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Impact of Information and Communication Technology (ICT) on Job Outcomes: Does Knowledge Sharing Matter?

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ABSTRACT

This article examines the effects of two ICT related factors, ICT utilization and perceived ease of ICT usage, on two job outcomes, job satisfaction and work effectiveness. On a theoretical basis, the author proposed that these effects could be mediated by knowledge sharing. A total of 246 usable responses from full-time employees working in China were analyzed using hierarchical regression analyses, which were further confirmed by Sobel test and bootstrap-based PROCESS analysis. Results showed that both job satisfaction and work effectiveness were positively related to ICT utilization and perceived ease of ICT usage. Employees' knowledge sharing orientation significantly mediated the relationships of job satisfaction with ICT utilization and ease of ICT usage, as well as the relationships of work effectiveness with these two factors. The present study provides further understanding of the mechanism underlying the influences of ICT on employee workplace issues.

INTRODUCTION

Information and communication technology (ICT) is increasingly used in today's organizational environment. ICT refers to the various electronic devices or technologies that enable people to gather, store, and send information (Steinmueller, 2000). Recent investigations suggest that over 80%, and even approximately 90%-100%, of businesses in Western countries have Internet access and e-mail systems (Day, Paquet, Scott, & Hambley, 2012). As globalization speeds, the introduction of ICT systems at the workplace has also been increasing rapidly in many developing countries. The advancement and use of information technology have led to changes in approaches to business operations and ways of working and living. Employees in modern business organizations need to adapt to this changing environment.

The process of adapting to using ICT in the workplace is complicated and can have both positive and negative effects on employees' work outcomes (Day, Scott, & Kelloway, 2010; Zuboff, 1988). For example, research shows that workplace ICT can improve employees' problem solving skills by increasing access to information and enhance their work efficiency by increasing communication competencies (Day et al., 2012). However, according to O'Driscoll, Brough, Timms, and Sawang (2010), ICT also increases employees' accessibility to resources and expectations for productivity, which increase the demands placed on employees. These demands may negatively impact employees' workplace experiences (e.g., decreased health condition and well-being, Day et al., 2012; Day et al., 2010). While this stream of research on the effects of ICT on workforce issues has contributed to the area of workplace ICT through initiating the connections between ICT and employee abilities, attitudes, and behaviors, very few studies have tested the mechanism underlying these connections, particularly those underlying the positive effects of ICT. This study intends to contribute to the literature by identifying a path that explains the relationships between ICT and work outcomes.

One approach is to examine the mediating role of knowledge sharing orientation in the effect of ICT on job outcomes. The literature has documented that ICT-related variables can increase employees' knowledge sharing abilities (Kim & Lee, 2006) and that knowledge sharing can also influence employee outcomes (Baird & Henderson, 2001). Although not tested, the empirical and conceptual evidence has suggested the possibility that knowledge sharing orientation mediates the ICT-job outcome relationships. The present study focuses on two popularly examined ICT-related variables (i.e., ICT utilization and perceived ease of ICT usage) and two important job outcomes (i.e., job satisfaction and work effectiveness) in workplace studies.

In summary, the specific objectives of this study are to examine the relationships of ICT utilization and perceived ease of ICT usage with job satisfaction and work effectiveness, respectively, and the mediating role of knowledge sharing orientation in these relationships.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

■ The Impact of ICT on Work

Since the successful adoption of information technology in the 1980s (Lyytinen & Rose, 2003), such technology has been significantly influencing individuals and their work (Torkzadeh & Doll, 1999). From the organization level, ICT is central to refreshing our understanding of organizational structure and functions for human activities; at the individual level, ICT may hold the power of job enhancement or render human labor unnecessary (Moore & Benbasat, 1992). In addition, technologies can impact people's work and personal lives through forcing environmental,

political, economic, and social changes (Coates, 1991).

The literature has offered several theoretical frameworks for ICT effects on employees (Day et al., 2010; O'Driscoll et al., 2010). Most of these models contend that ICT can both promote and hinder employee outcomes (Day et al., 2012). For example, Day et al.'s (2010) model indicates that ICT may be considered as either the resource that supports employees in the accomplishment of the work or the work demand that causes stress and strain. Their model proposes that the ICT effect on employee outcomes is a function of how much influence ICT has on employees' access to their workplace, colleagues, information, and communications with others; the monitoring of employee performance and the provision of feedback; and employees' control over their work and life (Day et al., 2012). Workplace ICT research has intensively investigated ICT utilization and perceived ease of ICT usage, and these two ICT components have been used to predict future intention to use technologies based on the analysis of people's psychological attitudes.

This study examines two employee outcomes that may be affected by workplace ICT. One is job satisfaction, which refers to "a pleasurable or positive emotional state resulting from the appraisal of one's job or job experiences" (Locke, 1976, p. 1304). Employees tend to appraise their jobs based on whether their individual values are fulfilled or congruent with what they perceive in the workplace (Janssen, 2001; Morris & Venkatesh, 2010). The other is work effectiveness, which can be defined as the extent to which outcomes and experiences resulting from the working process are in line with the objectives of the work (Van den Akker, 1999). Effectiveness at work may reflect employees' productivity and be useful in predicting their job performance. Both job satisfaction and work effectiveness are regarded as positive employee outcomes, and they can be fostered through a number of measures taken by the organization, including the provision of support (Gutierrez, Candela, & Carver, 2012).

Research demonstrates that general organizational support is related to positive work outcomes, such as organizational citizenship behavior (Chen, Aryee, & Lee, 2005), employee commitment, and job satisfaction (Baranik, Roling, & Eby, 2010). Organizational support can also buffer the negative effects of management practices on employees (Maertz, Griffeth, Campbell, & Allen, 2007). Although the adoption of ICT is a major trend in business, from the perspective of the employee, the availability of ICT usage may sometimes be considered a kind of support that organizations offer to meet employees' various needs and expectations, such as convenience of communication (Day et al., 2012), assistance in learning and training (Hammond & Bennett, 2002), personal development (McCarney, 2004), and time management (H. Lee & Sawyer, 2002). Although the level of support that is made available by the introduction of ICT in companies may be minimal, this support is perhaps the most essential contributor to employee cognitions and perceptions of ICT application. In the work setting, the effectiveness of ICT is dependent not on the absence or availability of an individual factor but on a set of interrelated factors in a dynamic process (Drent & Meelissen, 2008). ICT utilization and perceived ease of ICT usage are important in this regard. Only when employees frequently use ICT can they perceive how these technologies have supported their work, which then promotes them to achieve positive outcomes. Likewise, if employees perceive the ICT as easy to use, they might develop the impression that the company is considerate in supporting their tasks. The literature has provided evidence that these factors not only affect employees' psychological feelings such as job satisfaction but also increase the quality of work (Day et al., 2012; Day et al., 2010; O'Driscoll et al., 2010). Thus, the present study proposes:

Hypothesis 1: *The level of employees' ICT utilization positively affects their job satisfaction.*

Hypothesis 2: *The degree of perceived ease of ICT usage positively affects their work effectiveness.*

■ The Role of Knowledge Sharing in the Impact of Information Technology

Knowledge sharing is defined as "the extent to which critical or proprietary information is communicated to one's partners" (J. N. Lee, 2001, p. 327) so as to collectively use the shared knowledge to pursue common interests (Tsai, 2002). Knowledge sharing activities are important for modern organizations to maximize the ability to satisfy various stakeholders and gain a competitive advantage (Kim & Lee, 2006), given that knowledge sharing has been regarded one of the most important factors that influence the agility and performance of the organization (Beckman, 1997). Both the public and the private sector have realized that knowledge is important to maintaining and promoting organizational development. However, effective knowledge sharing seems now to have become a management challenge for creating positive workplace experiences for employees and for developing high-quality communications with customers (Kim & Lee, 2006). Thus, it is of value to improve the employees' knowledge sharing orientation.

The application of ICT might create an environment that cultivates the knowledge sharing orientation of the employees. As shown in previous research (Kim & Lee, 2006; Strover & Straubhaar, 2000), the Web, the Internet, and numerous ongoing advancements in ICT have

increased people's tendency to generate, integrate, and transfer knowledge and information among agency networks. In the organizational context, ICT utilization and perceived ease of ICT usage have been shown to increase employees' knowledge sharing capabilities, which may motivate them to share information (Kim & Lee, 2006). According to Alavi and Leidner (2001), ICT infrastructure and application increase knowledge transfer mainly by extending individuals' reach beyond formal communications (e.g., formal conversations and meetings). Specifically, electronic bulletin boards, computer networks, discussion forums, Internet-based networks, databases, electronic data-management systems, intranets, groupware systems, knowledge-management information systems, and other online systems facilitate contact between those who seek knowledge and those who manage access to knowledge (Kim & Lee, 2006). Additionally, ICT systems should be user-friendly to enhance the acceptance among employees, regardless of the technology (Kim & Lee, 2006; King, 1999). When employees perceive no difficulties in using ICT systems, they may show greater willingness to share information through these systems (Bock, Zmud, Kim, & Lee, 2005; King, 1999).

Knowledge sharing can contribute to the organization's competitive advantage by strengthening both tangible and intangible assets. Organizational performance, which under certain circumstances is measured using the profits made by the organization, is a type of tangible asset. Employees' work effectiveness is directly related to organizational performance (Paul & Anantharaman, 2003), demonstrating its potential contribution to the increased value of tangible resources. Employees' positive attitudes are important intangible assets that make organizational development smooth (Bijlsma-Frankema & Koopman, 2004). One such attitude is job satisfaction, which has been found to affect a series of employee outcomes such as commitment (Lok & Crawford, 2001) and counterproductive work behaviors (Mount, Ilies, & Johnson, 2006), and to boost attainment of organizational goals through enhancing cohesiveness among members (Judge, Thoresen, Bono, & Patton, 2001). As such, although knowledge sharing facilitates efficiency at the organizational level, it may also influence the individual-level outcomes that are the foundation stones of organizational outcomes. Prior research indicates that both job satisfaction and work effectiveness can be enhanced by knowledge sharing (Almahamid, McAdams, & Kalaldehy, 2010; Zhuge, 2002). Taking into account the above discussion, knowledge sharing holds the potential to mediate the influence of ICT factors on employee outcomes. Specifically, it is hypothesized:

Hypothesis 3: *Knowledge sharing orientation mediates the relationship between job satisfaction and ICT utilization (H3a) and perceived ease of IT usage (H3b).*

Hypothesis 4: *Knowledge sharing orientation mediates the relationship between work effectiveness and ICT utilization (H4a) and perceived ease of IT usage (H4b).*

METHODS

Sample and Procedures

The participants in this study were 246 full-time employees from the People's Republic of China (the PRC). Invitations were sent to the members of a professional talent pool through an online investigation system. To precisely identify those who worked full time, a screening question asked participants about their employment status (i.e., full-time, part-time, unemployed, and other). Most participants worked in the areas of research and development, management, administration, and accounting. These participants were spread throughout most parts of the PRC, presenting a relatively general population for full-time workers, especially those serving in the areas named above.

Among these participants, 53.7% ($n = 132$) were male. The average age was 31.89 ($SD = 6.18$), ranging from 19 to 53. The majority (95.5%, $n = 235$) completed tertiary education: 23 held college diplomas, 183 held bachelor's degrees, and 26 held postgraduate degrees. The average number of years of work experience was 8.67 ($SD = 6.02$).

The questionnaire was developed originally in English. In accordance with Brislin's (1980) recommendation, the back-translation method was used to produce the Chinese version of the questionnaire. One bilingual researcher translated the English questionnaire into a Chinese version, which then was translated back to English by a different bilingual individual. Any discrepancies in this process were resolved by joint discussion. The questionnaire was pretested on 10 full-time Chinese workers before the formal study. The translated questionnaire was understandable to all participants in the pretest group.

Measures

Information and Communication Technology (ICT) Utilization: To measure employee utilization of ICT applications, Kim and Lee's (2006) four-item scale was used. The items on the scale are as follows: (1) "I regularly use the Internet, e-mail, and electronic bulletin boards"; (2) "I regularly use our organization's intranet"; (3) "I regularly use our organization's database and/or electronic data management system"; and (4) "I regularly use our organization's knowledge

management system". Participants responded to these items on a seven-point Likert scale ranging from "1 = strongly disagree" to "7 = strongly agree". The Cronbach's alpha for the four items was 0.83.

Perceived Ease of ICT Usage: To measure employees' perceived ease of using ICT applications, two items developed by Kim and Lee (2006) were used. The items were "In this agency, information systems and software are designed to be user-friendly", and "It is easy for me to use information systems without extra training". Participants' answers to these items were based on a seven-point Likert scale ranging from "1 = strongly disagree" to "7 = strongly agree". The Cronbach's alpha for the two-item scale was 0.66.

Knowledge Sharing Orientation: To assess knowledge sharing orientation, this study adopted two items from Kim and Lee's (2006) scale: "I voluntarily share my know-how, information, and knowledge with others," and "I am willing to cooperate or communicate with others for sharing information and knowledge". Responses were based on a seven-point Likert scale ranging from "1 = strongly disagree" to "7 = strongly agree". The Cronbach's alpha for this scale was 0.80.

Job Satisfaction: To measure job satisfaction, this study followed Sy, Tram, and O'Hara (2006) and employed three items from the Michigan Organizational Assessment Questionnaire (Seashore, Lawler, Mirvis, & Cammann, 1982). The three items include: (1) "All in all, I am satisfied with my job"; (2) "In general, I do not like my job" (reverse-coded); and (3) "In general, I like working at my company". As deletion of the second item greatly improved the reliability of the scale, only the first and third items were included in further analyses. Response options were based on a seven-point Likert scale ranging from "1 = strongly disagree" to "strongly agree". The Cronbach's alpha for the two-item scale was 0.69.

Work Effectiveness: To measure work effectiveness, the author developed four items based on Cohen, Ledford, and Spreitzer's (1996) four aspects (quality, productivity, costs, and safety) for assessing work team effectiveness. This study focused on individual work effectiveness, so the items were designed to fit the individual level: (1) I perform quality work; (2) I demonstrate high-level productivity at work; (3) In my work, I always produce maximal outputs at minimal costs; and (4) I have done well at work in ensuring my own and others' safety. Response options ranged from "1 = strongly disagree" to "7 = strongly agree". The Cronbach's alpha for this four-item scale was 0.86.

Analysis Strategy

Analyses were conducted using procedures developed by Loi, Ngo, and Foley (2006). First, confirmatory factor analyses were conducted in AMOS 20 to check the discriminant validity of the variables. To test the relationship between IT factors and job outcomes and the mediating effect of knowledge sharing, hierarchical regressions based on Baron and Kenny's (1986) four-step strategy were used. To further confirm the mediation, Sobel's (1982) test and bootstrapping-based PROCESS analyses (Hayes, 2013) were performed. Throughout the analyses, gender was dummy-coded as female = 0 and male = 1. Education was coded as high school or below = 1, tertiary diploma = 2, bachelor's degree = 3, master's degree = 4, and doctorate degree = 5. In analyses, all assumptions for regression were met. No impactful outliers or influential cases were detected.

RESULTS

Confirmatory Factor Analyses

In the CFA, four measurement models were compared: (1) the five-factor model, in which each variable represented a single factor; (2) the four-factor model, in which the two ICT-related variables (ICT utilization and perceived ease of ICT usage) were combined into one factor; (3) the four-factor model, which combined the two job outcomes (job satisfaction and work effectiveness) into one factor; (4) the three-factor model, in which the two ICT-related variables loaded on one factor and the two job outcomes loaded on another single factor; and (5) the single factor model, in which all 13 items loaded on one factor.

Following Chen, Aryee, and Lee (2005), the present study used a number of indexes to assess model fit, including the overall model chi-square (χ^2), the goodness-of-fit index (GFI), the Tucker-Lewis index (TLI), the comparative fit index (CFI), and the root mean square error of approximation (RMSEA). Values of GFI, TLI, and CFI greater than 0.90 indicate a good model fit (Roussel, Durrieu, & Campoy, 2002). Fan, Thompson, and Wang suggest that RMSEA should be at least smaller than 0.10, while other scholars also employ 0.80 (Cooke, Michie, Hart, & Clark, 2005) or 0.50 (Browne & Cudeck, 1993) as a cutoff point. However, the badness-of-fit measure (i.e., the chi-square/degree of freedom ratio) instead of the overall model chi-square (χ^2) was used because it is less likely to be affected by sample size. While Kline (2011) indicates that a value of less than 3.0 is recommendable, the value of 5.0 is also used as a comparative criterion (Marsh & Hocevar, 1985).

The results of CFA are presented in Table 1. Among these models, the 5-factor model demonstrated the best model fit, suggesting that the five variables had good discriminant validity. Since the factor loading was statistically significant and greater than twice the standard error, the convergent validity of these variables was supported (Anderson & Gerbing, 1988). In addition, the 5-factor model fitted the data much better than the 1-factor model, indicating that common method bias was not a significant issue in this study (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003).

Table 1. Results of confirmatory factor analyses

Model	χ^2	df	χ^2/df	SRMR	RMSEA	GFI	TLI	CFI
Model 1 (5-factor)	95.51	55	1.74	.03	.06	.94	.97	.98
Model 2 (4-factor)	174.93	59	2.96	.06	.09	.89	.92	.94
Model 3 (4-factor)	214.19	59	3.63	.04	.10	.88	.90	.92
Model 4 (3-factor)	292.72	62	4.72	.07	.12	.84	.86	.89
Model 5 (1-factor)	515.58	65	7.93	.08	.17	.74	.73	.78

Note. $N = 246$.

Descriptive Statistics

Table 2 presents the means, standard deviations, and correlations for demographic statistics and study variables. As shown in the table, ICT utilization and ease of ICT use were significantly and positively correlated to knowledge sharing, as well as to job satisfaction and work effectiveness. Knowledge sharing was also significantly and positively correlated to job satisfaction and work effectiveness.

Main Effect Analyses

Table 3 presents the regression results for the main effects of ICT utilization and perceived ease of ICT usage on job satisfaction and work effectiveness, and the mediating role of knowledge sharing in these effects. As shown in Model 2 of Table 3, the effects of ICT utilization ($B = .32, p < .001$) and perceived ease of ICT usage ($B = .35, p < .001$) on job satisfaction were positive and significant, supporting Hypothesis 1. Similarly, ICT utilization ($B = .26, p < .001$) and perceived ease of ICT usage ($B = .24, p < .001$) were also significantly and positively related to work effectiveness (see Model 4 of Table 3), supporting Hypothesis 2.

Table 2. Means, standard deviations, and correlations

Variables	M	SD	2	3	4	5	6	7	8	9
1. Gender (dummy)	.54	.50								
2. Age	31.89	6.18	.04							
3. Education	3.95	.65	.09	-.14						
4. Work experience	8.67	6.02	.03	.93	-.20					
5. IT utilization	5.51	1.10	.08	.02	.22	.01				
6. Ease of IT usage	5.42	1.03	.10	-.01	.15	-.00	.57			
7. Knowledge sharing	5.72	.83	.10	-.09	.17	-.06	.58	.62		
8. Job satisfaction	5.45	1.09	.04	.02	.25	-.01	.54	.52	.59	
9. Work effectiveness	5.60	.78	.08	-.02	.16	.01	.57	.54	.62	.66

Note. Correlation coefficients equal to or greater than .14 are significant at $p < .05$. Correlation coefficients equal to or greater than .20 are significant at $p < .01$.

Table 3. Hierarchical regression results for main and mediating effects

Variables	Knowledge sharing		Job satisfaction				Work effectiveness			
	Model 1		Model 2		Model 3		Model 4		Model 5	
	B	SE	B	SE	B	SE	B	SE	B	SE
(Constant)	3.09***	.50	.32	.71	-1.11	.73	3.32***	.50	2.30***	.51
Gender (dummy)	.06	.08	-.08	.11	-.11	.11	.02	.08	.00	.07
Age	-.03 ⁺	.02	.03	.03	.04 ⁺	.02	-.03 ⁺	.02	-.02	.02
Education	.04	.06	.22*	.09	.20*	.09	.05	.06	.04	.06
Work experience	.02	.02	-.02	.03	-.03	.02	.03 ⁺	.02	.02	.02
ICT utilization	.26***	.04	.32***	.06	.20**	.06	.26***	.04	.18***	.04
Ease of ICT usage	.34***	.05	.35***	.07	.19**	.07	.24***	.05	.13**	.05
Knowledge sharing					.46***	.09			.33***	.06
Adjusted R ²	.46		.36		.43		.38		.45	
F-statistic	35.73***		24.35***		27.32***		26.51***		29.64***	

Note. Unstandardized coefficients are reported. *** $p < .001$; ** $p < .01$; * $p < .05$; + $p < .10$. $N = 246$.

Mediation Analyses

For the mediation analysis, this study first examined Baron and Kenney's (1986) four requirements: (1) the independent and mediating variables are significantly related; (2) the independent and dependent variables are significantly related; (3) the mediating and dependent variables are significantly related; and (4) the relationship between the dependent and independent variables becomes significantly weaker (partial mediation) or non-significant (full mediation) when the mediating variable is added.

As shown in Table 3, ICT utilization ($B = .26, p < .001$) and Ease of ICT usage ($B = .34, p < .001$) were significantly related to knowledge sharing, supporting the first requirement. This supported for Hypothesis 1 suggested that the second requirement was met for both job satisfaction and work effectiveness when they were the dependent variables.

Model 3 of Table 3 shows that when knowledge sharing was added into the regression model, it had a significant effect on job satisfaction ($B = .46, p < .001$). In the meantime, the formerly significant relationships between ICT utilization and job satisfaction (from $B = .32, p < .001$ to $B = .20, p < .01$), and those between ease of ICT usage and job satisfaction (from $B = .35, p < .001$ to $B = .19, p < .01$), became much weaker. Thus, the relationships of job satisfaction with ICT utilization and ease of ICT usage were partially mediated by knowledge sharing. Sobel tests (Table 4) showed that the indirect effects of ICT utilization ($B = .12, SE = .04, p < .001$) and ease of ICT usage ($B = .16, SE = .04, p < .001$) on job satisfaction via knowledge sharing were significant. The results therefore supported Hypothesis 3.

Likewise, Model 5 of Table 3 demonstrates that when knowledge sharing was added to the regression equation, it significantly impacted work effectiveness ($B = .33, p < .001$). The previous relationships of work effectiveness with ICT utilization (from $B = .26, p < .001$ to $B = .18, p < .001$) and ease of ICT usage (from $B = .24, p < .001$ to $B = .13, p < .01$) were greatly weakened by the addition of knowledge sharing. Therefore, the results indicated that knowledge sharing would partially mediate the relationships between the two ICT-related factors and work effectiveness. Further evidence from Sobel tests (Table 4) demonstrated that mediation of the effects of ICT utilization ($B = .09, SE = .03, p < .01$) and ease of ICT usage ($B = .11, SE = .03, p < .001$) on work effectiveness by knowledge sharing was significant.

The results for mediation obtained from Baron and Kenny's (1986) strategy and Sobel test were also confirmed by Hayes' (Hayes, 2013) PROCESS analyses based on 5,000 bootstrap samples. The results of PROCESS analyses are presented in Table 4. As shown in the table, none of the 90% bias-corrected confidence intervals for these indirect effects included 0, suggesting the statistical significance of the knowledge-sharing-mediated effects. Together with the significant direct effects in the table, these results were consistent with the conclusion from Baron and Kenny's methods that the role of knowledge sharing in the effects of ICT utilization and ease of ICT usage on job satisfaction and work effectiveness was partial, rather than full, mediation.

Table 4. PROCESS analyses for direct and indirect effects

Independent variables		Job satisfaction				Work effectiveness			
		B	B SE	LLCI	ULCI	B	B SE	LLCI	ULCI
ICT utilization	Indirect	.12 ^{***}	.04	.07	.19	.09 ^{**}	.03	.05	.14
	Direct	.20 [*]	.09	.05	.35	.18 ^{**}	.06	.09	.27
Ease of ICT usage	Indirect	.16 ^{***}	.04	.10	.22	.11 ^{***}	.03	.07	.17
	Direct	.19 [*]	.08	.05	.33	.13 [*]	.06	.03	.24

Note. Gender, age, education, and work experience were controlled. B SE = bootstrapped standard error. LLCI = Lower limit of the 90% bias-corrected confidence interval; ULCI = Upper limit of the 90% bias-corrected confidence interval. Superscripts for unstandardized coefficients (B) are based on normal theory tests (Sobel test for indirect effects). *** $p < .001$; ** $p < .01$; * $p < .05$.

DISCUSSION

General Discussion

The present study explored how ICT-related factors, i.e., ICT utilization and perceived ease of ICT usage, impact employees' work outcomes, job satisfaction, and work effectiveness. Importantly, this study also contributes to the current literature by examining the mechanisms underlying the relationships between ICT factors and these work outcomes. The results largely supported the proposed hypotheses.

First of all, in line with previous research (Day et al., 2012; O'Driscoll et al., 2010), the results suggested that employees who used ICT systems more often were more likely to have higher levels of positive job outcomes. Their perceived ease of ICT usage showed similar impacts on job satisfaction and work effectiveness. It could be that through frequently using ICT and assessing ICT applications, employees establish more psychological contact with the organization,

particularly in the aspect of ICT-specific support. While ICT utilization exposes employees to the awareness of the organization's efforts to invest in employees' working systems, the ease of ICT usage may go further to make employees feel that the organization cares about them in terms of providing convenience and support in the work procedure. These psychological interactions deriving from the perception of organizational support could thus lead to positive employee outcomes. The process of organizational support influencing job outcomes can be explained using social exchange theory (Farh, Hackett, & Liang, 2007). The present findings, to a certain extent, add empirical evidence to this theory through focusing on ICT-specific support.

In addition, a new finding in the field is that employees' knowledge sharing orientation was able to mediate the influence of ICT on employees' positive outcomes. Specifically, when employees used ICT more frequently and when they perceived ICT systems were easier to use, they had a greater orientation to share knowledge with others. This tendency was able to enhance employees' workplace experiences, which could have led to their positive feelings about themselves. The findings are consistent with Kim and Lee's (2006) results suggesting that ICT factors are influential in predicting knowledge sharing, and with Baird and Henderson's (2001) argument that knowledge sharing is related to work outcomes. According to Baird and Henderson, when knowledge sharing is limited in the organization, it is more likely that knowledge gaps will arise, which may produce work outcomes that are less than desirable (Bock et al., 2005). The present study steps forward to integrate these two streams of study (i.e., the ICT-knowledge connection and knowledge-employee outcome linkage), successfully identifying a possible mechanism bridging the gap between ICT and employee outcomes.

Furthermore, the influences of ICT on work outcomes could only be partially explained by knowledge sharing orientation. For ICT utilization, its indirect effects on job satisfaction and work effectiveness via knowledge sharing orientation accounted for approximately one third of the total effects. For perceived ease of ICT usage, this ratio was less than, but very close to, fifty percent. The findings imply that other mechanisms that have not been examined in the present study might also explain ICT-work outcome relationships. Future research is warranted to explore these possible mechanisms.

■ Limitations and Future Research

There are several limitations that should be noted for this study. First, this study examines only one mediator for the ICT-work outcome linkage, which is far from sufficient to demonstrate a comprehensive model to explain ICT impacts on employee outcomes. As stated above, other possible mediators may exist. Solely including knowledge sharing has technically ignored the competing influence other mediators may hold. Examining more mediators would also be helpful in identifying which factors are more powerful in explaining ICT effects. Future research should consider multiple mediators in examining the effects of ICT. Second, the present study did not consider the ICT influences on negative work outcomes. Although past research indicates that ICT can increase the demands placed on employees, which may have negative effects on employees' work experiences and raise workplace problems, such as low-quality well-being and health (Day et al., 2012; Day et al., 2010), it is still unclear whether knowledge sharing can mediate ICT impacts on negative work outcomes. Future studies are expected to examine both positive and negative employee outcomes from the ICT perspective. Third, the study adopted a cross-sectional design, which makes causal influences inappropriate. To more thoroughly explore the process through which ICT influences employee attitudes and behaviors, future research should employ a longitudinal study design. Fourth, the present study collected single-source data, which is deemed to have a high risk of common method bias. Although the CFA results demonstrated a low probability that this bias could affect the data analysis, one ideal way to address this issue would be to employ data from multiple sources. Future research can use different types of data and other techniques to reduce common method variance.

■ Practical Implications

In spite of these limitations, the present study provides some important practical implications. For example, as per the present findings, organizations should shift from the traditional thinking mode in relation to the purposes of ICT application. Traditionally, organizations might simply consider ICT as a vehicle that facilitates increasing organizational performance (i.e., profits) and that helps the organization to develop an advantage in competition. However, many organizations have not paid enough attention to the soft aspects (e.g., employee outcomes) that ICT has created to promote the organization's goal achievement. The tangible and mobile assets (e.g., job satisfaction, employee trust, and employee commitment) might be more important to maintaining the long-term development of the organization. This study calls for managers' rethinking of the value of ICT from multiple angles. Additionally, organizations should endeavor to create a positive environment for knowledge sharing. The information-sharing climate is likely to increase the positive feelings of the employees toward their organizations and their own jobs. One approach to improve knowledge



sharing is to provide ICT-specific support.

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