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Knowledge portals in Chinese consulting firms: a task–technology fit perspective

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Abstract
Although knowledge management (KM) has been examined in previous research, the utilization of KM technologies is still not well understood. Hence, in this study, a model was developed to investigate the utilization of KM technologies, specifically, knowledge portals, from the task–technology fit (TTF) perspective. An empirical study was conducted in the Chinese consulting industry to test the validity of the model. The results show that knowledge tacitness, output quality, and compatibility are positively related to utilization. Utilization and compatibility are positively related to performance. TTF is more strongly related to performance than to utilization. Implications of the results are discussed.
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Introduction

Organizations increasingly recognize that in order to build and sustain competencies, it is essential to make knowledge available to the right worker at the right time and the right place (Drucker, 1995; Kwan & Balasubramanian, 2003). Information technology (IT) is believed to facilitate knowledge management (KM) by accumulating organizational knowledge, providing access to retrievable knowledge, and enhancing collaboration for knowledge sharing and creation (Stein & Zwass, 1995; Ryan & Prybutok, 2001).

The increasing importance of KM has encouraged researchers to work on this topic, including the discussion of technological, managerial, and cultural factors that facilitates KM (Davenport *et al*., 1998; Alavi & Leidner, 2001; Janz & Prasarnphanich, 2003), development of KM frameworks and theoretical models (Nonaka & Konno, 1998; Zack, 1999), identification of the relationship between KM and other business functions (Hellström *et al*., 2000; Yahya & Goh, 2002), and value of KM (Chen & Edgington, 2005; Tanriverdi, 2005). However, the nature of the factors influencing the utilization of KM technologies has not been well understood (Ryan & Prybutok, 2001). Specifically, relatively few studies have empirically examined this topic. Hence, this study builds on existing literature by examining the utilization of KM technologies, specifically, knowledge portal (K-portal), through a survey of knowledge workers in consulting firms. Note that the types of knowledge provided and utilized by different consultants may differ as it is dependent on the nature of activities they undertake. Nevertheless, all consultants deal with knowledge, that is stored in some repositories accessible through their organizations' K-portal. K-portals are currently widely used in a variety of organizations

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to support internal knowledge retrieving, synthesizing, and exchanging tasks for knowledge workers. In general, successful K-portals require high capability of integrating knowledge from various sources, supporting collaboration, and presenting knowledge in a personalized manner (Gupta, 2003).

The task–technology fit (TTF) model, which theorizes that the fit between task requirements and technology functionality influences utilization and performance, is used as the theoretical framework for this study. To date, there are few studies on TTF, if any, carried out in Asia. However, previous studies have generally found that TTF is applicable across a relatively wide range of tasks and technologies (Gebauer *et al.*, 2005), so it is reasonable to expect that TTF is also applicable to the utilization of K-portals in China. TTF is an appropriate model to examine K-portals as both task requirements and technology functionality are expected to affect its usage.

The contributions of this study are as follows. First, while KM has been around for many years, there are not many survey-based empirical studies on it. Extant KM research has commonly been based on case studies or descriptive studies. This study expands the repository of KM studies by using survey data. Second, this study extends previous KM literature by introducing a fit perspective. To the best of our knowledge, this is the first study to use TTF as a framework for understanding KM utilization in the context of K-portals. Compared to other types of information technologies, the widespread availability of information found on the Internet makes the issue of TTF in K-portal utilization an important issue. In other words, unlike other technologies, employees may have access to a wide range of information and knowledge sources available online in addition to the corporate K-portal. Consequently, it becomes important to examine whether TTF becomes crucial in encouraging more utilization of K-portal. Further, K-portals are quite different from other types of information systems (IS). The major difference between K-portals and traditional IS lies in uncertainty. Traditional IS (e.g., transaction processing systems, management information systems) are generally developed only if the typical users are determined and user requirements are clear. As for K-portals, it is often hard to generalize who the typical user is; hence, there may be some difficulty in determining user requirements. In other words, it is not easy to forecast who, at what time, will request what kind of knowledge. Even for the same piece of knowledge, different users may need it to be presented in different ways. Consequently, it may not be easy for K-portals to find a balance point between task requirements and technology functionality, so it is interesting to examine whether TTF affects K-portal's utilization and performance.

Third, this study examines KM in an Asian context, specifically China. Previous research on KM in an Asian context is rather limited. Most KM research focuses on the United States or Europe. Research on KM in Asia tends to be anecdotal and based on case studies (e.g., Teo, 2005) rather than based on specific theories to empirically test research model. Further, previous research has found that China tends to manage knowledge informally compared to their U.S. counterparts (Burrows *et al.*, 2005). In other words, the Chinese tends to prefer to transfer knowledge through interpersonal contact than through formal or written means. Despite this, consulting firms in China have K-portals to capture and store their knowledge (e.g., lessons learned from their projects). Hence, testing TTF in a different context helps us gauge the consistency of the various factors affecting utilization and performance and consequently aids in claims about empirical generalizations (Bass, 1995).

After introduction, the literature on KM and TTF is reviewed. This is followed by the research model, hypotheses, and research method. The results of data analysis are then presented. Finally, main findings, implications, limitations, and future research directions are discussed.

Literature review

The essence of the KM concept is to disseminate existing knowledge and make full use of it so as to create more value in both productivity and innovation (Drucker, 1995). Alavi & Leidner (1999) defined KM as 'the systematic and organizationally specified process for acquiring, organizing, and communicating both tacit and explicit knowledge of employees so that other employees may make use of the knowledge to be more effective and productive in their work' (p. 6).

Kalling (2003) suggested that knowledge is not always utilized, and that utilized knowledge does not always result in improved performance. To achieve improvement in organizational performance, knowledge strategy should be integrated into the whole strategic decision (Pablos, 2002). Organizational performance may be measured not only in terms of tangible benefits, but also intangible benefits. However, not much research has focused on this aspect of KM, which might result from the difficulty in measuring its indirect benefits, such as organizational learning ability and new ideas generation ability.

This study examines one of the major KM technologies, namely K-portals. Generally, K-portals bear the following features (Mack *et al.*, 2001; Kesner, 2003):

(1) A single, integrated, web-based platform, which brings together in one location all the knowledge needed, regardless of source.
(2) Easy access to knowledge documents in all formats, either by query or by navigation.
(3) The ability to synthesize knowledge and information from different sources, such as textual analysis features and metadata analysis features.
(4) The ability to collaborate and participate in threaded discussions online.

K-portals are generally comparable in that they offer the above features. However, although there may be some differences in the design, interface, and content for

different firms, their main aim is the same, that is, providing convenient access to knowledge.

To date, research on K-portals tends to be anecdotal in nature, with relatively little empirical research being done on it. Previous research has examined K-portal development (e.g., Kesner, 2003; Kreng & Wu, 2007), implementation (Scheepers, 2006; Mee *et al*., 2007), applications (Mack *et al*., 2001; Su *et al*., 2004; Klein, 2007), challenges (Teo, 2005; Voelpel *et al*., 2005), learning processes (Ryu *et al*., 2005), and benefits (Bacheldor, 1999). To date, no research has examined K-portal using the TTF perspective.

TTF perspective and the fit concept

Building on rational choice theory, Goodhue & Thompson (1995) used the TTF perspective to explain IS utilization. TTF refers to the matching of the capabilities of the technology to the demands of the task, that is, the ability of technology to support a task. The model theorizes that the fit between task requirements and technology functionality influences utilization and performance (Goodhue & Thompson, 1995). In other words, a technology will be used well if, and only if, the functions of the technology can support the needs of users (Goodhue, 1998; Dishaw & Strong, 1999). An underfit, which means too little capability, would not result in benefits, since the technology is ineffective when it is behind the task requirements. On the other hand, an overfit with too much capability is by no means optimal in that it produces IT slack by wasting unnecessary investment and providing excess resources (Gupta, 2003). The best technology is not the most advanced, but rather the fittest, which has the right ability to help finish the tasks. The TTF model assumes users to be rational and that they will adopt the technology as long as it supports the task best.

Note that although TTF is related to the fit between task and technology, Goodhue & Thompson (1995) also included the fit between individual characteristics and the technology being used in their general theory of TTF. However, for empirical testing, Goodhue and Thompson omitted individual characteristics and tested a simpler model focusing on task and technology. In a similar vein, other researchers (e.g., Zigurs & Buckland, 1998) also focused on the fit between task and technology. Hence, in this paper, we omitted user characteristics and also focused our attention on the fit between task and technology.

The TTF model has been extended with attitude/behavior models, providing a better explanation of users' choices of technology. For example, Goodhue & Thompson (1995) proposed and tested a performance chain based on TTF and attitude/behavior theory. Staples & Seddon (2004) extended Goodhue and Thompson's work by testing the technology-to-performance chain model in both voluntary and mandatory settings. They found strong support for the impact of TTF on performance. In a similar vein, Klaus *et al*. (2003) also found support for the relationship between TTF and four (out of five) performance measures. Further, Dishaw & Strong (1999) integrated the technology acceptance model (TAM), which was originally derived from attitude/behavior model to explain technology acceptance behavior, into the TTF model. The results show that the combination of TTF and TAM explains more variance than either model alone. In a similar vein, Lin & Huang (2008) combined TTF with social cognitive theory and found TTF to be important for KM system usage.

The TTF model has been applied to explain issues in many areas such as group support systems (GSS) and mobile technology. While Goodhue (1995) and Goodhue & Thompson (1995) developed a general theory of TTF, Zigurs & Buckland (1998) developed a specific theory of TTF for group tasks and GSS (Gebauer *et al*., 2005). Specifically, Zigurs and Buckland discussed TTF in GSS environments based on attributes of task complexity and their relationship to relevant dimensions of GSS technology. Murthy & Kerr (2000) revealed that GSS is more appropriate for idea-generation tasks than for problem-solving tasks. Gebauer & Shaw (2002) adapted TTF to mobile applications to reveal a general trade-off between functionality and portability in organizations. Further, based on Goodhue & Thompson's (1995) and Zigurs & Buckland's (1998) work, Gebauer *et al*. (2005) proposed a specific theory of TTF for mobile IS. Overall, previous research suggests that the TTF theory is generally useful in explaining technology utilization and performance.

In the IS literature, fit has also been examined in the context of alignment (Chan *et al*., 1997), interorganizational relationships (Premkumar *et al*., 2005), IT implementation (Khazanchi, 2005), technology requirements and work group communications (Belanger *et al*., 2001), and business reengineering (Huizing & Koster, 1997). While the TTF perspective is prominent in IS literature, the concept of fit has been around for sometime in organizational behavior and strategic management literature. Consequently, various researchers have attempted to synthesize the different conceptualizations of fit. For example, Drazin & Van de Ven (1985) identified three approaches to assess fit in contingency research:

(1) selection (examines how variables in independent pairs relate to each other);
(2) interaction (examines how intervening variable(s) affect relationship between criterion and predictor variables); and
(3) system (gestalts characterizing holistic pattern(s) of interdependencies).

Analogous to Drazin and Van de Ven's classification, Umanath (2003) also classified fit in terms of three main types: congruence, contingency, and holistic configurations. These three types generally encompass Venkatraman's (1989) six perspectives of fit, namely:

(1) mediation (existence of intervening (indirect) effects between an antecedent variable and its consequent variable);

(2) moderation (varying effect of an independent variable on a dependent variable as a function of the moderating variable);
(3) matching (fit is a theoretically defined match between two related variables);
(4) gestalts (identification of distinct groups);
(5) profile deviation (degree of adherence to a specified profile); and
(6) covariation (pattern of covariation or internal consistency among a set of theoretically related variables).

The first two perspectives are more commonly used compared to the remaining four perspectives (Premkumar *et al*., 2005). Previous research on TTF commonly operationalized fit as mediation since fit is operationalized as an intervening variable between (1) task and technology and (2) utilization or performance (e.g., Goodhue & Thompson, 1995). Although Staples & Seddon (2004) suggested that fit could be assessed in terms of facets-of-fit (identify important facets-of-task requirements and assess whether the proposed tool meets each of the facet-of-task requirements) and predicted outcomes (predict outcome of tool use and see if they are as desired), their research model actually uses fit as mediation since TTF is measured as an intervening variable.

In contrast, Dishaw & Strong (1998a) assessed fit by comparing the functionality actually available in a tool with users' anticipation of functionality required to complete various tasks. The lower the anticipated functionalities available in the tool, the lower the fit. Hence, fit is conceptualized as matching since Dishaw and Strong tries to match the 'characteristics of a maintenance task to supporting functionality in a software maintenance tool' (p. 14).

Conceptually, although fit as moderator is distinct from fit as matching, both could be operationalized as an interaction effect. For example, although Premkumar *et al*. (2005) conceptualized fit as matching, fit was modeled as an interaction between information processing needs and information processing capability. The key difference between matching and moderation lies in the presence of a moderator variable. In terms of TTF, Goodhue & Thompson (1995) suggested that the '*experience of utilizing the technology may lead users to conclude that the technology has a better (or worse) impact on performance than anticipated, changing their expected consequences of utilization and therefore affecting future utilization*' *(p. 219)*. This suggests that technology characteristics, moderates the relationships between task and individual characteristics, and system use. Although the authors conceptualize these relationships as moderating, they actually tested TTF as a mediator (Chin *et al*., 2003).

'Fit as mediation' is usually based on user perceptions of TTF and can be viewed as an indirect assessment of TTF since Goodhue and Thompson actually theorize fit as a moderator. 'Fit as matching' tends to be specific to a particular type of task and technology, for example, Dishaw and Strong's work is rather specific to software maintenance tools. 'Fit as matching' can also be measured using the difference score approach, for example, Chan *et al*. (1997) assessed strategic alignment by computing difference scores between business-related and IS-related responses on alignment. They also tested strategic alignment as a moderator as the matching difference score approach has several limitations that the moderation or interaction approach avoids (Edwards, 1993). The remaining three types examine fit as holistic configurations. 'Fit as gestalts' is suitable only if we can identify specific configurations (usually via cluster analysis), for example, Lee, Miranda & Kim (2004) identified three gestalts for IT outsourcing strategies. 'Fit as profile deviation' is suitable if we can determine an ideal profile and measure variation from this ideal profile, for example, Zigurs & Buckland (1998) viewed fit as 'ideal profiles composed of an internally consistent set of task contingencies and GSS elements that affect group performance' (p. 323). In a similar vein, Gebauer *et al*. (2005) also viewed TTF as predefined profiles. However, Edwards (1993) highlighted several limitations of assessing fit using profile deviation. 'Fit as covariation' is less often used in IS research. It generally involved second order factor analysis to derive an intermediate coalignment construct (Venkatraman, 1989). In this study, since TTF is conceptualized as a moderator, we decided to adopt 'fit as moderator' perspective.

Research model and hypotheses

In this study, we examine task characteristics (knowledge tacitness and task interdependence) and technology characteristics (output quality and compatibility) and the interaction between them. We selected these variables in our model because previous research has found them to affect KM (e.g., Alavi & Leidner, 2001; Kankanhalli *et al*., 2001), and consequently the use of K-portals.

Figure 1 shows the research framework for this study. We extend existing research by examining TTF as a moderator (as opposed to a mediator) using interaction effects between task and technology characteristics. In fact, fit as a moderator is often used in organizational and strategy literatures (e.g., Schoonhoven, 1981; Drazin & Van de Ven, 1985). Consequently, unlike previous TTF model by Goodhue & Thompson (1995), we also hypothesize direct relationships between task and technology characteristics, and utilization. In fact, Dishaw & Strong (1999) also tested direct links of task and technology on utilization.

Task characteristics

Organizational knowledge does not flow easily by itself (Schulz & Jobe, 2001). It is generally believed that when knowledge can be explicitly articulated, obtaining the knowledge tends to be easy and time-saving. Zander &

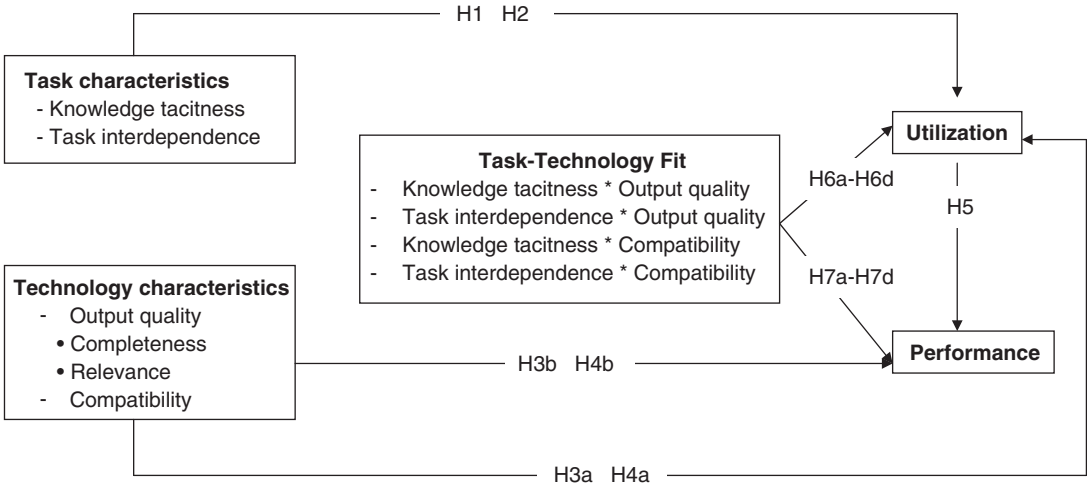

Figure 1 Research model.

Kogut (1995) emphasized that the more easily knowledge can be communicated and understood, the shorter the time needed for its transfer. Alavi & Leidner (1999) also suggested that the rate of knowledge distribution is correlated to knowledge tacitness. One of the major functions of K-portals is to provide employees with knowledge they require so as to save time and effort as much as possible. When the knowledge needed is explicit, K-portals can quickly and easily provide a number of knowledge documents with high relevance and in great details. Thus, users do not need to try other channels for the knowledge. On the other hand, the cost of using K-portals should be higher if it involves tacit knowledge (Kankanhalli *et al*., 2001). The search results of tacit knowledge may be expressed in an ambiguous way; or due to the ambiguity, it is possible that the search results are not as relevant as users expect. In either case, users have to spend more time and effort to read, understand, and filter the results, which may have a negative influence on their use of the K-portal. Therefore, it is reasonable to infer that:

Hypothesis 1 *Knowledge tacitness is negatively related to the utilization of K-portals.*

Task interdependence refers to the extent to which the ongoing task involves other business functions or organizational units (Goodhue & Thompson, 1995). In general, task interdependence is the degree to which a task is related to other tasks and organizational units. It also includes the extent to which coordination with other organizational units is required (Thompson, 1967; Gebauer *et al*., 2005). In a collaborative work context, TTF theory implies that those whose work involves tasks that are interdependent of others should use the collaborative technology more than those who work alone (Jarvenpaa & Staples, 2000). The more substantial the task interdependence, the greater the coordinating and sharing needs (Tushman, 1979). The lesser the task interdependence, the lesser the existing knowledge can be referred to. Previous research has found that task interdependence has an impact on the behavior of technology usage. Thompson (1967) noted that as task interdependence increases, it is predicted that managers would select increasingly local, informal, and cooperative coordination strategies in order to reduce coordination costs. According to Jarvenpaa & Staples (2000), those whose work involves tasks that are interdependent with others should be motivated to use the knowledge sharing technology more than those who act alone. Kankanhalli *et al*. (2001) found that task interdependence influenced knowledge seeking behaviors. In other words, those whose work depends on others might often face changes in their work and the type of information they need. Consequently, task interdependence might increase their use of K-portals as they might need to look for additional information. Therefore, the following hypothesis is put forth:

Hypothesis 2 *Task interdependence is positively related to the utilization of K-portals.*

Further support for Hypotheses 1 and 2 can be obtained from previous research on technology acceptance. For example, Venkatesh *et al*. (2003) reviewed past literature on technology acceptance and found that there is consistent support for the relationship between usefulness and utilization. Since the usefulness of K-portals will also depend on the task characteristics, it is reasonable to hypothesize a direct link between task characteristics and utilization.

Technology characteristics

Analogous to Rogers' (1983) work that define innovation characteristics in terms of relative advantage and compatibility, we define technology characteristics in

terms of output quality and compatibility. Output quality refers to how well a technology performs its tasks (Venkatesh & Davis, 2000). On the basis of pure self-interest, it can be expected that the more positively the output quality is perceived, the more likely the technology is used (Jarvenpaa & Staples, 2000). Venkatesh & Davis (2000) pointed out that 'given a choice set containing multiple relevant systems, one would be inclined to choose a system that delivers the highest output quality' (p. 192). People have been found to conserve the expenditure of time and effort in computer mediated environment (Todd & Benbasat, 1994). They will not be enticed to use the technology, and hence, will choose to conserve the time and effort, when the knowledge provided is of low quality and thus useless to them (Alavi & Leidner, 1999; Kankanhalli *et al*., 2001). Also, output quality may directly influence performance. Delone & McLean (1992, 2003) summarized the relationship between output quality and system success, which was manifested in terms of both individual and organizational impact. K-portals are expected to provide easy access to knowledge, that is, presented in a complete, coherent, and integrated format. This helps to remove cognitive difficulty and reduce the time and effort of trying other channels for knowledge (Goodhue, 1995). When K-portals can deliver knowledge of good quality, users will save significant time and effort in searching for knowledge. In turn, this will directly influence users' performance. It follows that:

Hypothesis 3a *Output quality (in terms of completeness and relevance) is positively related to the utilization of K-portals.*

Hypothesis 3b *Output quality (in terms of completeness and relevance) is positively related to performance.*

Compatibility is the degree to which a technology is perceived as being consistent with the tasks at hand. In innovation adoption literature, it has been shown to be an important factor in technology adoption (Cooper & Zmud, 1990). Compatibility has also been tested against a variety of technologies, such as spreadsheet (Brancheau & Wetherbe, 1990) and the web (Nambisan & Wang, 2000). McCarthy *et al*. (2001) suggested that compatibility is a significant characteristic for the usage of KM technologies in both public and private sector organizations. It has been found that the more a technology is compatible with working styles, or internal needs, the higher the confidence of utilizing the technology well and the higher the actual utilization (Brancheau & Wetherbe, 1990; Thong, 1999). In the case of K-portals, compatibility is normally determined by its suitability with the nature of work or working style. Only when compatibility exists, users may find that the K-portal saves time and is useful in enhancing performance. Therefore, the following hypotheses are proposed:

Hypothesis 4a *Compatibility is positively related to the utilization of K-portals.*

Hypothesis 4b *Compatibility is positively related to performance.*

The relationship between utilization and performance has been extensively studied (Fishbein & Ajzen, 1975; Goodhue & Thompson, 1995). Basically, in order for technology to have an impact, it must be utilized. Thus, it is hypothesized:

Hypothesis 5 *Utilization is positively related to performance.*

TTF and utilization

In this study, the fit between task and technology is operationalized into the following interaction effects: (1) knowledge tacitness and output quality, (2) task interdependence and output quality, (3) knowledge tacitness and compatibility, and (4) task interdependence and compatibility.

Utilization is defined as the behavior of employing the technology in completing tasks (Davis *et al*., 1989). Researchers have suggested a positive relationship between TTF and utilization (Goodhue & Thompson, 1995; Dishaw & Strong, 1998a, b). TTF is considered to be one important determinant of whether a technology is believed to be more useful, more important, or gives more relative advantage. Therefore, TTF is related to utilization because of the link between TTF and the beliefs about the consequence of using the technology (Goodhue & Thompson, 1995). When users expect the technology to have the exact capability needed to complete the required tasks, higher utilization should result. Otherwise, they will choose other alternatives to complete the required tasks. Further, the relationship between fit and utilization was argued at both the organizational level and the individual level (e.g., Cooper & Zmud, 1990; Goodhue & Thompson, 1995). It is reasonable to propose that TTF will influence consultants' utilization of K-portals.

The two task characteristics examined in this study are expected to affect the utilization of K-portals by influencing the amount of existing knowledge that can be referred to by users. The greater the knowledge tacitness and the lesser the task interdependence, the lesser the amount of codified knowledge that can be found through K-portals. That is, the direct reason why users would not like to use K-portals. However, the strength of the relationship between task characteristics and utilization may vary from case to case, due to the differences in the technology characteristics of K-portals.

In other words, when differences in output quality exist, the usage of K-portals may not be the same in different firms, even if users' tasks characteristics are quite similar. Technology in organizations has limits to the level of processing that can be achieved (Gupta, 2003). When the processing capability of K-portals is low in a firm, the knowledge it provides may be too general, or inaccurate, or low in relevance or consistency. In this case, even when users' tasks do have quite a lot of knowledge for reference, users may not be willing to use K-portals as their knowledge source because the knowledge they find through the portals may be inadequate or misleading. Thus, the low quality may lead to users' waste of time, and hence, may eventually be an inhibitor of high utilization. Therefore, the expected relationship between task characteristics and the utilization of K-portals might be influenced by output quality.

Hypothesis 6a *Output quality (in terms of completeness and relevance) moderates the relationship between knowledge tacitness and utilization of K-portals. The relationship is weaker under higher levels of output quality and stronger under lower levels of output quality.*

Hypothesis 6b *Output quality (in terms of completeness and relevance) moderates the relationship between task interdependence and utilization of K-portals. The relationship is stronger under higher levels of output quality and weaker under lower levels of output quality.*

Similarly, compatibility could also moderate the relationship between task characteristics and utilization. Individuals feel more inclined to choose the technology they are used to or familiar with (Jarvenpaa & Staples, 2000). Since knowledge can be obtained from a variety of sources, K-portals are usually chosen only when they are compatible with users' usual practices. Otherwise, even if the task characteristics do require users to learn from existing knowledge, they may resort to other knowledge sources such as paper-based documents or face-to-face communication with experts. Thus, it is quite likely that when knowledge is needed because of low knowledge tacitness or high task interdependence, individuals will actively search for knowledge through K-portals in high compatibility situations, while they will try other channels instead, in low compatibility situations. Therefore, we propose the following hypotheses:

Hypothesis 6c *Compatibility moderates the relationship between knowledge tacitness and utilization of K-portals. The relationship is weaker under higher levels of compatibility and stronger under lower levels of compatibility.*

Hypothesis 6d *Compatibility moderates the relationship between task interdependence and utilization of K-portals. The relationship is stronger under higher levels of compatibility and weaker under lower levels of compatibility.*

TTF and performance

In most previous studies, the dependent variable in the TTF model is performance impact. It is generally believed that when the required tasks can be completed with the assistance of an appropriate technology, better performance should result (Goodhue *et al*., 2000). Vessey (1991) found that mismatches between data representations and tasks lead to additional time and effort. Jarvenpaa (1989) suggested that a lack-of-fit between task requirements and technology functionality results in slow decision processes or greater errors or both. TTF affects performance, no matter whether the usage is voluntary or mandatory (McCarthy *et al*., 2001).

It is commonly recognized that firms with greater technology capability can be more effective. However, the link between technology characteristics and system success could also depend on task needs. Easley *et al*. (2003) showed that system usage is associated with performance for tasks supported by the system, but not for the unsupported tasks. Goodhue (1995, 1998) suggested that task characteristics moderate the strength of the relationship between specific characteristics of IS and their success. The greater the congruence between task needs and technology characteristics, the greater the favorable outcomes towards achieving individual and organizational goals tends to be (Vessey, 1991). Thus, individuals will have to need the K-portal before it can actually deliver performance. When needs are imminent, users can better leverage technologies to improve performance. Otherwise, even if the technology capability is high, it can hardly be converted into performance (Gupta, 2003). Since the two task characteristics (knowledge tacitness and task interdependence) influence the extent to which users need to refer to existing knowledge, they will have interaction effects on the relationship between technology characteristics and performance.

Hypothesis 7a *Knowledge tacitness moderates the relationship between output quality (in terms of completeness and relevance) and performance. The relationship is weaker under higher levels of knowledge tacitness and stronger under lower levels of knowledge tacitness.*

Hypothesis 7b *Task interdependence moderates the relationship between output quality (in terms of completeness and relevance) and performance. The relationship is stronger under higher levels of task interdependence and weaker under lower levels of task interdependence.*

Hypothesis 7c *Knowledge tacitness moderates the relationship between compatibility and performance. The relationship is weaker under higher levels of knowledge tacitness and stronger under lower levels of knowledge tacitness.*

Hypothesis 7d *Task interdependence moderates the relationship between compatibility and performance. The relationship is stronger under higher levels of task interdependence and weaker under lower levels of task interdependence.*

Method

All the constructs in the theoretical model are operationalized using validated items adapted from prior research. The appendix provides a summary of the constructs and the reference sources for the measurement scales.

Eight items of output quality were scored on a semantic differential scale ranging from 1 to 7. Frequency of utilization was anchored on a scale of (1) never/almost never to (6) several times a day. Similarly, intensity of utilization was anchored on a scale of (1) never/almost never to (6) more than 7 h. Six items of performance were scored on a seven-point Likert scale ranging from (1) very low to (7) very high. All other items were anchored on a scale of (1) strongly disagree to (7) strongly agree.

This study uses the interaction method for operationalizing the concept of TTF. In previous studies, Goodhue (1998) developed a list of questionnaire items to measure 'fit.' However, the list was rather long (altogether 32 items), and the items did not directly measure 'fit.' Instead, user evaluations were used as surrogates of TTF. In contrast, organizational and strategic management literatures often used the interaction approach to measure fit (e.g., Schoonhoven, 1981; Drazin & Van de Ven, 1985; Hyatt & Prawitt, 2001). This method was chosen in this study so that the limitations mentioned above are mitigated.

Data were gathered through a questionnaire survey (please see Appendix) of employees in consulting firms in China. Consulting firms were chosen as the sample because they are the epitome of knowledge-based organizations whose main asset is the expertise and competence of staff. Hence, as KM is inherent in their daily activities, they tend to be active users of K-portals. The questionnaire was administered in Mandarin. Before the survey, the questionnaire was first translated from English to Mandarin and then back to English, so as to ensure the accuracy of translation. The questionnaire was pretested with three graduate students and two Chinese ERP implementation consultants. This was done to detect problems in content, format, and wording. Modifications were made following feedback from respondents. The questionnaire was then pilot tested with 26 respondents. No major problems were found, and the questionnaire was deemed ready for data collection. Data were then gathered from eleven Chinese consulting firms, including four local firms and seven foreign capitalized ones. The survey was administered to 595 consulting professionals. One hundred and fifty-nine responses were received, among which one hundred and fifty-four were deemed usable. The remaining five questionnaires were removed from further analysis due to missing responses. The response rate was 26.7%.

Results

Demographic profile

Table 1 summarizes the demographic profile of respondents. Males comprise 66.2% of respondents. This proportion is consistent with the survey conducted by

Table 1 Demographic profile of respondents

	Number	*%*
Gender		
Male	102	66.2
Female	52	33.8
Age		
Under 25	64	41.6
25–34	78	50.6
35–44	12	7.8
Above 45	0	0.0
Education level		
High school and below	1	0.6
Bachelor	103	66.9
Master	47	30.5
Ph.D.	2	1.3
Others	0	0.0
Missing	1	0.6
Number of employees		
Under 250	48	31.2
250–500	77	50.0
501–750	0	0.0
751–1000	7	4.5
1000–2000	22	14.3
Above 2000	0	0.0
Number of IS/IT employees		
Under 25	35	22.7
25–50	13	8.4
51–75	6	3.9
76–100	7	4.5
101–200	20	13.0
Above 200	73	47.4
Annual revenue (Unit: RMB)		
Under 10 million	0	0.0
10–100 million	62	40.3
101–300 million	59	38.3
301–600 million	29	18.8
601 million–1 billion	4	2.6
Above 1 billion	0	0.0

Note: $N = 154$.

ChinaHR.com, which indicates that the percentage of working males and females in China is 63 and 37%, respectively. Most of the respondents (92.2%) were under 35 years old. The average industry experience of respondents is 3.2 years. On average, respondents had stayed in the current firms for 2.3 years and 98.8% of respondents held at least a bachelor's degree. This is reasonable because in China, to be a consultant, a bachelor's degree is one of the most important prerequisites. Comparisons (using χ^2-tests) between respondents and non-respondents were made in terms of number of employees, number of IT employees, and annual revenue. The results indicated that the responses were representative of the demographic characteristics of firms surveyed. In addition, in line with Armstrong & Overton's (1977) suggestion on estimating non-response bias, we also compared the individual demographic profile of early and late responses and found no significant differences in terms of gender ($\chi^2 = 0.12$, $P > 0.05$) and age ($\chi^2 = 1.45$, $P > 0.05$).

Table 2 Factor analysis

	F1	*F2*	*F3*	*F4*	*F5*	*F6*	*F7*
Knowledge tacitness							
KTC1	−0.161	−0.055	−0.162	−0.113	−0.064	**0.716**	0.141
KTC2	−0.160	0.092	−0.056	−0.064	−0.187	**0.809**	−0.118
KTC3	−0.105	−0.093	−0.106	−0.043	−0.091	**0.881**	−0.012
KTC4	−0.149	0.009	0.228	−0.076	−0.191	**0.604**	−0.259
Task interdependence							
TIT1	0.151	**0.773**	0.252	−0.082	−0.133	0.094	−0.085
TIT2	0.199	**0.852**	0.139	0.054	−0.036	0.005	−0.041
TIT3	0.090	**0.695**	0.009	−0.032	0.230	−0.155	0.231
TIT4	0.050	**0.682**	−0.030	0.111	0.219	−0.061	0.020
TIT5	0.158	**0.841**	0.059	0.175	0.057	0.028	0.046
TIT6	−0.077	**0.872**	0.058	0.001	0.017	−0.010	0.155
Output quality – completeness							
OPQC1	0.149	0.061	0.287	0.245	0.071	−0.098	**0.777**
OPQC2	0.156	0.115	0.476	0.054	0.058	−0.058	**0.707**
OPQC3	0.163	0.054	0.194	0.199	0.080	−0.023	**0.782**
OPQC4	0.031	0.188	0.374	0.042	0.096	−0.024	**0.626**
Output quality – relevance							
OPQR1	0.087	0.187	**0.702**	0.243	0.187	−0.093	0.059
OPQR2	0.066	0.124	**0.808**	0.257	0.071	−0.121	0.167
OPQR3	0.071	−0.013	**0.740**	0.161	0.203	0.024	0.296
OPQR4	0.139	0.072	**0.695**	0.009	0.320	0.006	0.344
Compatibility							
COMP1	0.164	0.028	0.411	0.206	**0.721**	−0.120	0.028
COMP2	0.222	0.096	0.142	0.147	**0.769**	−0.152	0.078
COMP3	0.238	0.119	0.258	0.084	**0.701**	−0.243	0.102
COMP4	0.297	0.087	0.060	0.340	**0.644**	−0.123	0.061
Utilization							
UTL1	0.246	0.013	0.117	**0.782**	0.175	−0.037	0.178
UTL2	0.272	−0.023	0.177	**0.780**	0.077	−0.076	0.108
UTL3	0.329	0.078	0.175	**0.681**	0.155	−0.090	0.078
UTL4	0.162	0.172	0.269	**0.559**	0.426	−0.251	0.185
UTL5	0.362	0.172	0.152	**0.523**	0.266	−0.074	0.179
Performance							
IPP1	**0.668**	−0.038	0.161	0.216	0.294	−0.179	0.112
IPP2	**0.692**	0.113	−0.050	0.112	0.301	−0.268	0.302
IPP3	**0.818**	0.072	−0.065	0.219	0.091	−0.186	0.119
IPP4	**0.759**	0.155	0.088	0.110	0.199	−0.046	0.199
IPP5	**0.780**	0.160	0.197	0.305	0.091	−0.102	−0.030
IPP6	**0.749**	0.207	0.141	0.339	0.119	−0.107	−0.026

Validity and reliability assessment

Table 2 presents the results of factor analysis for independent and dependent variables. Results showed that all items loaded on their *a priori* factors with loadings of 0.50 and above, thereby satisfying convergent validity. Discriminant validity was also satisfied, as the items measuring a construct loaded more highly on that construct than on other constructs.

The means, standard deviations, bivariate correlation coefficients, and Cronbach's α values of the seven constructs are presented in Table 3. Since all correlation coefficients are well below the cutoff level of 0.80, multicollinearity is not a problem (Gujarati, 2003). We tested for multicollinearity among the independent variables by examining the variance inflation factor (VIF). We found the VIFs for the independent variables to be less than 5, thereby indicating that multicollinearity is not a problem. In addition, all constructs have α values greater than 0.70, thereby indicating adequate reliability (Nunnally, 1978).

Hypotheses testing

To test the main effects, the regression coefficients of each independent variable were examined (Table 4). The positive relationship between knowledge tacitness and utilization was significant ($\beta = -0.142$, $P < 0.05$), thus lending support to Hypothesis 1. Hypothesis 2 was not supported ($\beta = 0.067$, $P > 0.05$). Hypothesis 3a was strongly supported because both completeness and relevance were significant predictors of utilization ($\beta = 0.148$, $P < 0.05$; $\beta = 0.201$, $P = 0.01$). However, the results showed that completeness and relevance were not significant predictors of performance ($\beta = 0.127$, $P > 0.05$; $\beta = -0.135$, $P > 0.05$). Overall, Hypothesis 3b was not supported. The results were strongly significant for Hypothesis 4a ($\beta = 0.379$, $P < 0.01$), Hypothesis 4b ($\beta = 0.347$, $P < 0.01$), and Hypothesis 5 ($\beta = 0.450$, $P < 0.01$).

Moderated regression analysis using the hierarchical technique (Igbaria & Guimaraes, 1993; Pierce *et al.*, 1993; Lim, 1996) was performed to assess the moderating effects. Basically, the independent variables were entered

Table 3 Means, standard deviations, correlations, and Cronbach's α

	Construct	*Mean*	*s.d.*	*1*	*2*	*3*	*4*	*5*	*6*	*7*
1	KTC	3.151	1.421	0.811						
3	TIT	5.510	1.178	−0.096	0.895					
4	OPQC	4.822	1.210	−0.178*	0.154	0.879				
5	OPQR	5.082	1.170	−0.137	0.178*	0.652**	0.873			
6	COMP	4.976	1.096	−0.369**	0.148	0.458**	0.518**	0.872		
7	UTL	4.441	1.154	−0.332**	0.190*	0.485**	0.521**	0.609**	0.863	
8	PERF	4.931	1.096	−0.383**	0.207*	0.419**	0.367**	0.609**	0.651**	0.919

*$P < 0.05$, **$P < 0.01$ (two-tailed).
Note: Diagonals indicate Cronbach's α values for reliability assessment.

Table 4 Results of the main effects

Dependent variable	*Independent variable*	β	*P-value*
Utilization	*Task characteristics*		
	Hypothesis 1: Knowledge tacitness	−0.142	0.019*
	Hypothesis 2: Task interdependence	0.067	0.141
	Technology characteristics		
	Hypothesis 3a: Output quality		
	Completeness	0.148	0.036*
	Relevance	0.201	0.010**
	Hypothesis 4a: Compatibility	0.379	0.000**
R^2			0.463
Performance	Hypothesis 5: Utilization	0.450	0.000**
	Hypothesis 3b: Output quality		
	Completeness	0.127	0.054
	Relevance	−0.135	0.052
	Hypothesis 4b: Compatibility	0.347	0.000**
R^2			0.509

Note: $N = 154$.
*$P < 0.05$, **$P < 0.01$.

Table 5a Results of the interaction effects on predicting utilization

Hypothesis	*Variables*	R^2	ΔR^2	*FChg*
Hypothesis 6a	(i) A. KTC+OPQC	0.297		
	B. KTC+OPQC+KTC*OPQC	0.302	0.005	1.074
	(ii) A. KTC+OPQR	0.340		
	B. KTC+OPQR+KTC*OPQR	0.358	0.018	4.206*
Hypothesis 6b	(i) A. TIT+OPQC	0.249		
	B. TIT+OPQC+TIT*OPQC	0.255	0.006	1.208
	(ii) A. TIT+OPQR	0.281		
	B. TIT+OPQR+TIT*OPQR	0.286	0.005	1.050
Hypothesis 6c	A. KTC+COMP	0.383		
	B. KTC+COMP+KTC*COMP	0.385	0.002	0.488
Hypothesis 6d	A. TIT+COMP	0.381		
	B. TIT+COMP+TIT*COMP	0.384	0.003	0.731

*$P<0.05$, **$P<0.01$. Significant interaction effects are plotted in Figure 2.
KTC, knowledge tacitness; TIT, task interdependence; OPQC, completeness.
OPQR, relevance; COMP, compatibility.

Table 5b Results of the interaction effects on predicting performance

	Variables	*Performance (IPP)*		
		R^2	ΔR^2	*FChg*
Hypothesis 7a	(i) A. OPQC+KTC	0.268		
	B. OPQC+KTC+OPQC*KTC	0.307	0.039	8.442**
	(ii) A. OPQR+KTC	0.240		
	B. OPQR+KTC+OPQR*KTC	0.273	0.033	6.809**
Hypothesis 7b	(i) A. OPQC+TIT	0.196		
	B. OPQC+TIT+OPQC*TIT	0.197	0.001	0.187
	(ii) A. OPQR+TIT	0.155		
	B. OPQR+TIT+OPQR*TIT	0.160	0.005	0.893
Hypothesis 7c	A. COMP+KTC	0.398		
	B. COMP+KTC+COMP*KTC	0.427	0.029	7.592**
Hypothesis 7d	A. COMP+TIT	0.386		
	B. COMP+TIT+COMP*TIT	0.389	0.003	0.736

*$P<0.05$, **$P<0.01$. Significant interaction effects predicting performance are plotted in Figure 2.
KTC, knowledge tacitness; TIT, task interdependence; OPQC, completeness.
OPQR, relevance; COMP, compatibility.

first followed by the interaction term (using centered variables). As suggested by Carte & Russell (2003), β coefficient 'is not an indicator of moderator effect size' (p. 484); the increments in R^2 rather than the magnitude of the coefficients were used to determine the relative importance of moderators (Igbaria & Guimaraes, 1993; Carte & Russell, 2003).

The results of moderated regression analyses on predicting utilization are shown in Table 5a and 5b and the significant interaction effects are plotted in Figure 2. Relevance demonstrated significant interaction effect on the relationship between knowledge tacitness and utilization ($\Delta R^2 = 0.018$, $P<0.05$). The graph in Figure 2a indicated an ordinal interaction. The directions of the relationship are in line with that proposed in Hypothesis 6a in that the slope for low relevance is steeper than the slope for high relevance, thus lending support to the hypothesis that the relationship between knowledge tacitness and utilization is weaker under higher levels of relevance and stronger under lower levels of relevance. However, completeness was shown to be an insignificant moderator. Therefore, Hypothesis 6a was partially supported. Contrary to expectations, Hypotheses 6b, 6c, and 6d were not supported.

Knowledge tacitness demonstrated significant moderating effects on the relationship between output quality

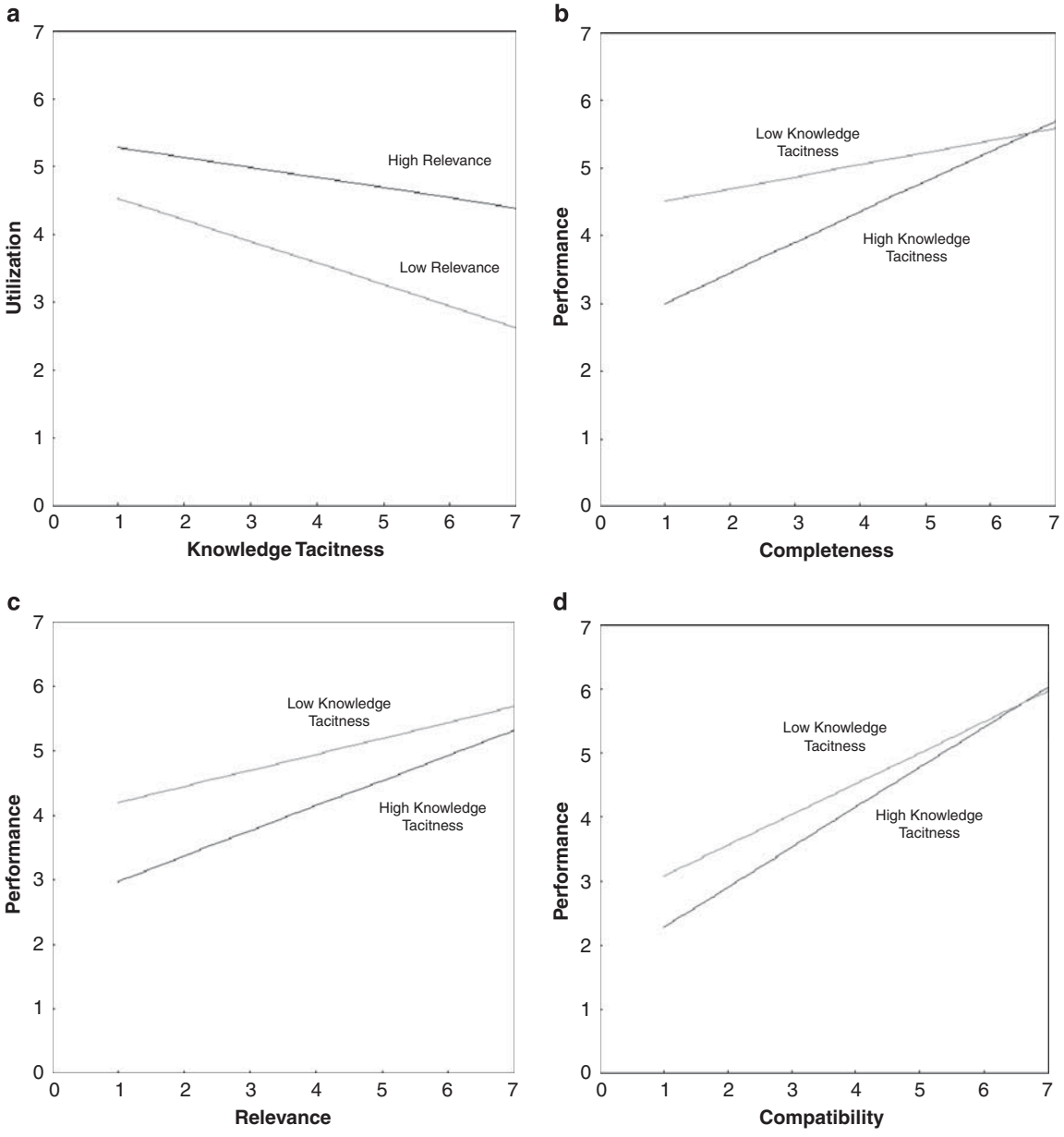

Figure 2 Results on interaction effects on predicting utilization and performance.

(completeness and relevance) and performance ($\Delta R^2 = 0.039$ and $\Delta R^2 = 0.033$, respectively, $P < 0.01$). The graphs are shown in Figures 2b and c with high tacitness having a steeper slope than low high tacitness. Thus, Hypothesis 7a was supported. The moderating effects of knowledge tacitness with compatibility on performance ($\Delta R^2 = 0.029$, $P < 0.01$; Figure 2d) was significant. Thus, Hypothesis 7c was supported. Both interactions were disordinal. It appears that at high levels of compatibility, the level of knowledge tacitness have lesser influence in determining performance.

The interaction effects were not significant for Hypotheses 7b and 7d. Table 6 summarizes the results of the hypotheses testing. Of the fifteen hypotheses, seven were supported; two were partially supported; the other six were rejected.

Limitations

Some limitations of this study should be recognized. First, the sample size is small. However, a check revealed no response bias. Second, this study relies on self-reported data, which may lead to common method bias. Hence, in future research, such bias should be reduced by using reports from other sources instead of self-reports. Further, we used the one-factor Harmon's test and found that the minimum and maximum explained variance ranged from 8.2 to 12.9% out of the total variance of 71.1%. Hence, no one construct explained the majority of the

Table 6 Summary of results

Hypothesis	*Supported?*	*Hypothesis*	*Supported?*	*Hypothesis*	*Supported?*
Hypothesis 1	Yes	Hypothesis 4b	Yes	Hypothesis 6d	No
Hypothesis 2	No	Hypothesis 5	Yes	Hypothesis 7a	Yes
Hypothesis 3a	Yes	Hypothesis 6a	Yes[a]	Hypothesis 7b	No
Hypothesis 3b	Yes[a]	Hypothesis 6b	No	Hypothesis 7c	Yes
Hypothesis 4a	Yes	Hypothesis 6c	No	Hypothesis 7d	No

[a]Partial support.

variance in the factor analysis, thereby indicating that common method bias is not an issue. As a second method of assessing common method bias, we used a marker variable to adjust partial correlation to control for this bias (Podsakoff *et al*., 2003; Malholtra *et al*., 2006). We chose tenure of respondents in the firm as the marker variable since it is theoretically unrelated to constructs examined in this study. After partial correlation adjustment, all significant zero order correlations remained significant, providing further evidence that common method bias is not a serious problem in our study. Third, although the model includes several important antecedents, there exist other predictors of utilization. Thus, future research may also want to take into account the effects of other variables, for example, user characteristics, and other task/technology characteristics. Fourth, this study is limited to a special context, namely, Chinese consulting firms. Future research may want to test the model in other industries, or compare the results among different countries to see to what extent differences exist. Fifth, this study is cross-sectional in nature where data were collected at a single point in time. Future research may involve a longitudinal study to examine whether the usage and impact of K-portals change over time.

Discussion and conclusion

The results indicate a significant negative relationship between knowledge tacitness and the utilization of K-portals. In other words, when users used explicit knowledge in work, they were more willing to refer to K-portals. This is consistent with previous research, which found that users are more likely to be motivated to seek knowledge in electronic knowledge repositories under low knowledge tacitness (Kankanhalli *et al*., 2001).

In addition the results show that task interdependence does not have significant relationship with utilization. The non-significant result is inconsistent with the findings of Jarvenpaa & Staples (2000) who suggested that those who are involved in tasks interdependent with others are more likely to use the knowledge sharing technology than those who work on their own. One possible explanation is that users' tendency to utilize the K-portal may be decreased when using the K-portal is incompatible with their work style. Even when tasks are highly interdependent, they may choose alternative ways such as e-mail or person-to-person communication, which are more traditional and more often used in the Chinese organizations.

Further, the result supports the positive relationship between utilization and performance. This is consistent with previous research (e.g., Goodhue & Thompson, 1995). The support for the effect of output quality on utilization is consistent with the findings of Kankanhalli *et al*. (2001) which indicates that users are more willing to seek knowledge from knowledge repositories if they feel that the output is of good quality. However, an unexpected result is that the relationship between output quality and performance is not significant. This is inconsistent with previous research (e.g., Delone & McLean, 1992, 2003; Goodhue & Thompson, 1995). One plausible explanation is that China is still at an early stage in using K-portals. Consequently, respondents may not be fully aware of the impact of K-portals. Another explanation could be that K-portal may be the less preferred choice for obtaining knowledge. Whenever respondents have other alternatives, they would not refer to K-portals. Consequently, the link between output quality and performance may be weakened, because when they are not able to get satisfactory answers from other channels, it is most probable that K-portals cannot help either.

As predicted, results show that there is a strong positive relationship between compatibility and utilization as well as performance. This finding is consistent with innovation adoption literature (e.g., Cooper & Zmud, 1990).

Based on the moderated regression analysis, marginal evidence was found for the relationship between TTF and utilization (Hypothesis 6a is partially supported; Hypotheses 6b, 6c, and 6d are not supported). This is consistent with previous research that also found the link between TTF and utilization to be moderate to weak (e.g., Goodhue & Thompson, 1995; Dishaw & Strong, 1998a). Several possible explanations for the marginal support for the relationship between TTF and utilization should be noted.

First, Goodhue *et al*. (2000) suggested that self-reporting was a poor measure of utilization and could help to explain the weak link between TTF and utilization. Second, other factors such as habit and social norms may have a greater effect on utilization than TTF (Goodhue & Thompson, 1995).

In addition to the above reasons, the context may play a role in affecting the relationship. For example, previous research of 'fit' regarding new technologies was mostly

conducted in western countries, where the technologies were well developed and widely accepted. However, in China, IT is not mature yet, so that it still has some way to go before reaching 'fit.' Further, after China implemented the 'Open Door' policy, there was a sharp increase in the number of MNCs and joint ventures in China. The advent of IT, together with the new work style IT brought, may conflict with the traditional way of working Chinese are used to. Further, the Chinese favor informal and implicit forms of communication, preferring to obtain and transfer knowledge through interpersonal contact than through formal and written means such as K-portals (Burrows *et al*., 2005). In a similar vein, Alavi *et al*. (2005/2006) found that the use of KM tools is shaped by cultural values.

Despite the fact that the relationship between TTF and utilization is not shown to be strong, an important finding needs to be highlighted: The negative impact of knowledge tacitness on the utilization of K-portals may be buffered when the relevance of K-portals with users' requirements is maintained at a satisfactory level. This result suggests that the technology factors may, to a certain extent, counteract the negative impacts on utilization brought about by task factors.

The relationship between TTF and performance is moderately supported (Hypotheses 7a and 7c are strongly supported; Hypotheses 7b and 7d are rejected). This result is consistent with Goodhue & Thompson (1995), who found evidence for three out of eight hypotheses. Overall, knowledge tacitness was shown to be a significant moderator of the relationship between technology characteristics and performance impact in that two of the four interaction effects tested were strongly supported and one was partially supported. Our results are also consistent with previous research which generally found that TTF explains performance better than utilization (Gebauer *et al*., 2005).

Contrary to previous expectations, it is surprising that task interdependence is not shown to be a significant moderator of the relationship between output quality and performance. One possible reason may be due to the fact that consultants work in project teams. Each project team is a temporary work group. After one project is finished, team members will join new projects and work with totally different teammates. Therefore, in a team, members have different backgrounds, and are usually experienced in different aspects. When one member needs knowledge on an area he is not familiar with, it is most probable that other team members may help. Thus, even if K-portals are able to provide high quality knowledge from other interdependent tasks, employees may still think that it is more direct and time-saving to refer to their teammates who are just one desk away. Some comments from respondents are quoted below:

> Usually I work together with some senior consultants. When I meet any problems, I can easily know how to solve from them. They did teach me a lot. So although the K-portal in our company is very well built, sometimes I just cannot think of using it.
>
> Searching is so time-consuming. If you know your teammate can help, why don't you ask?
>
> For consultants, the most important thing is to communicate, with your clients, your teammates, and your project manager. So there is nothing you can be proud of, when you take a lot of time to solve a problem independently.

This study extends previous KM literature by introducing the concept of 'fit' into KM research, specifically, K-portals, which are among the major KM technologies used in consulting firms. Findings of this study are instructive because they provide some insights into what Chinese managers could do to enhance the utilization of K-portals. First, since there is evidence that the more K-portals are used, the more benefits in performance, it is timely for firms which have never taken KM into consideration to begin examining the potential of using KM technologies to enhance business performance. Second, the results point to the counteracting effect of technology characteristics, especially relevance, on the negative relationship between knowledge tacitness and utilization. In other words, the higher the relevance of K-portals with users' requirements, the lesser the effect of knowledge tacitness on utilization. Therefore, the output quality of KM technologies could be improved as much as possible so as to increase its utilization. Third, compatibility plays an important role in the utilization and impact of K-portals. Since the development of K-portals is relatively new in China (compared to the United States), it may need some time before potential users could embrace the new technology. This is perhaps why some employees may choose other channels to obtain knowledge rather than K-portals. Therefore, training is extremely important in China, including initial training and retraining for consolidation.

In conclusion, this study uses the TTF perspective (modeled as interaction effects) to examine the utilization and impact of K-portals in Chinese consulting firms. In doing so, it is the first study to apply TTF to K-portals in the Chinese context model, and it is also the first study to model TTF as a moderator compared to previous studies on TTF which modeled TTF as a mediator (even though moderating effect is implicit in TTF conceptualization by Goodhue & Thompson, 1995; Goodhue, 1995, 1998). This study also extends prior research on TTF by including characteristics of both task and technology into the model as antecedents of fit, rather than operationalize task into its main activities and technology into its major functions. In previous research, since different technologies have different functions, different processes, and different activities, the measures developed for one technology cannot be widely used in other areas. Further, TTF was operationalized directly as interaction effects rather than using indirect surrogate user satisfaction measures. By modeling TTF as interaction effects, we are able to examine the role of moderators by

plotting the significant interactions. In doing so, we extend TTF theory to better understand fit as a moderator (rather than as a mediator) since the interaction graphs could help to facilitate our understanding of how task and technology interact to enable greater utilization and performance impact.

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Appendix

Instrument and sources

Knowledge tacitness (Source: Subramaniam & Venkatraman, 2001)
Please indicate the extent to which you agree/disagree with the following statements.
(1 – strongly disagree to 7 – strongly agree)
The knowledge required for my task is:
KTC1: easy to comprehensively document in manuals or reports
KTC2: easy to comprehensively understand from written documents
KTC3: easy to precisely communicate through written documents
KTC4: easy to communicate without personal experience.

Task interdependence (Source: Jarvenpaa & Staples, 2000)
(1 – strongly disagree to 7 – strongly agree)
TIT1: My work is often completed with staff from other departments.
TIT2: My work often involves sharing knowledge or information with other departments.
TIT3: The results of my work are dependent on the efforts of people from within my department.
TIT4: The knowledge and information I need is often subject to change.
TIT5: My work often involves using knowledge or information from other departments.
TIT6: The results of my work are dependent on the efforts of people from other departments.

Output quality
Please rate the scale below according to how you feel about the knowledge content provided by the K-portal in your company.

Completeness (Source: Bailey & Pearson, 1983)
OPQC1: Incomplete (1)–Complete (7)
OPQC2: Inconsistent (1)–Consistent (7)
OPQC3: Insufficient (1)–Sufficient (7)
OPQC4: Inadequate (1)–Adequate (7)

Relevancy (Source: Bailey & Pearson, 1983)
OPQR1: Useless (1)–Useful (7)
OPQR2: Irrelevant (1)–Relevant (7)
OPQR3: Hazy (1)–Clear (7)
OPQR4: Bad (1)–Good (7)

Compatibility (Source: Moore & Benbasat, 1991)
Please indicate the extent to which you agree/disagree with the following statements.
(1 – strongly disagree to 7 – strongly agree)
COMP1: Using the K-portal is compatible with my work.
COMP2: Using the K-portal is completely compatible with my current situation.
COMP3: I think that using the K-portal fits well the way I like to work.
COMP4: Using the K-portal fits into my work style.

Utilization (Source: Thompson *et al.*, 1991)
Frequency
UTL1: On the average, how frequently do you use the K-portal in your company?
- ☐ Never/almost never
- ☐ Less than once a month
- ☐ A few times a month
- ☐ A few times a week
- ☐ About once a day
- ☐ Several times a day

Intensity
UTL2: On the average, how much time do you spend *per week* using the K-portal in your company?
- ☐ Never/almost never
- ☐ Less than 1 h
- ☐ 1–2 h
- ☐ 2–4 h
- ☐ 4–7 h
- ☐ More than 7 h

Please indicate the extent to which you use the K-portal in your company to perform the following tasks for

obtaining knowledge (1 – not at all to 7 – to a great extent).
UTL3: Searching/retrieving knowledge.
UTL4: Synthesizing, summarizing or analyzing available knowledge.
UTL5: Collaborating with colleagues for knowledge purpose.
Performance (Source: Henderson & Lee, 1992)
Please evaluate the extent of your performance with the assistance of the K-portal.
(1 – very low to 7 – very high)
IPP1: The efficiency of the operations in my work.
IPP2: The adherence to plan and budgets of my work.
IPP3: The amount of work I produce.
IPP4: Effectiveness of my interaction with people from other projects, teams or units.
IPP5: The quality of my work.
IPP6: The ability to meet the goals of my work.