to be a significant determinant of explorative IT capability at the .01 level. The two groups of IT resources explained 62.9% and 71.0% of the variances of exploitative IT capability and explorative IT capability, respectively. Moreover, all second-order loadings were highly significant and the structural links between the second-order measurement model and the criterion variables, i.e., exploitative IT capability and explorative IT capability, were significant. Hence, the second-order factor model that represents the combinative effects among the first-order IT resources find support (Venkatraman 1990). Therefore, all hypotheses regarding the effects of IT resources on the two types of IT capability, i.e., H1, H2, and H3, are supported.

In this model test, both types of IT capability were found to be significant determinants of organizational agility; exploitative IT capability ($\beta = .234, t = 2.654$) at the .05 level and explorative IT capability ($\beta = .327, t = 3.784$) at the .01 level. On the other hand, the control variable, firm size ($\beta = .002, t = 0.034$), was not significant in determining organizational agility. The model explains 27.8% of the variance of organizational agility. Therefore, the hypotheses regarding the effects of the two types of IT capability on organizational agility, i.e., H4 and H5, are supported. Interestingly, the test results indicate that the path coefficient and the associated t-value of explorative IT capability ($\beta = .327, t = 3.784$) was higher than that of exploitative IT capability ($\beta = .234, t = 2.665$).

5.3 Implications

The results indicate that specific groups of IT resources lead to each of the two types of IT capability. In particular, internally-oriented IT resources, involving shared service infrastructure, development skills, and internal relationship, is a significant driving force for both exploitative IT capability and explorative IT capability. On the other hand, externally-oriented IT resources, involving specialized applications, procurement skills, and external relationship, is a significant driving force for explorative IT capability. The results suggest that a firm’s IT resources are the sources of its strategic IT
exploitation and/or exploration. The findings are consistent with Wade and Hulland (2004)’s perspective that organizational IT resources have different roles in creating organizational IT value, particularly in accordance with their orientations.

The two types of IT capability, in turn, significantly lead to organizational agility. The results indicate that explorative IT capability may be stronger in determining organizational agility than exploitative IT capability. This may suggest the strategic significance of IT exploration in a fast growing economy, such as China. This finding appears to be consistent with Wheeler’s (2002) argument that firms require different modes of IT activities under different environmental conditions.

6 CONCLUSION

This study examined the roles of exploitative IT capability and explorative IT capability in building organizational agility. In addition, in order to explain specific roles of various IT resources in forming the two types of IT capability, a new classification scheme of IT resources was also suggested by combining two well-established IT resource classification schemes in the literature. Multi-respondents survey data of medium- and large-size enterprises in China were used to validate the proposed model.

The results of model test reveal the specific effects of various IT resources on the two types of IT capability: (1) the group of internally-oriented IT resources leads to exploitative IT capability; (2) the group of externally-oriented IT resources leads to explorative IT capability; (3) the group of internally-oriented IT resources also leads to explorative IT capability. The results also indicate the significant, yet distinctive, impacts of the two types of IT capability on organizational agility: (1) exploitative IT capability leads to organizational agility; (2) explorative IT capability leads to organizational agility.

This study has several limitations which involve (1) cross-sectional research design, (2) data collection within a country, and (3) conceptual distinction in practices. First, this study used a cross-sectional research design. Such a snap-shot approach may have limitations in terms of studying the causal relationships or time effects between research variables, such as the lead-time of the IT impact (Bharadwaj 2000). Second, the data used in this study were collected within a country. With more data sets across regional and cultural boundaries, the generalizability of the findings can be enhanced. Third, while the variables in this study, such as various IT resources and the two types of IT capability, have been developed with strong theoretical bases, their clear distinctions in practical settings can be challenging. This is because, within a contemporary firm, organizational resources are highly interconnected with each other and their deployment strategies of a firm are highly complex.

Regardless of the aforementioned limitations, this study has several contributions to the literature. First, this study both theoretically and empirically reveals the mechanisms by which IT can create organizational agility. Since the underlying mechanisms of IT-enabled organizational agility creation have been ill-understood in the extant literature, the theory-based models and the empirical findings of the study are both interesting and useful to academics in this research area. Second, through this study, new measurements with psychometric properties suited to the research constructs used in the research models have been developed. They can be of use to the growing community of researchers and practitioners in this area. Third, this study also benefits practitioners by providing guidelines to strategically and selectively invest and deploy specific IT resources and IT capabilities that fit their business context. In particular, considering the specific roles of IT resources in different types of IT capability may provide additional guidelines to practitioners in the development of organizational IT strategy.
REFERENCES


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