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THE EFFECTS OF PEOPLE ON DEPARTMENTAL IS PERFORMANCE: A MULTILEVEL MODEL

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Abstract

The paper aims to theorize and examine one of the earliest models of people-related antecedents of departmental IS performance. Based on the research gap about the effect of departmental managers on organizational IS performance and job performance theory as it is presented in the organizational behavior research field, this study develops a multilevel framework for people-related factors affecting departmental IS performance. The proposed multilevel research model was validated by using Hierarchical Linear Modeling (HLM) method with survey data of 283 department managers and 42 top managers in 42 companies with application of transaction processing systems. It suggests that top management support and the knowledge and attitude of department managers are the key determinants of departmental IS performance, and that in turn shapes company IS performance. This paper provides a pilot study on departmental IS performance by developing a multilevel model of people's effects on departmental IS performance from organizational behavior and cross-level perspectives. Future research may attempt to integrate the constructs developed in this paper with those from other theories to develop and test more comprehensive models of departmental IS performance.

Keywords: Departmental IS performance, Top management support, Department manager knowledge, Department manager attitude, Job performance.

1 INTRODUCTION

Many organizations are using information systems (IS) in their drive to become more productive and competitive in the 21st century (Luftman 2003; Szydowski & Smith 2009; Yeh & Teng 2012; Li et al. 2013). While there are many IS success stories, there have also been reported failures (Dawson & Owens 2008). The application of IS does not necessarily lead to favorable organizational outcomes (Soh & Markus 1995). This has motivated researchers to analyze the antecedents of organizational IS performance (e.g., Somers & Nelson 2001; Chatzoglou & Diamantidis 2009). However, the extant literature has focused on the antecedents of organizational IS performance at the company-level (e.g., Ragu-Nathan et al. 2004), and little attention has been paid to the antecedents of department-level IS performance. As most companies are composed of various departments in which different IT systems may be applied, producing departmental IS performance at a variety of levels which contributes to IS performance company-wide, it is important to analyze the antecedents of departmental IS performance.

People may play important roles in successful application of IS (Nguyen 2005), but most of the research on people's effects on organizational IS performance has focused on top management support's effect on company-level IS performance (e.g., Somers & Nelson 2001; Ragu-Nathan et al. 2004). Although department managers' resistance has been acknowledged as a bottleneck for attaining organizational IS performance (Gallivan 2001), there is a paucity of theoretical development and empirical studies about the effect of department managers on organizational IS performance.

Due to these research gaps, this study focuses on the influence people have on departmental IS performance, and strives to address the following research questions.

1. Will department managers affect organizational IS performance?
2. What are the salient people-related factors affecting departmental IS performance?

Research on organizational behavior has shown that job performance has multiple dimensions because a job usually consists of more than one task, and that job performance is predicted by three components: resource, ability, and motivation (e.g., Campbell 1990; Blumberg & Pringle 1982). Departmental managers are responsible for the IS effectiveness of their departments, and thus departmental IS performance should be one of the job performance dimensions of department managers. Job performance theory in organizational behavior research (e.g., Blumberg & Pringle 1982; Campbell 1990) focuses on the people-related antecedents of job performance, and can therefore be applied to analyze the people-related factors affecting IS performance. The research model development process in this study is similar in spirit to the IT (information technology) acceptance research and IS continuance research in that this study adapts the job performance theory from organizational behavior literature to propose a model of IS performance, just as IT acceptance research adapted the theory of reasoned action from the social psychology literature to propose a model of IT acceptance (Davis 1989), and IS continuance research adapted the expectation-confirmation theory from the consumer behavior literature to propose a model of IS continuance (Bhattacharjee 2001). Based on the job performance theory, we develop a multilevel model illustrating the people-related factors affecting departmental IS performance and argue that the knowledge and attitude of department managers in relation to IS and top management support are the key determinants of departmental IS performance.

Before describing the theoretical background and our hypotheses, we must define departmental IS performance and company-level IS performance. Previous research has shown that successful application of IS can help enhance the strategic positioning of a company and improve its operational efficiency and effectiveness (Byrd et al. 2006; Umezurike 2007; Li et al. 2013). As this study concentrates on IS's influence on companies' internal operations, we define departmental IS performance as an improvement in the efficiency and effectiveness of a department that applies IS, and company-level IS performance as an improvement in the efficiency and effectiveness of a company that applies IS. IS performance can be assessed from an economic, financial, behavioral, or perceptual perspective (Delone & Maclean 1992; Molla & Licker 2001). In this study, we adopt the

perceptual view because economic, financial, and behavioral improvements may be difficult to be assessed at the department level. Even if such improvements are able to be assessed, direct comparisons of departments may not accurately reflect IS effectiveness because the utility of IS applications may differ among departments. Thus, we assess IS performance from the users' point of view. First, the perceptions of the department managers responsible for the application of IS are used to judge departmental IS performance. Then, the perceptions of top managers are used to assess company-level IS performance.

In the following sections, we first introduce a conceptual job performance model adapted from the organizational behavior research, and then develop our research hypotheses based on this model. Following this, we report the results of our empirical study designed to test the hypotheses. Finally, we discuss the subsequent theoretical and practical implications.

2 THEORETICAL BACKGROUND AND RESEARCH MODEL

2.1 Theoretical background

Job performance theory is widely used to explain the people-related antecedents of job performance (Waldman & Spangler 1989; Law et al. 2008), which has shown that the job performance of a particular task is a function of ability, motivation, and resource (Vroom 1964; Blumberg & Pringle 1982). Figure 1 illustrates the key constructs and relationships in job performance theory. The relationships among the key constructs are as follows.

First, individual ability is a key predictor of job performance. For example, to write a computer program, a programmer must possess the relevant abilities such as knowledge of computer languages and the related hardware and software. Without such knowledge, it seems impossible for the individual to write a high quality program. Therefore, individual ability is a key effect factor of job performance.

Second, individual motivation is also important for job performance. For instance, if the programmer is not interested in the program or not satisfied with the rewards that he or she expects to receive in compensation, he or she may have little motivation to write a high quality program. The programmer in such a situation might make excuses for why the program operates slowly or at a lower standard. Therefore, both ability and motivation affect the standard of employees' performance (Vroom 1964).

Third, in addition to motivation and ability, resource is a key contributor for the attainment of job performance. As Blumberg and Pringle (1982) stated, employees need adequate resources to perform tasks effectively. This is echoed by other researchers, who have stated that factors such as the availability of adequate instruments and materials, and leaders' guidance and support are significant determinants of job performance (e.g., Gist 1987; Komaki 1986). For example, a programmer may need clear instructions and guidance from supervisors and adequate computer hardware and software to write the required program. Without these resources, the programmer will be unable to perform well, despite possessing the ability and motivation to write a high-quality program.

Fourth, job performance may have different dimensions. As Campbell (1990) stated, job performance may have different components due to the fact that jobs consist of various tasks, and there are major types of individual differences determining the success of each performance component.

In short, job performance theory has shown that there are a number of dimensions to job performance because usually a job may consist of different tasks. For each job performance dimension, an employee must have the ability and motivation and adequate resources to perform at a high level.

The next section examines how job performance theory can serve as a theoretical basis for explaining the relationships among people and IS performance.

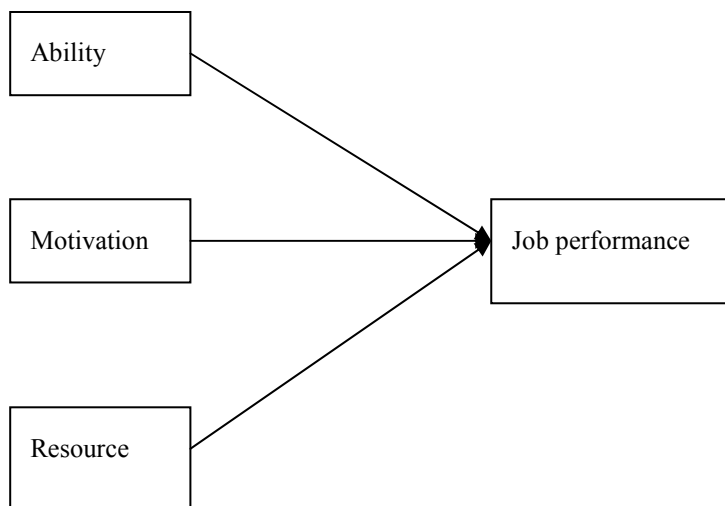


Figure 1. A conceptual model of job performance

2.2 Research Model and Hypotheses

Like any other employee, a company's department managers are required to perform multiple tasks. In the companies with application of IS, one of tasks performed by departmental managers is overseeing the application of IS. Thus, departmental IS performance is a significant job performance dimension for department managers, and the job performance model reviewed in the previous section can be served as the conceptual framework for understanding the people-related determinants of department-level IS performance.

First, according to the job performance model, department managers need to have ability to carry out the IS-related tasks within their departments. Possibly, the most critical ability relates to their IS knowledge. Previous studies have shown that ability is related to job knowledge, which in turn determines job performance (Hunter 1983; Schmidt et al. 1986). Without adequate IS knowledge, it appears impossible for a department manager to make the correct decisions in adopting and implementing IS, and clearly describe the business data and information needs of his/her department. For example, careful selection of the right package is a critical factor in successful application of IS. An IS vendor may claim that their system has overlapping functionality when it does not, and some packages are better suited to larger organizations while others perform better in smaller firms (Akkermans & Helden 2002). To choose the most suitable package, it is necessary to decide which version or modules will best fit the organization (Piturro 1999). If the wrong package is selected, the organization will face either a misfit between the IS package and their business processes and strategy, or the need for modifications, which can be costly and risky (Janson & Subramanian 1996). Furthermore, clearly defining business data and information needs is an important first step for successful application of IS (Davenport & Prusak 2000).

Based on above discussion, we believe the IS knowledge of departmental manager is critical to achieve department IS performance. Thus, the following hypothesis is proposed.

Hypothesis 1: The IS knowledge of department managers has a positive effect on the IS performance of their departments.

Second, according to the job performance model, department managers need to have motivation to carry out the IS-related tasks within their departments. Therefore, we believe that department managers who are more willing (i.e., have higher motivation) to apply IS will perform better in this task. According to Blumberg and Pringle (1982), willingness can be measured by attitude. The more positive a department manager's attitude towards IS, the more willing they will be to accept IS

projects assigned by top management or even to initiate new IS projects within their own departments, and to improve department IS performance. Thus, we hypothesize:

Hypothesis 2: The attitude of department managers towards IS has a positive effect on the IS performance of their departments.

Finally, according to the job performance model, a department manager needs the resources necessary to achieve the department's expected IS performance. In the IS context, usually the main source of resources is allocated by top management. In general, IT systems are open systems comprising two subsystems, one being the users and their organization, and the other the computer hardware and software (Diehl 2005). These resources require investment, such that if top management does not actively back application of IS by allocating the appropriate resources, then there is little hope to achieve departmental IS performance. The important role of top management in the diffusion of innovation has been documented. With respect to the implementation of IS projects, top management must understand the capabilities and limitations of IS, establish reasonable goals for the IT systems, exhibit strong commitment to the success of the project, and communicate the corporate IS strategy to all employees (McKersie & Walton 1991). Ginzberg (1981) argued that top management is instrumental to the successful application of IS. Grover and Walker (2003) stated that the implementation of new technology must be orchestrated with a commitment from top management. Therefore, the resource for application of IS allocated by the top management is critical for department to achieve IS performance.

Based on the above discussion, we believe top management may play important role in departmental application of IS, and top management support is a critical resource for department to achieve IS performance. Thus, the following hypothesis is proposed.

Hypothesis 3: Top management support has a positive effect on departmental IS performance.

Additionally, although we can't find evidence in the literature of the relationship between departmental and company-wide IS performance, we believe that such a relationship exists. As most companies are composed of various departments, improving the IS performance of individual departments should enhance that of the company at large. As the relationship between departmental and company IS performance is not the major focus of this study, we do not propose a formal hypothesis.

To summarize, we have applied job performance theory in organizational behavior research to propose a multilevel model that describes the people-related factors affecting IS performance at the department level. The research model in this study is shown in Figure 2. Overall, the IS knowledge and attitude of department managers and the top management support are hypothesized to be determinants of IS performance at the department level, which is expected to correlate with IS performance at the company level.

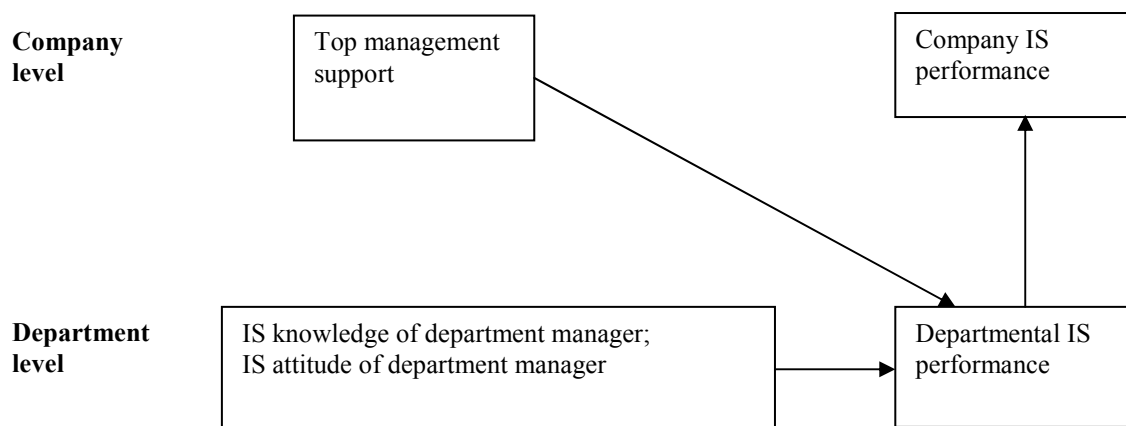


Figure 2. A multilevel model of people's effects on departmental IS performance

3 METHOD

3.1 Procedures and Samples

Our empirical investigation, conducted in Guangdong province, China, consisted of three stages. In the first stage, we interviewed 17 practitioners. Five of them were Chief Information Officers (CIOs) in their companies, seven were business managers in companies with application of IS, four were IS implementation consultants working for software suppliers, and one was a university professor with extensive IS consultant experience. During the interviews, we discussed the IS knowledge and attitudes of the department managers, and IS performance at the company and department levels. We presented our existing measurement items to examine their practicality and validity, and solicited suggestions for modifying the existing items and generating new items. The purpose of this stage was to develop the questionnaire to be used in our survey.

In the second stage, we investigated 42 companies with application of transaction processing systems such as SCM (supply chain management) systems, CRM (customer relationship management) systems, and MRP (manufacturing resource planning) systems. Guangdong was chosen as the research site because it is one of the most developed provinces in China and a large number of the companies situated there have applied IS with varying degrees of performance. Transaction processing systems context was selected because transaction processing systems is relatively complex in integrating business and IS, which contributes to the variance of IS performance. Additionally, many failure stories about the application of transaction processing systems were reported (Dawson & Owens 2008). We personally contacted the top- and middle-level managers of the 42 companies to solicit their support for this study. After gaining their support, we asked the companies to distribute questionnaires to their ordinary employees. This first survey was used as a pilot sample to conduct a preliminary check of the appropriateness of the measurement items for IS knowledge and attitude, and departmental IS performance. A total of 219 valid questionnaires were received in this round of data collection.

After finalizing the measurement items based on the pilot sample data, we conducted the third stage, in which we asked each of the 42 companies to distribute questionnaires to their departmental heads and a member of the top management team. The questionnaire for the department managers consisted of department-level items (i.e., department managers' IS knowledge and attitude, and departmental IS performance) and the questionnaire for the top managers consisted of items measuring top management support for IS and IS performance at the company level. We received a total of 283 valid questionnaires from department managers, and 42 valid questionnaires from top managers in this main sample. The data of this main sample is used to test the relationships shown in Figure 2. The key advantage of this sampling process is to ensure that the questionnaires are completed by the appropriate department managers and top managers.

Of the 42 companies studied, 54.8 percent are in the manufacturing industry and the others are in the service industry. Of the 283 department manager respondents, 70.3 percent are male. Of the 42 top manager respondents, 81.0 percent are male.

3.2 Measures

Company IS performance. The items for measuring IS performance at the company level are drawn from previous studies of IS performance (Delone & Maclean 1992; Ragu-Nathan et al. 2004; Byrd et al. 2006), with modifications based on our interviews. The final version of the scale consists of 6 items, an example item being, "The use of IS has led to better management of company activities." The measure of company IS performance was completed by the top managers of the 42 companies in our sample. The internal consistency reliability of this measurement was .97.

Top management support. We adopted the scale developed by Ragu-Nathan et al. (2004), with modifications based on our interviews. The scale consists of 3 items, an example item being, “The top management supports the application of IS.” This scale was completed by the top managers of the 42 companies in our sample. The internal consistency reliability of this measurement was .88.

Department IS performance. We modified the 6 items for company IS performance to measure IS performance at the department level. An example item was, “The use of IS has led to better management of department activities.” This 6-item scale was completed by the ordinary employees in the pilot sample and the department managers in the main sample. The internal consistency reliability of this measurement with the main sample was .87.

Attitude towards IS. We adopted the scale developed by Ajzen (1991), with modifications to suit our research context. The scale consists of four items, an example item being, “It is wise for my department to apply IS.” This scale was completed by the ordinary employees in the pilot sample and the department managers in the main sample. The internal consistency reliability of this measurement with the main sample was .90.

IS knowledge. Based on the knowledge requirements for given tasks reported in previous studies (e.g., Boyatzis 1982; Spencer & Spencer 1993) and our interviews, we developed five items to measure the IS knowledge of department managers, an example item being, “I know which type of IT systems is helpful to improve the operation efficiency of my department.” This scale was completed by the ordinary employees in the pilot sample and the department managers in the main sample. The internal consistency reliability of this measurement with the main sample was .89.

All of the measurement items used a 5-point Likert-type scale response format, ranging from strongly disagree (1) to strongly agree (5). Exploratory factor analysis (EFA) was used to analyze the data from the pilot sample to ensure that the items adopted for departmental IS performance, knowledge, and attitude towards IS were appropriate. Confirmatory factor analysis (CFA), correlations, and Hierarchical Linear Modeling (HLM) (Raudenbush et al. 2000) were used to analyze the data from the main sample to test the hypotheses.

4 RESULTS

EFA of the pilot sample. The results of the exploratory factor analysis (EFA) of the pilot sample data are shown in Table 1. A three-factor solution emerges, which explains 68.8 percent of total variance. All of the items loaded heavily on their respective factors (i.e., department IS performance, knowledge, and attitude towards IS) and the cross-loadings were relatively small. As Table 1 shows, the internal consistency reliabilities of the three scales with the pilot sample were well above .80. Thus, we conclude that the items derived from the existing scales that were modified following the interviews are appropriate for the main sample.

CFA of the main sample. We conduct confirmatory factor analysis (CFA) to test the factor structure of the three department-level constructs (i.e., departmental IS performance, knowledge, and attitude towards IS) using the main sample reported by department managers. The fit of the three-factor (i.e., departmental IS performance, knowledge, and attitude towards IS) model appears to be reasonably acceptable ($\chi^2=48.81$; $df=32$; $RMSEA=0.043$; $CFI=0.99$, $NNFI=0.99$), and the single-factor model has an extremely poor fit ($\chi^2=1327.57$; $df=35$; $RMSEA=0.36$; $CFI=0.60$, $NNFI=0.48$). Thus, together with the high internal consistency reliability coefficients with the main sample shown in Table 2, we conclude that the measurement items completed by department managers in this sample have reasonable reliability and validity. The descriptive statistics and correlations among the variables in the main sample are shown in Table 2. All variables have a reasonable dispersion in the distributions across the ranges, as the standard deviations show.

Testing of hypotheses 1 to 3. As our model involves cross-level predictors (i.e., department-level predictors and company-level predictors), and the dependent variable is at the lower level (i.e., department level), we use HLM (Raudenbush et al. 2000) to test hypotheses 1 to 3. A prerequisite for testing the cross-level predictors is that the between-group variance is significant. To test the

hypotheses in this study, we conduct a 3-step HLM analysis. The first step in HLM is to estimate a null model with no specific predictors of the dependent variable to examine the within-group (i.e., variances among departments within the same company) and between-group (i.e., variances among companies) variances of the dependent variable. In the second step, the level 1 independent variables (i.e., IS knowledge and attitude of department managers) are regressed on the dependent variable (i.e., departmental IS performance) for each company. In the third step, the level 2 independent variable (i.e., top management support) is used to predict the intercept estimates obtained from the previous model. If top management support can predict the intercept estimates, then it has a direct effect on the dependent variable (i.e., departmental IS performance) on top of the predictors at level 1. The relative explanatory power of the two-levels of predictors can be estimated from the proportion of variance in departmental IS performance that can be accounted for by department-level factors ($R^2_{\text{within-group}}$) and by company-level factors ($R^2_{\text{between-group}}$).

Items	Factor 1	Factor 2	Factor 3	Reliability
DITP (Departmental IS performance) 1	.653	.191	.171	.862
DISP 2	.769	.209	.003	
DISP 3	.822	.138	.143	
DISP 4	.800	.201	.118	
DISP 5	.734	.270	.169	
DISP 6	.664	.267	.027	
ATIS (Attitude towards IS) 1	.147	.171	.894	.915
ATIS 2	.172	.224	.881	
ATIS 3	.158	.182	.918	
ATIS 4	.023	.003	.701	
ISK (IS knowledge) 1	.246	.755	.110	.839
ISK 2	.237	.750	.239	
ISK 3	.226	.830	.093	
ISK 4	.233	.828	.141	
ISK 5	.245	.796	.081	
Eigenvalue	6.346	2.345	1.625	
Cumulative % of variance explained	24.483	48.063	68.778	

Table 1. Results of the factor analysis

Variable	Means	Std. Deviation	Sample Size	1	2	3
Department-level						
1.Department IS performance	3.37	.75	283	(0.87)		
2.IS knowledge of department manager	3.37	.81	283	.55**	(0.89)	
3.IS attitude of department manager	4.26	.70	283	.32**	.35**	(0.90)
Company-level						
1.Top management support	3.68	.87	42	(0.88)		
2.Company IS performance	2.95	.74	42	0.45**	(0.97)	

Table 2. Descriptive statistics and correlations¹

The results of the HLM analyses are shown in Table 3. The null model indicates a significant between-group (i.e., across companies) variance ($\tau = 0.14$, $p < .01$). The intra-class correlation (ICC) is 0.25, indicating that 25 percent of the variance in departmental IS performance resided between companies and 75 percent resided within companies. As for the level 1 predictors, the two department-level variables explained 26 percent of the within-group variance of departmental IS performance. Both predictors exhibit significant effects on the dependent variable ($\gamma = 0.46$, $p < .01$ and $\gamma = 0.10$, $p < .05$ for IS knowledge and attitude, respectively). Thus, hypotheses 1 and 2 are supported.

¹ Notes: numbers in the parentheses are coefficient alphas; * $p < 0.05$; ** $p < 0.01$

When the company-level predictor (i.e., top management support) is added to the model, it accounts for 29 percent of the between-group variance of departmental IS performance and the effect ($\gamma=0.15$) is statistically significant ($p<.01$). Thus, hypothesis 3 is supported.

Variable	Null model	Department-level predictors	Adding company-level predictors
Level 1			
Intercept	3.41(0.14**)	1.38**(0.07**)	0.83**(0.05**)
IS knowledge		0.46**	0.45**
IS attitude		0.10*	0.10*
Level 2			
Top management support			0.15**
Within-group residual variance	0.43	0.32	0.32
$R^2_{\text{within-group}}$		0.26	
$R^2_{\text{between-group}}$			0.29
Model deviance	612.70	527.16	522.81

Table 3. Hierarchical linear modeling results for departmental IS performance²

Correlation between departmental and overall company IS performance. Our main sample comprises 42 companies and 283 department managers. In other words, on average, 6.7 department managers responded in each company. To examine the relationship between departmental IS performance and company IS performance which is shown in Figure 2, we average the departmental IS performance reported by the department managers within each company. This average score is then correlated with company IS performance reported by the top managers. The correlation is quite large ($r=.46$, $p<.01$), which provides support for our expectation that departmental IS performance is related to company IS performance.

5 DISCUSSION AND CONCLUSION

With the ongoing advancement in information technologies, an increasing number of companies are able to benefit from the application of IS. However, there is both success and failure in application of IS (Dawson & Owens 2008), thus it is necessary to analyze the antecedents of organizational IS performance. People may play important role in successful application of IS (Nguyen 2005). However, the majority of the research on people-related antecedents of organizational IS performance has focused on the effects of top management support on company-level IS performance (e.g., Somers & Nelson 2001; Ragu-Nathan et al. 2004). Few studies have been conducted regarding the effects of department managers on organizational IS performance and the antecedents of department-level IS performance. This study developed a pilot research strategy to examine the people-related antecedents of department-level IS performance based on job performance theory in organizational behavior research. Specifically, based on the job performance model adapted from previous organizational behavior research, we argue that department managers who regard IS performance as one of the important dimensions of their performance play a significant role in achieving department-level IS performance. As most companies consist of a number of departments, company IS performance can be enhanced by the improvement of departmental IS performance. Based on a sample of 283 department managers and 42 top managers from 42 companies with application of transaction processing systems in China, we find evidence that department managers' knowledge and attitudes towards IS, along with top management support, are crucial to departmental IS performance. We also learn that departmental IS performance has a strong relationship with company-level IS performance.

² Notes: department managers $n=283$, companies $n=42$; * $p<.05$; ** $p<.01$. Estimations of the random variance components (τ s) are in parentheses.

This study has several important theoretical implications. First, it theorizes and examines one of the earliest models of people-related antecedents of departmental IS performance. Applying the job performance model from organizational behavior research provides an integrated picture of the people-related factors and their relationships to departmental IS performance. Future research may attempt to integrate the constructs developed in this paper with those from other theories to develop and test more comprehensive models of departmental IS performance.

Second, this research is one of the earliest studies about the effect of department manager on organizational IS performance. Although department managers' resistance has been acknowledged as a bottleneck for attaining organizational IS performance (Gallivan 2001), there is a paucity of theoretical development and empirical studies about the effect of department managers on organizational IS performance. This research provides empirical evidence that department managers' attitude and knowledge will affect organizational IS performance.

Third, this study learns organizational IS performance from cross-level perspectives, which is novel to IS performance research, as most of the previous IS performance studies have focused on the same level analysis. Previous research has shown that top management support is a key contributing factor to company-level IS performance (e.g., Ragu-Nathan et al. 2004). However, research about top management support's effect on departmental IS performance remains limited. Based on the job performance theory, we propose a multilevel model showing that as the critical resource for department to achieve IS performance, top management support has significant influence on departmental IS performance. Our results show that top management support accounts for 29 percent of between-group variance of departmental IS performance and then support the hypothesis. Furthermore, as this study is based on a cross-level perspective, it provides a good cross validation of previous findings and a strong theoretical extension explaining the relationship between top management support and company-level IS performance. It also provides a theoretical explanation of how upper-level management can affect the performance of lower-level employees in IS context.

Fourth, this study conducts a preliminarily empirical test of the relationship between departmental IS performance and company IS performance. Future research may further theorize and examine the relationship between departmental IS performance and company IS performance.

This study also has several practical implications. First, top management support has been emphasized as an important determinant of organizational IS performance, whereas the effect of department managers has received relatively little attention. Our finding that department managers significantly influence organizational IS performance, beyond the effects of top management support, indicates that to successfully apply IS within an organization, it must gain top management support and improve the knowledge and attitudes of department managers in relation to the application of IS. According to Spencer and Spencer (1993), a company can improve a manager's knowledge by providing training for a specific job and foster a manager's positive attitude towards the job through training, psychotherapy, and positive developmental experiences. Second, based on the knowledge requirements for given tasks reported in previous studies and our interviews with 17 IS experts, we developed items to measure the IS knowledge of department managers. These items show the details of IS knowledge that the department manager needs to gain to achieve departmental IS performance, which may provide guidance for companies with application of IS to train and develop their department managers.

As with any other study, this study has several limitations. First, the data in this study were collected from Guangdong province in China, which may hinder the generalization of the research results to other areas. However, there is no evidence that Guangdong has any particular characteristics that would make our results unique to the province. Second, the department-level variables were self-reported by the department managers, which could introduce a common method bias. However, the survey responses were anonymous and we assured the respondents that there were no right or wrong answers and that they should answer the questions as honestly as possible, which reduces the possibility of a common method bias (Podsakoff et al. 2003). We also conducted confirmatory factor analyses and found that the single-factor structure fitted the data poorly. Therefore, common method effects do not appear to significantly influence the findings. Nonetheless, future research should strive

to obtain evaluations of departmental IS performance from other raters and collect data from other provinces to cross validate the results of this study.

To summarize, this study contributes to the IS literature in several ways. First, it develops one of the earliest models of people-related antecedents of departmental IS performance. Second, it provides empirical evidence for the effect of department managers on organizational IS performance. Third, it learns organizational IS performance from cross-level and organizational behavior perspectives, which is novel to the IS performance research. Fourth, it provides preliminarily empirical evidence for the relationship between departmental IS performance and company IS performance. It also provides important insights for companies training their department managers and other relevant employees.

Acknowledgements

This research was supported by the National Natural Science Foundation of China (No. 71202098) and the Natural Science Foundation of Guangdong Province (No. S2011040001064).

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