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Abstract

Employing new IT to react to external changes and developing IS effectively and efficiently are critical for IS department in contemporary business environment. In order to solve wicked problems that are never faced before, IS department needs to use knowledge uncommonly through twisting current knowledge slightly or analogizing from other areas. In addition to understand its impact on performance, this study also explores the antecedents of uncommon knowledge use from a human resource management perspective. Specifically, we hypothesize that uncertainty avoidance culture, communication, shared decision making, team style work design, and human resource policies are critical antecedents of knowledge augmentation and adaptation, which in turns lead to better IS performance. The results show that while knowledge adaptation can be enhanced by uncertainty avoidance culture and communication, knowledge augmentation is a function of shared decision-making, use of team, and innovation-based policies. The results serve as guidance for managers to choose needed HRM practices to boost desired uncommon knowledge use style.

Keywords: Uncommon knowledge use, Human resource management practices, Information system department.
1 INTRODUCTION

Nowadays technology and business environment changes rapidly. Organizations have to change their business strategies, process, and structure frequently so that they can effectively use knowledge and utilize decision-making strategies to cope with the changing environment (Jones & Mahon 2012). External changes in the business context often lead to changes in user requirements of the information system that developed by information system (IS) department (Lee & Xia 2005). Therefore, the IS department has to have sufficient capability to respond to changing needs and help firms to achieve their goals. For example, IS department should be able to employ new information technology (IT) to react to external changes and develop IS effectively and efficiently. Given that IS development is a knowledge intensive process, the final performance of ISD is a function of effective knowledge management (Joshi et al. 2007; Ko et al. 2005; Patnayakuni et al. 2007; Pee et al. 2010).

Indeed, previous knowledge management studies have demonstrated that performance is related to the extent to which organization can create, acquire, and apply knowledge effectively (Chang Lee et al. 2005; Choo 1996; Gold et al. 2001; Janz & Prasarnphanich 2003; Lee & Choi 2003). Early literatures in knowledge management area emphasize the importance to store knowledge effectively and be able to retrieve it when needed. However, under a turbulent environment, being able to retrieve and apply existing knowledge may not be sufficient. Solutions generated through simply applying accumulated experiences in the same way may not be sufficient to solve problems never facing before. Researchers suggest that organizations need to acquire new knowledge from external (Cohen & Levinthal 1990; Matusik & Hill 1998; Tsai 2001). The following studies therefore shift their focus to clarify the role of knowledge acquisition, such as absorptive capacity (Jansen et al. 2005; Lichtenthaler 2009; Zahra & George 2002). However, simply applying existing knowledge, accumulated within organization or acquired from external, is not sufficient for organizations in such a turbulent environment. Recently, researchers further highlight the need to utilize existing knowledge uncommonly, through twisting current knowledge slightly or analogizing from other areas, in order to solve wicked problems to gain advantage. Nag and Gioia (2012) classify the way to adopt uncommon knowledge use into two types: knowledge adaption and knowledge augmentation. While the former refers to applying knowledge to modify and improve specific operational activities the later is defined as criticizing what are known so as to generate new understandings on problem solving.

Nag and Gioria (2012), through case studies, demonstrate the critical role of uncommon knowledge use under a turbulent environment. Analogizing the same concept to IS area, IS department may also need to use knowledge uncommonly to improve the development process and to create innovative information systems. However, a lack of systematic analysis leaves this question unanswered. Therefore, the first purpose of this study is to understand the impact of uncommon knowledge use on the outcomes of IS department. Furthermore, if using knowledge uncommonly does allow IS department to perform better, we are also interested in knowing the ways to encourage members to use knowledge uncommonly within IS department. The drivers of behavior include motivation or capability (Vroom 1964). Human Resource Management (HRM) practices are frequently adopted to motivate or provide employees sufficient capability (Bowen & Ostroff 2004). For example, HRM practices can foster innovation and improve firm’s ability to sustain competitive advantage (Beugelsdijk 2008; Gupta & Singhal 1993). However, even though past studies have demonstrated the relationship between HRM practices and outcome variables, how effectively HRM practices can lead to better outcomes (such as innovation) in such a turbulent environment is not clear. We suspect that HRM practices may motivate or provide employees capability to use knowledge uncommonly. Therefore, the second purpose of this study is to understand what HRM practices can enhance the performance of IS department, through promoting uncommon knowledge use within the department. Through achieving the above purposes, this study contributes to knowledge management literature by highlighting the importance of uncommon knowledge use and illustrating ways to enhance it. Furthermore we also contribute to HRM literatures by showing how effective HRM practices can enhance unit performance indirectly through promoting uncommon knowledge use.
This paper is organized as follows. In the next section, we introduce uncommon knowledge use and the role of HRM practice to two modes of uncommon knowledge use. In the third section, we describe the method used to collect data and examine the proposed model. The fourth section presents the analysis results. Last, conclusion and implication are provided.

2 LITERATURE REVIEW

2.1 Effectiveness of IS department

Contemporary business environment requires effective IS department to be innovative while maintaining sufficient performance. One the one hand, the dramatic change of information technology and economic make being innovative as a critical factor for organizations to success in the competitive environment (Cardozo et al. 1993; Frambach & Schillewaert 2002). IS department often need to introduce new technology quickly to accommodate the turbulent environment. Since organizations often need to employ new technologies to empower their business function and increase their competitive capability (Dewett & Jones 2001; Sambamurthy et al. 2003), being innovative therefore refers to implementing new IT, adopting new methodology, or developing new IS to enable new product or service or improve business operation.

On the other hand, the performance of IS department is defined as the extent to which IS department can plan, develop, and operate information system effectively and efficiently. IS department is responsible for developing or implementing information system to support organization operation, e.g. to provide useful information that can solve organization’s business problem and improve the efficiency and effectiveness of decision-making. However, the variation in the business context often leads to changes in user requirements of the information system that is developed or implemented by IS department. High failure rate of IS/IT projects is one significant issue in IS area and enhancing IS department’s performance is therefore cannot be neglected.

2.2 From Common to Uncommon Knowledge Use

Insufficient knowledge has been identified as one critical problem in information system (IS) development (Sakthivel 2007). IS department performance suffers when needed capability cannot be constructed because of lacking sufficient knowledge resources (Nelson & Cooptrider 1996). Effectively acquiring, storing, and retrieving knowledge has been emphasized by knowledge management literatures (Alavi & Leidner 2001; Nemati et al. 2002). Recent studies further highlight the need to acquire needed knowledge from external (Cohen & Levinthal 1990; Matusik & Hill 1998; Tsai 2001). However, Nag and Gioia (2012) pointed out that many firms feel no interest in generate novel knowledge generally, but only focus on following what they used to do in the past and maintaining the status quo. For example, firms prefer to continue with current approach even though there are other more efficient ways to do things. Those firms value knowledge mainly for maintaining responsiveness to current customers. Nag and Gioia referred this situation as common knowledge use. According to Nag and Gioia (2012), strategic leaders have to transform common knowledge into uncommon knowledge to create distinctive capabilities and sustain competitive advantage. They further proposed two modes of uncommon knowledge use: knowledge augmentation and knowledge adaptation. Knowledge adaptation emphasizes on utilize existing knowledge to figure out new solution to modify or improve the process of specific operational activities. Knowledge augmentation encourages employees to question existing knowledge to generate new understanding for future activities. The process of information system development is knowledge intensive and it is critical to acquire knowledgeable IS developers for effective system development and implementation (Tesch et al. 2009). In addition, there is no two identical projects within IS department. Members need to generate effective solutions for various problems. Since many problems are unique, IS department therefore need to use knowledge uncommonly to improve the development process and to create innovative information systems. However, limited efforts in IS area have been entered to understand the role of uncommon knowledge use. The goal of this study is therefore to introduce two types of uncommon knowledge use and explore their impact on the outcomes of IS department.
2.3 Human Resource Management Practices

The importance of employing effective HRM practices has long been emphasized in organization studies. For example, many studies investigate the relationship between HRM practices and firm performance (e.g. Becker & Huselid 2006; Boselie et al. 2005; Collins & Clark 2003; Evans & Davis 2005) or innovative outcome (e.g. Beugelsdijk 2008; Chen & Huang 2009; Oke et al. 2012). Some scholars also explore the impact of HR practices on knowledge sharing (e.g. Cabrera & Cabrera 2005; Collins & Smith 2006). While few studies attempt to explore the link between HRM practices and performance or innovative outcome (Laursen & Foss 2003), limited effort has been entered to understand what transfers the effect of HRM to outcome variables. Wright et al. (2001) suggested that people management practices impact the knowledge creation, transfer, and integration of firms. We believe that effective HRM practices can improve the performance of IS department through promoting uncommon knowledge use. Managers can use effective HRM practices to create an environment that encourage members to use knowledge uncommonly. In this study, we introduce common HRM practices, including uncertainty avoidance culture, communication, shared decision-making, work design (e.g. use of team), and innovation-based policies as the factors impacting uncommon knowledge use.

Given the importance of being innovative and having high performance, this study addresses these issues from a knowledge perspective. Specifically, we propose that different modes of uncommon knowledge use can help IS department to utilize their expertise creating more effective performance and innovative solutions. The research model is shown in Figure 1.
3 HYPOTHESIS DEVELOPMENT

3.1 From Uncommon Knowledge Use to Outcome

3.1.1 Knowledge Adaptation

Knowledge adaptation is a way to use knowledge which can be described as an ability to apply knowledge to modify and improve specific operational activities (Nag & Gioia 2012). Knowledge adaptation emphasizes “tweaking” knowledge already known to create novel solutions to specific problems but not innovation. According to literature, with accumulated knowledge, an IS department can draw from its experiences to quickly figure out what need to do to match organization’s objective as firm’s strategy changing. However, performance remains the same if only applying the same solution on the same problems. Therefore, Nag and Gioia proposed that, strategic leaders should focus on how to tweak existing knowledge so as to improve operational efficiency. This implies that, by keeping tweaking existing knowledge (knowledge adaptation), IS department continuously refines its existing resources and processes of daily work. As an outcome, better performance can be expected. Thus, we hypothesized:

H1: Knowledge adaptation has a positive impact on performance.

3.1.2 Knowledge Augmentation

Different from knowledge adaptation focuses on solving the same problem with slightly tweaked knowledge, knowledge augmentation style uncommon knowledge use encourages members of a firm to reflect upon, criticize, questioning what they have known, and generate new understandings to solve problems (Nag & Gioia 2012). Knowledge augmentation style uncommon knowledge use doesn’t focus on a particular problem but analyse problems to figure out how these solutions apply to other problems. It emphasizes on using existing expertise and skills of the firm to develop new understandings and principles for future action to benefit the firm’s competitiveness. Based on these experience, the members of IS department can quickly apply the solution to similar situation. Then, they can solve problem more effectively and efficiently during the development or implementation. Therefore, we proposed:

H2a: Knowledge augmentation has a positive impact on performance.

For example, managers who choose knowledge augmentation as their strategy for developing uncommon knowledge believe that new technological knowledge enabled them to find new insights and develop a richer understanding of customer needs. In a rapidly changing environment, IS department has to respond to the changing business strategy and user requirements effectively. While some problems are predictable, some problems are wicked and unpredictable at all. It is not likely for IS department to only tweak existing knowledge slightly to solve those problem never faced before. Instead, innovative approaches are needed. Members should challenge what have known and develop unique insights. They can apply these ideas to other problems in the future and meet changing user needs more easily. Since members are encouraged to challenge existing knowledge, they are more likely to generate some novel insights during this process and also be more willing to adapt new technologies or new ways to perform work. With effective knowledge augmentation, IS department can then be able to improve the ability to support the organizational strategy. Therefore, we proposed:

H2b: Knowledge augmentation has a positive impact on innovation.

3.2 From Human Resource Management Practices to Uncommon Knowledge Use

3.2.1 Uncertainty avoidance culture

Members in a society with uncertainty avoidance culture prefer to work through rules, budgets, and standard operating procedures (Shane et al. 1995). The company with high uncertainty avoidance culture invest more time and effort on planning and designing their program (Javidan et al. 2005). In our context, culture of department has significant impact on the intention to change. If an IS
department has clear norm and procedure for employees to follow, employees are constrained with standard operational procedure to avoid risks. The members of IS department will focus on the existing process, hence, we proposed:

H3a: Uncertainty avoidance culture is positively related to knowledge adaptation.

On the other hand, members are more willing to break the rules and norms to innovation in the society with uncertainty accepting culture (Shane et al. 1995). Javidan et al. (2005) also indicated that the company with low uncertainty avoidance culture is more willing to explore opportunities to adapt quick changes and develop new ideas. In other words, employees in the IS department with uncertainty avoidance culture are not allowed to question existing knowledge and unlikely to change and innovate as well. Therefore, we proposed:

H3b: Uncertainty avoidance culture is negatively related to knowledge augmentation.

3.2.2 Communication

Smith and Rupp (2002) define communication as “human interaction through oral conversations and the use of body language” and considered that communication is fundamental in encouraging knowledge transfer. Communication can be classified into two types: formal and informal communication. Formal communication refers to communication that flows through written modes, like official meetings, manuals and procedure and rule books. On the other hand, informal communication is based on social relationship among employees. Employees can share work-relevant information and create collaboration opportunities outside the formal channels (Mohr & Nevin 1990; Smith et al. 1994). In this study, we primarily focus on informal communication among IS department members. Informal communication can facilitate the knowledge flows among members (Smith et al. 1994). Frequent informal communication between department members enables members to learn from others and exchange ideas and information with each other. Moreover, informal communication can facilitate the collaborative work between members and further figure out more effective solution. Therefore we proposed:

H4a: Communication is positively related to knowledge adaptation.

Through the process of communication, the members of the IS department can build a sharing belief and express new ideas to increase the quality of knowledge creation (Henderson et al. 1997; Patnayakuni et al. 2007). Senge (1997) also proposed that organizational knowledge is created through communication of individual learning among co-workers. The communication among members can arouse them to find the problem of process and generate new ideas. Therefore, we proposed:

H4b: Communication is positively related to knowledge augmentation.

3.2.3 Shared-decision making

Shared decision making refers to “seeking team members’ input in decision making” (Patnayakuni et al. 2007). Shared decision making has effect on uncommon knowledge use for the following two reasons. First, previous studies have indicated that employees are more like to accept the decision if they are involved in the decision making process. Employees feel that they are recognized by the organization when involving in decision making. Employees also sense more responsibilities toward the outcomes if they are included in the decision making process (Driscoll 1978). By viewing themselves as critical members in the department, employees are more willing to spend efforts and, more importantly, adjust themselves to reach a better outcome. So they may pay more attention on how to improve operational efficiency. Therefore, we proposed:

H5a: Shared-decision making is positively related to knowledge adaptation.

Second, in the process of shared-decision making, members have to collect various perspectives in order to make more comprehensive decision and get better performance. This action would encourage members to understand others’ expertise and share their knowledge with each other (Patnayakuni et al. 2007). Thus, empowering the members of department to make decision increase opportunities and
need of knowledge sharing to solve problems (Srivastava et al. 2006). They need to expand their knowledge and acquire new skills. Knowledge creation and innovation are more likely to result if team members are allowed to make decision, solve problem, and identify opportunities by themselves (Bligh et al. 2006). Therefore we proposed:

H5b: Shared-decision making is positively related to knowledge augmentation.

3.2.4 Teamwork Design

Teamwork design refers to use teams for performing activities of information system development (Patnayakuni et al. 2007). Using team as work design provides members of department opportunities to work closely with others. Teamwork is a process to integrate individual knowledge into collective knowledge and realize the value of integrated knowledge (Okhuysen & Eisenhardt 2002). An information system team usually includes members from different department or expertise, such as users, programmers, and project managers. Since each member has different background, they have their own opinion and viewpoint to understand the existing process. They may find different problems that should be solved based on their unique background. Therefore, we proposed:

H6a: Teamwork design is positively related to knowledge adaptation.

The use of teams can not only bring better use of local knowledge, but also be positively related to innovation performance (Laursen & Foss 2003). Integrating individual’s perspectives and unique skills of team members into collective knowledge of team can contribute to team creativity – using different ways to develop information systems (Tiwana & Mclean 2005). So the use of team can integrate knowledge of team members to create more value and innovation. Thus, we hypothesized:

H6b: Teamwork design is positively related to knowledge augmentation.

3.2.5 Innovation-based Policies

Empirical studies have shown that including “being innovative” as a requirement in recruitment, compensation, and promotion of employees are important to promote innovations in firms (Atuahene-Gima 1996; Khazanchi et al. 2007). In this study, we move further and argue that innovation-based policies, such as hiring creative employees and rewarding innovative initiates, are expected to have positive impacts on uncommon knowledge. The policies allow organization to successfully hire employees who have required expertise to solve difficult problems and find novel ideas (Amabile 1998; Seijts & Latham 2005). Therefore, we proposed:

H7a: Innovation-based Policies is positively related to knowledge adaptation.

Rewarding and recognizing being innovative encourage employees to generate new ideas, break rules (Khazanchi et al. 2007), and also motivate employees’ willingness to achieve innovative outcomes (Seijts & Latham 2005). The innovation-based HR policies are also likely to facilitate an innovative organizational culture (Oke et al. 2012). Specific policies foster the climate, such as psychological safety, that drives employees to learn and be innovative (Edmondson 1999). Individuals are more willing to challenge existing process and try out new ideas. Therefore, we proposed:

H7b: Innovation-based Policies is positively related to knowledge augmentation.

4 RESEARCH METHOD

4.1 Data Collection

We conducted a survey to examine the proposed hypotheses. The target sample of this study is the manager of IS department. The data were collected from the members of the Information Management Association (IMA) in Taiwan. IMA is an association aims to improving IT usage and enhancing communication among IS professionals. Members of this organization are either IS seniors or IS manager. First, we contacted members of the IMA to introduce the purpose of this study and obtain their willingness to participate. A total of 750 survey packages were then sent to managers who
agree to participate. We received 133 survey packages, yielding a valid response rate of 17.73%. Table 1 provides the detailed information.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Categories</th>
<th>#</th>
<th>%</th>
<th>Variables</th>
<th>Categories</th>
<th>#</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industry type</td>
<td>Information Technology</td>
<td>47</td>
<td>35.3</td>
<td># of company employee</td>
<td>&lt;30</td>
<td>15</td>
<td>11.3</td>
</tr>
<tr>
<td></td>
<td>Financial</td>
<td>2</td>
<td>1.5</td>
<td></td>
<td>30-50</td>
<td>7</td>
<td>5.3</td>
</tr>
<tr>
<td></td>
<td>Manufacturing</td>
<td>39</td>
<td>29.3</td>
<td></td>
<td>50-100</td>
<td>11</td>
<td>8.3</td>
</tr>
<tr>
<td></td>
<td>Service</td>
<td>8</td>
<td>6.0</td>
<td></td>
<td>100-500</td>
<td>26</td>
<td>19.5</td>
</tr>
<tr>
<td></td>
<td>Medical</td>
<td>13</td>
<td>9.8</td>
<td></td>
<td>500-1000</td>
<td>15</td>
<td>11.3</td>
</tr>
<tr>
<td></td>
<td>Hospitality</td>
<td>1</td>
<td>0.8</td>
<td></td>
<td>1000-5000</td>
<td>26</td>
<td>19.5</td>
</tr>
<tr>
<td></td>
<td>Retailing</td>
<td>1</td>
<td>0.8</td>
<td></td>
<td>&gt;5000</td>
<td>33</td>
<td>24.8</td>
</tr>
<tr>
<td></td>
<td>Government</td>
<td>10</td>
<td>7.5</td>
<td># of IS employee</td>
<td>&lt;5</td>
<td>21</td>
<td>15.8</td>
</tr>
<tr>
<td></td>
<td>School</td>
<td>9</td>
<td>6.8</td>
<td></td>
<td>5-10</td>
<td>18</td>
<td>13.5</td>
</tr>
<tr>
<td></td>
<td>Others</td>
<td>3</td>
<td>2.3</td>
<td></td>
<td>10-15</td>
<td>15</td>
<td>11.3</td>
</tr>
<tr>
<td>Position</td>
<td>Senior member</td>
<td>62</td>
<td>46.6</td>
<td></td>
<td>15-20</td>
<td>14</td>
<td>10.5</td>
</tr>
<tr>
<td></td>
<td>Manager</td>
<td>20</td>
<td>15</td>
<td></td>
<td>20-50</td>
<td>14</td>
<td>10.5</td>
</tr>
<tr>
<td></td>
<td>Senior manager</td>
<td>12</td>
<td>9</td>
<td></td>
<td>50-100</td>
<td>12</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Administrator</td>
<td>38</td>
<td>28.6</td>
<td></td>
<td>&gt;100</td>
<td>39</td>
<td>29.3</td>
</tr>
<tr>
<td></td>
<td>Others</td>
<td>1</td>
<td>0.8</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 1. Sample demographics (N=133)

4.2 Constructs and Measurement

All constructs of our research model were measured using multiple items. Most of measurement items were adapted from past studies. Due to the research of Nag and Gioia (2012) was conducted by interview, the measurement items of adaptation and augmentation were developed by the authors. The questionnaire adopted Likert scales ranging from 1 (strongly disagree) to 7 (strongly agree). The definitions of the constructs are shown in Table 2.

<table>
<thead>
<tr>
<th>Construct</th>
<th>Definition</th>
<th>Source of items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance of IS department</td>
<td>the efficiency of IS department to develop and implement information system</td>
<td>Adapted from DeLone and McLean (1992); Ravichandran and Lertwongsatien (2005)</td>
</tr>
<tr>
<td>Innovation</td>
<td>the extent to innovation activities of IS department</td>
<td>Song et al. (2006)</td>
</tr>
<tr>
<td>Knowledge adaptation</td>
<td>the mode of uncommon knowledge use that focuses on applying knowledge to modify and improve specific operational activities</td>
<td>Developed by authors</td>
</tr>
<tr>
<td>Knowledge augmentation</td>
<td>the mode of uncommon knowledge use that represents an orientation toward using existing expertise and skills to reflecting upon, critiquing, and questioning for problem solving and generating new insights</td>
<td>Developed by authors</td>
</tr>
<tr>
<td>Uncertainty avoidance</td>
<td>the extent that the members of a culture feel threatened by uncertain or unknown situations</td>
<td>Hwang (2005)</td>
</tr>
</tbody>
</table>
and try to avoid them

<table>
<thead>
<tr>
<th>Constructs</th>
<th>Items</th>
<th>Loadings</th>
<th>ITC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication</td>
<td>the extent of informal interaction among members of IS department</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patnayakuni et al. (2007)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shared decision-making</td>
<td>sharing of decision-making authority among IS employee</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patnayakuni et al. (2007)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Work design</td>
<td>use of teams for ISD activities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patnayakuni et al. (2007)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Innovation-based policy</td>
<td>the extent to which a firm adopts people-focused policies including recruitment and selection, and reward systems that foster the development of innovation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oke et al. (2012)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2. Construct definition and source of items

4.3 Common Method Variance

Common method variance (CMV) might be a concern in this study, because both independent and dependent variables are collected simultaneously from the same respondent. We implemented the Harman’s single factor to ensure there was no significant method effect on the predefined causal relationship. The result shows that the first factor explains 16.52% of variance through the exploratory factor analysis process. Besides, we followed Liang et al. (2007) to test the impact of common method variance in the PLS model. There are 33 indicators and only 6 method factor loadings are significant. The summation of substantively explained variance of the indicators is 25.1, while the average method based variance is 0.46. The ratio of substantive variance to method variance is approximately 54:1. Therefore, CMV is unlikely to be a problem in this study.

4.4 Reliability and Validity

We used PLS (Partial Least Squares) to evaluate the item reliability, convergent validity, and discriminant validity of measurement model. The reliability was ensured through composite reliability, Cronbach’s alpha and factor loading. Convergent validity should be examined by item-to-total correlation (ITC), composite reliability, and average variance extracted (AVE) by constructs (Fornell & Larcker, 1981). For discriminant validity, the correlation between construct pairs should be lower than 0.90 and the square root of AVE should be higher than the inter-construct correlation coefficients (Fornell & Larcker 1981). All validity requirements are met, as shown in Tables 3 and 4. Table 4 shows the descriptive statistics.

<table>
<thead>
<tr>
<th>Constructs</th>
<th>Items</th>
<th>Loadings</th>
<th>ITC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uncertainty avoidance culture</td>
<td>It is important to have job requirements and instructions spelled out in detail so that employees always know what they are expected to do.</td>
<td>0.930</td>
<td>0.828</td>
</tr>
<tr>
<td>Alpha: 0.91 ; AVE:0.84 ; CR:0.94</td>
<td>Rules and regulations are important because they inform employees what the organization expects of them.</td>
<td>0.910</td>
<td>0.807</td>
</tr>
<tr>
<td>Communication</td>
<td>There is extensive informal communication among IS employees at the same level.</td>
<td>0.865</td>
<td>0.675</td>
</tr>
<tr>
<td>Alpha: 0.85 ; AVE:0.76 ; CR:0.91</td>
<td>There is extensive informal communication among IS employees at different level.</td>
<td>0.908</td>
<td>0.773</td>
</tr>
<tr>
<td>Shared decision making</td>
<td>Participative decision-making is broadly used in these development projects.</td>
<td>0.916</td>
<td>0.769</td>
</tr>
<tr>
<td>Alpha: 0.87 ; AVE:0.80 ; CR:0.92</td>
<td>Decision-making authority rests with managers as opposed to development staff. (R)</td>
<td>0.878</td>
<td>0.744</td>
</tr>
<tr>
<td>Work design</td>
<td>All projects are managed by autonomous teams.</td>
<td>0.832</td>
<td>0.594</td>
</tr>
</tbody>
</table>
System development is team based.  
Project team performance is evaluated rather than individual performance. 
Our human resource policies support a culture of innovation. 
The rewards and recognition systems encourage innovation. 
Innovation is a key criterion in our recruitment and selection process. 
Innovation forms part of our training and development programs. 
Clear innovation targets are set for all employees. 
We encourage everyone to question what they think they know, to generate new understanding. 
We analyze problems to figure out how solutions apply to other problems. 
We use new technical knowledge to find unique insights. 
We capable of refining and extending our existing knowledge and technologies to enhance the efficiency of firm. 
We usually change the operation processes (development, implementation, maintenance process) we use slightly to gain better performance. 
We regularly recombine and integrate existing technologies in new products or services process. 
Our innovation comes through small steps rather than giant leaps. 
Information quality providing by our IT department has met our firm’s objectives 
The quality of information system developing or implementing by our IT department has met our firm’s objectives. 
The efficiency of developing or implementing information system by our IT department has been successful. 
The efficiency of introducing information system by our IT department has been successful. 
The efficiency of maintaining information system by our IT department has been successful. 
The overall performance of developing innovative information system program has met our objectives. 
From an overall profitability standpoint, implementing new information system program has been successful. 
We successfully use innovative method to plan and manage information systems and launch novel development process, 
We successfully use innovative information technology to support business operations. 
Note: ITC-Item-Total Correlation 

Table 3. The results of factor analysis

| Mean | Std  | M3   | M4   | INN | IBP | SDM | PE  | WD  | AD  | AUG | COM | UAC |
|------|------|------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| INN  | 4.19 | 1.404| -0.291| -0.647| 0.87 |
| IBP  | 4.21 | 1.370| -0.282| -0.253| 0.56 | 0.89 |
| SDM  | 4.25 | 1.317| -0.308| -0.276| 0.44 | 0.61 | 0.89 |
| PE   | 4.62 | 1.013| -0.590| 0.412| 0.54 | 0.35 | 0.26 | 0.87 |
| WD   | 4.83 | 1.250| -0.390| 0.403| 0.39 | 0.64 | 0.59 | 0.40 | 0.83 |
| AD   | 5.13 | 0.988| -0.213| -0.273| 0.34 | 0.40 | 0.43 | 0.53 | 0.45 | 0.78 |
| AUG  | 4.34 | 1.224| -0.297| -0.049| 0.63 | 0.65 | 0.57 | 0.42 | 0.57 | 0.53 | 0.87 |
| COM  | 4.71 | 1.205| -0.128| -0.325| 0.36 | 0.65 | 0.55 | 0.46 | 0.59 | 0.55 | 0.48 | 0.87 |
| UAC  | 5.35 | 1.195| -0.634| 0.607| 0.24 | 0.43 | 0.40 | 0.37 | 0.54 | 0.59 | 0.36 | 0.57 | 0.92 |

Note: INN-innovation; IBP-Innovation-based Policies; SDM-Shared decision making; PE-Performance; WD-Work design; AD-Adaptation; AUG-Augmentation; COM-Communication; CUL-Uncertainty avoidance
5 RESULTS

Test results are shown in Figure 2. The path coefficients from knowledge adaptation to department performance and from knowledge augmentation to innovation are positively significant ($\beta = 0.430, p < 0.001$; $\beta = 0.630, p < 0.001$; respectively). Therefore, H1 and H2a are supported. But knowledge augmentation was partially related to department performance ($\beta = 0.193, p < 0.1$). Knowledge adaptation and knowledge augmentation total explains a $31.3\%$ variance of performance. Knowledge augmentation explains a $39.7\%$ variance of innovation. The path coefficients from uncertainty avoidance culture and communication to knowledge adaptation are positively significant ($\beta = 0.378, p < 0.001$; $\beta = 0.268, p < 0.01$; respectively), indicating that uncertainty avoidance culture and communication contribute to knowledge adaptation. The path coefficient from shared decision making to knowledge adaptation is partially significant ($\beta = 0.135, p < 0.1$, but from shared decision making, work design, and innovation-based policy to knowledge adaptation are not significant ($\beta = 0.036, p > 0.1$; $\beta = -0.046, p > 0.1$; respectively). Thus, H3a and H4a are supported but H5a, H6a, and H7a are not. The path coefficients from uncertainty avoidance culture and communication to knowledge augmentation are not significant ($\beta = 0.009, p < 0.1$; $\beta = -0.023, p > 0.1$; respectively), but from shared decision making, work design, and innovation-based policy are all positively significant ($\beta = 0.216, p < 0.05$; $\beta = 0.191, p < 0.05$; $\beta = 0.411, p < 0.001$; respectively). Therefore, H5b, H6b, H7b are all supported, but H3b and H4b are not. There five HR practices in total explain the $42.6\%$ and $49.2\%$ variance of knowledge adaptation and knowledge augmentation respectively.

![Figure 2. Results of hypotheses testing](image-url)
6 DISCUSSION

The results show that (1) knowledge adaptation has a significant effect on department performance, and knowledge augmentation is more important to innovation than department performance; (2) uncertainty avoidance and communication can enhance knowledge adaptation, and shared decision making, work design (use of team), and innovation-based policy are important to promote knowledge augmentation.

First, two types of uncommon knowledge use have different impact on performance and innovation. Knowledge augmentation is more important for innovation than for performance of the department. The relationship from knowledge augmentation to performance is not significant. We suspect that augmentation focuses on generating new understandings to solve problems for future actions. Hence the effects of improving performance probably are not obvious immediately. Second, we found that uncertainty avoidance culture and communication do not have effect on knowledge augmentation. For uncertainty avoidance culture, although we argue that employees are less creative under this condition, it is also reasonable that member may be able to apply one procedure to different problems after having clearly understanding toward the detail parts. For communication, although members communicate with each other and come out some creative ideas, but how to implement these ideas might be another problem. It probably needs to break rules or make some changes. Third, work team design and innovation-based policy were found to affect augmentation but have limited effects on adaptation only. Team is a combination of individuals with diversified expertise. Information exchange in problem analysis stage allows members to generate novel insight. However, many activities in IS department are not in teamwork style, especially those routines works. Since adaptation focuses on change the current way of doing things, it is then reasonable that teamwork style has limited effect on adaptation. In addition, innovation-based policy leads to strong innovative culture in which critical innovation is emphasized more than incremental innovation. Therefore, augmentation is highlighted instead of adaptation.

6.1 Implications to Academia

Nag and Gioia (2012) proposed the concept of uncommon knowledge use and illustrate the idea with several cases. This study introduces these two modes of uncommon knowledge use into the discipline of project management and empirically validates its antecedents and consequences. In addition to showing its effect on IS department outcomes, we also explore possible ways can be used to foster uncommon knowledge use from the HRM perspective. We contribute to HRM literature by introducing possible mediators that transfer the effect of HRM practices to innovation and performance. While most of past studies investigated the relationship between HRM practices and outcome variable, we further demonstrate that knowledge adaptation and knowledge augmentation might be important mediators of HRM practices and performance or innovation.

6.2 Implications to Practitioners

According to the result of this study, knowledge adaptation is associated with performance positively and knowledge augmentation leads to innovation. More important, this study identifies possible antecedents from a HRM perspective. Based on our results, managers of IS department can choose appropriate HRM practices to achieve the desired style of uncommon knowledge use. To promote knowledge adaptation, managers should pay attention on fostering open department culture and encourage communication between members. To boost augmentation, managers can empower members to make decision, form teams to integrate different expertise to promote creative ideas of members. In addition, managers should pay attention on member selection to select members with innovative characteristic. They may provide adequate reward to promote uncommon knowledge use or offer needed training to encourage members to think differently.
7 CONCLUSION

The objectives of our study are (1) examine the relationship of uncommon knowledge use between IS performance and innovation and (2) explore the factors that are important to foster uncommon knowledge use from the HRM perspective. Performance and innovation outcome represent the work result of IS department. To achieve organization’s goal and meet user’s need, IS department have to apply new method of knowledge use, which includes two modes of uncommon knowledge use. The results indicate that uncertainty avoidance culture and communication have significant impact on adopting knowledge adaptation; shared-decision making, work design (use of team), and innovation-based policy impact the use of knowledge augmentation. Some limitations of this study should be mentioned. First, the generalizability of the result might be limited because the sample pool of this study is only in Taiwan. Thus, the future study may collect western-culture based data to verify the generalizability of our results. Second, we validated our proposed model through cross-sectional data. It is very likely that poor performance may reversely drive IS department to use knowledge commonly in order to promote their performance. Finally, to maintain the parsimonious of our research model, we explored the antecedents of uncommon knowledge use from an HRM practices perspective only. We believe that exploring factors other than HRM practices allow us to know the way to boost uncommon knowledge use, given its positive impact on IS performance.
References


