

# **Does Organizational Structure Moderate the Effect of ICT Usage on Governance and Accountability Outcome?: Empirical Evidence from South Korean Government Cases**

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## **Introduction**

With the strong e-government initiative taken by the South Korean government, the South Korean e-government has been recognized as a top e-government performer not only in back-office applications but also in front-office applications of information and communication technologies (ICTs) (Ministry of Information and Communication, 2007; West, 2008; Im, 2011; United Nation, 2012, 2014, 2016). The studies on ICTs, however, mainly came from the macro rather than the micro perspective of organizations. To successfully implement ICT in public organizations and to ultimately improve the organizational performance using such, it is important to generate organizational commitment from the use of ICT. This study argues that as public officers perceive ICT as useful to their performance of their daily work tasks; they will develop a stronger motivation to work on behalf of the organization to which they belong if they are made to use ICT. Moreover, the positive relationship between ICT usage and employees' organizational commitment is contingent on the organization type.

The study aimed to answer the following questions. First, what are the effects of ICT usage on the facilitation of organizational effectiveness? The study investigated organizational effectiveness in terms of government officials' organizational commitment in the South Korean context. Second, in what way does organizational structure moderate the

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effects of ICT usage on the organizational outcomes? More specifically, the study tested the hypothesis that organizational structure will moderate the effect of ICT usage on the organizational outcomes such that a centralized and formalized organization will have a stronger effect than a decentralized and informalized organization, or vice versa. Using ordinary least square regression analysis, the specific model in this study was examined in the South Korean central and local governments. The study findings were analyzed in light of the potential advancement in this arena.

## **Theoretical Background and Hypotheses**

### *Organizational Commitments as Government Outcomes in Public Organizations*

The concept of organizational commitment has attracted considerable interest in public organizations since the emergence of New Public Management (NPM) (Moon, 2000). NPM employs performance based on managerial techniques to motivate employees to improve their work efficiency and to ultimately enhance their organizational performance (Brudney & Condrey, 1993; Moon, 2000). From an organizational behavior perspective, this study adopted organizational commitment as an important government outcome indicator in public organizations. It was assumed that individuals with a higher level of organizational commitment accept their organization's goals as their personal goals and exert greater efforts on behalf of the organization. As the government organizations' goals are very much emphasized in organizational performance, public employees with a higher organizational commitment will more likely have higher work efficiency. Moreover, a higher level of organizational commitment will increase an employee's willingness to participate in "extra-role" activities, such as being creative or innovative, which will ultimately help boost an

organization's competitiveness compared to others (Katz & Kahn, 1978).

Mayer and Allen (1997) defined organizational commitment as individuals' strong identification with their respective organizations and strong desire to achieve such organizations' goals. Mayer and Allen (1991, 1997) used a three-component model to explain the organizational commitment concept. First, affective commitment refers to the attachment and ties of the organizational members to the organization. The individuals who are affectively committed to the organization are more likely to do their work in the organization effectively (Mayer & Allen, 1991). Second, continuance commitment refers to individuals' willingness to remain in the organization based on their awareness of the costs associated with leaving the organization (Meyer & Allen, 1997). Continuance commitment is regarded as calculative (Myer & Allen, 1997), differing from affective commitment, where individuals remain with the organization because they want to and not because of the opportunity cost of leaving the organization. Third, normative commitment is regarded as a sense of responsibility or obligation on the part of individuals to continue working in their respective organizations (Meyer & Allen, 1997). Individuals who have a high level of normative commitment consider the moral aspect more important than the extrinsic reward provided by the organization when deciding to remain in the organization (Marsh & Mannari, 1977).

### ***Effects of ICTs on Organizational Commitment***

The importance of ICT<sup>3</sup> (information and communication technology) on individuals' attitudes and behaviors has been constantly discussed (Argyris, 1971; Turner, 1984; Botner, 1987). The previous studies on IT and employees' job attitudes mainly focused on the effects

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<sup>3</sup> In this study, we cover ICT topics and studies largely from informational technology area.

of these on job satisfaction (Sartore & Kramer, 1977; Kling, 1980; Millman & Hartwick, 1987; Kramer & Northrop, 1989; Zmuidzinas et al., 1990; Danziger & Anderson, 2002). The results show that IT has both positive and negative effects on job satisfaction. On one hand, it is argued that the use of IT makes it easier for employees to carry out their daily tasks and introduces autonomy and discretion in their work, which improves their job satisfaction (Kling, 1978). In addition, the use of IT may increase employees' sense of accomplishment and interest in and pleasure with their work (Millman & Hartwick, 1987; Kramer & Northrop, 1989), and even enhances their creativity (Norries & Kraemer, 1996). On the other hand, IT usage may also have negative effects on employees' job satisfaction. Zmuidzinas et al. (1990) pointed out that the use of IT makes managers set higher expectations of their employees' job performance. As a result, the employees feel greater time pressure to be more efficient in their work, and this "sweat-intensive" situation may reduce their job satisfaction. In other words, the use of IT may decrease the quality of the employees' job satisfaction and work life. Danziger and Anderson (2002) suggested that IT should take into account situational factors like the work's features and the organizational culture that might indirectly affect job satisfaction.

In light of the fact that the research so far on the relationship between organizational commitment and ICT usage, whose importance in public organizations is increasing, appears to be very limited, this study set out to gather data that may serve as empirical evidence for such matter. Considering the context of the South Korean government, ICT usage plays a major role in the performance of everyday work tasks. The computer anxiety and information stress appearing in the relevant literature would have been greatly relieved compared to the early ages of ICT construction. Rather, it is assumed that five characteristics of ICT usage will improve the public employees' perceptions of organizational commitment. First, the

frequency of ICT usage will affect the level of organizational commitment. If public officers do not use ICT enough or if it is not properly used to perform tasks, it cannot have any positive effect on organizational commitment. Second, it is important to have useful ICT features. If ICT is easy to use and if its various functions are useful for work performance, the employees' motivation to achieve the organizational goals and their commitment to the organization will more likely increase. Third, the degree of ICT integration will positively influence organizational commitment. If the different forms of ICT are not integrated, it can cause confusion among the employees (e.g., some are likely well aware of the use of ICT techniques and others are not). Fourth, a stable ICT is essential. It is expected that the organizational commitment of the employees will increase when they can stably use ICT to carry out their work tasks. The unstable operation of ICT may crowd out the effects of an individual's work motivation. Lastly, the use of ICT should improve work efficiency. If the employees believe that the time that they devote to their work can be reduced by their use of ICT, it will have a positive impact on their organizational commitment. Considering all these factors, hypothesis 1 suggests a positive relationship between ICT usage and organizational commitment.

*H1: An individual's perception of ICT usage is positively related to his/her organizational commitment.*

#### *Moderating Effects of Organizational Structure on ICT Usage and Organizational Commitment*

Identifying only the direct effects of ICT usage and organizational commitment, however, is largely an oversimplification of the reality. The previous studies on information technology

in public administration placed greater emphasis on testing the organizational structure change caused by the introduction and development of ICT. In this study, it was also expected that the organizational structure would matter when ICT is adopted in public organizations. Instead of setting organizational structure as a dependent variable of ICT, however, it was assumed that organizational structure might have a moderating effect on ICT and organizational commitment. In other words, the effect of ICT on organizational commitment may be strengthened or weakened depending on the characteristics of the structure of the organization that public officers belong to.

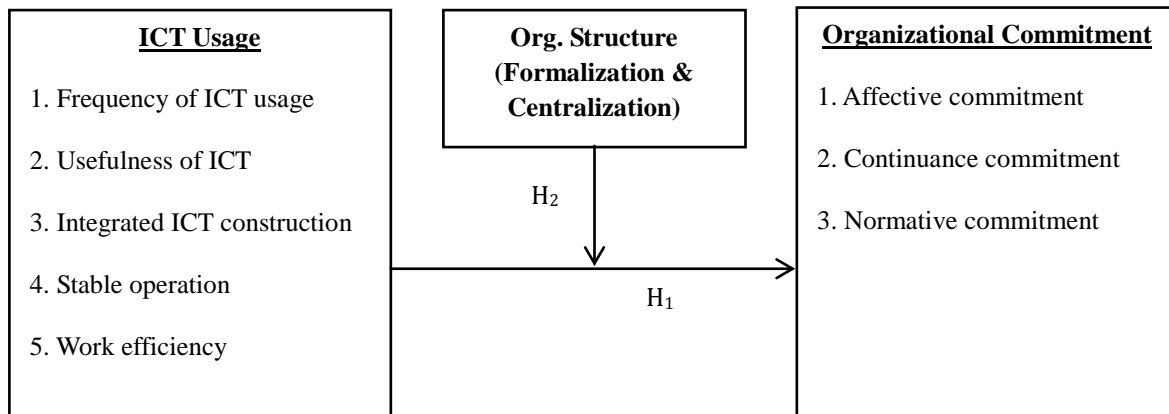
The organizational structure in public organizations has different types and degrees. This study analyzed the main organizational structure dimensions, including formalization and centralization, with the aim of examining the extent to which they have interaction with ICT and influence organizational commitment. According to Hall (1996), centralization is the controlling authority and centralization of the decision-making power of the upper class of an organization. Formalization, on the other hand, can be defined as the degree of standardization of the work procedures, job descriptions, and regulations according to the policy manual. Traditionally, the researches on ICT mainly focus on whether ICT brings about organizational changes in the centralized or decentralized organizational structure type (Ang & Pavri, 1994). In other words, the related studies try to examine whether the use of IT bring about changes in the decision-making authority (from a higher class to a lower class, or vice versa). The studies obtained different results in this regard. On one hand, the use of IT was shown to result in centralization (Leavitt & Whisler, 1958; King, 1983; Schwarz, 2002). On the other hand, decentralized organizational structures were shown to more likely occur after the introduction of IT (Bingham, 1984). It was also argued IT usage has no impact on both the decentralized and centralized organizational structures (Carter, 1984; Franz et al.,

1986; Heintze & Bretschneider, 2000). It is expected that the relationship between ICT usage and organizational commitment is contingent on the extent to which the organizational structure is centralized or formalized. In a centralized organization, where the high-level managers have great authority with regard to decision-making, the use of ICT will be monopolized by some departments, and only the decision-makers who can store and use the information obtained via ICT will benefit from ICT usage. Thus, the positive effect of ICT usage will be decreased. In decentralized organizations, however, where decision-making is delegated to all the members, ICT usage will benefit a relatively wide range of ICT users. Thus, the positive effect of ICT usage will be strengthened.

Previous studies on the effects of ICT usage on the formalized organizational structure mainly showed that the introduction and use of ICT would increase the degree of formalization (Mann & Williams, 1960; Huber, 1984; Zmud, 1982; Rousseau, 1985). In the development of an information management system, the work procedure, job descriptions, and regulations are standardized according to the manual. With this process, ICT replaces the daily routine work tasks with non-routine work tasks (Huber, 1984). Thus, organizations with a more formalized structure are more likely to adapt well to ICT usage, and the latter can bring greater benefits in terms of the employees' organizational commitment. Accordingly, hypothesis 2 suggests the moderating effects of organizational structure on ICT usage and organizational commitment.

*H2: The organizational structure (centralization and formalization) will moderate the effect of ICT usage on individuals' organizational commitment.*

The relationships of ICT usage, organizational structure, and organizational commitment in the public domain are presented in Figure 1. In general:



**Figure 1. ICT, organizational structure, and organizational commitment in public organizations.**

## Methods

### *Data Sources and Sample*

The study hypotheses were examined using “the first panel data of public officers in South Korea” of Korea Institute of Public Administration (KIPA) in 2011. KIPA used the survey method to collect data from the government employees in South Korea. It used the public officials’ personnel statistics issued by the Ministry of Public and Administration and Security (MPAS) as a sampling frame of the whole population of government employees in South Korea. Then the sample for the survey respondents was extracted using the proportional quota sampling method. In addition, official letters from government agencies were distributed to recruit government employees who wanted to participate in the survey. In September 2011, a survey was conducted using a self-filling questionnaire, and approximately 1,500 government employees responded to the survey. For the profile of the employees who took part in the survey, they came from both the central and local governments, belonged to different hierarchical levels in their respective organizations, and



had different job natures (technical vs. general occupation). Of the respondents, 68% were men, the average age was 41.66 (SD=8.05), 80% were married, and the average education status was bachelor's degree (college).

### Measures

The scale for all the variables ranged from 1 (strongly disagree/very much) to 5 (strongly agree/not at all), except for the demographic variables. The details of all the variables in the model are shown in Table 2 below.

**Table 2. Measure of Variables**

Measure
<b>Dependent Variable: Organizational Commitment (<math>\alpha=0.879</math>)</b> <i>Affective commitment (<math>\alpha=0.839</math>)</i> <ol style="list-style-type: none"> <li>1. I feel a strong sense of belonging to this organization.</li> <li>2. I feel absolutely delighted to be a member of this organization.</li> <li>3. The value of this organization is very similar to the value I seek.</li> </ol> <i>Continuance commitment</i> <ol style="list-style-type: none"> <li>4. I want and need to stay in this organization at this point.</li> </ol> <i>Normative commitment (<math>\alpha=0.721</math>)</i> <ol style="list-style-type: none"> <li>5. I do not feel any sense of obligation to stay in this organization (reverse coding).</li> <li>6. This organization is worthy of its employees' loyalty.</li> </ol>
<b>Independent Variable: Use of ICT (<math>\alpha=0.863</math>)</b> <i>Frequency of ICT usage (<math>\alpha=0.898</math>)</i> <ol style="list-style-type: none"> <li>1. ICTs are often used to perform tasks.</li> <li>2. Different types of ICTs are used to perform tasks.</li> </ol> <i>Usefulness of ICT (<math>\alpha=0.776</math>)</i> <ol style="list-style-type: none"> <li>3. It is easy to use ICT.</li> <li>4. The various functions of ICT are useful.</li> </ol> <i>Integrated ICT construction</i> <ol style="list-style-type: none"> <li>5. The forms of ICTs are being integrated.</li> </ol> <i>Stable operation</i> <ol style="list-style-type: none"> <li>6. ICT operates stably.</li> </ol> <i>Work efficiency</i> <ol style="list-style-type: none"> <li>7. The use of ICT improves work efficiency.</li> </ol>

**Moderating Variable: Organizational Structure ( $\alpha=0.610$ )***Formalized-type structure ( $\alpha=0.700$ )*

1. Our organization has documented the contents of the work tasks and the ways of carrying these out.
2. In our organization, work evaluation is done based on the documented standards.
3. The policies and directions of our organization must be disclosed through official letters.

*Centralized-type structure ( $\alpha=0.781$ )*

4. Our organization cannot take any action until a supervisor (or senior) makes a decision.
5. Even in trivial matters, our organization needs to first get the final decision (approval) of the supervisor.
6. Action can be taken and implementation can be done mainly after decisions are made at the higher management level.

**Control Variables***Goal clearness ( $\alpha=0.883$ )*

1. Our organization's vision and goals are clear.
2. The members of our organization are aware of the organization's vision and goals.
3. Any member of our organization can accurately explain the organization's vision and goals to others.

*Communication ( $\alpha=0.819$ )*

1. It is easy for our organization to communicate between departments or among the employees to conduct tasks or solve problems.
2. Our organization is able to communicate or cooperate with the other departments when cooperation is needed.
3. Our organization respects and appropriately accepts the employees' opinions.

*Feedback ( $\alpha=0.7352$ )**Feedback about work ( $\alpha=0.763$ )*

1. I have many opportunities to know how well I am doing in my job.
2. I can know how well I performed in my job.

*Feedback from the organization (supervisor) ( $\alpha=0.787$ )*

1. My supervisor often informs me of how my work will be evaluated.
2. My supervisor and co-workers inform me of how well I am doing in my job.

*Work difficulty ( $\alpha=0.906$ )*

1. My work requires a variety of high-level skills.
2. My work requires the use of complex skills and talents.

*Work identity ( $\alpha=0.746$ )*

1. I have the discretion to finish my work from beginning to end. (My work gives me an opportunity to completely finish the work I started.)
2. My work is distributed well so that I can conduct my whole work from beginning to end.

*Work resource*

1. I think I am getting the proper amount of resources that I need for my work.

**Demographic Variables**

*Gender: male=1; female=2*

*Age: 24-60, 1-year gap*

*Marriage status: married=1; not married=2*

*Education status: 2=elementary school graduate; 3=middle school graduate; 4=high school graduate; 5=bachelor's degree (college); 6=bachelor's degree (university); 7=Master's degree; 8=doctoral course completion; 9=others*

Note:  $\alpha$ =Cronbach's  $\alpha$

## **Data Analysis**

Ordinary least square (OLS) regression analysis was used to test the relationships suggested in this study. In the analysis, the following two models were compared: (1) the first model, which tests the effects of ICTs on organizational commitment (H1); and (2) the second model, which tests the moderating effects of organizational structure in governments (H2).

## **Results**

### *Descriptive Statistics*

Table 2 summarizes the means, standard deviations, and intercorrelations among all the variables in the research model. The mean ICT usage was above the median (3), which shows that the employees are actively using ICT in their work. The perceptions of organizational structure reveal a generally high level of formalization and centralization. Public employees have a relatively higher commitment to their respective organizations. According to the correlations figures in Table 2, ICT usage and organizational commitment are positively related to a formalized organizational structure. In addition, organizational commitment is negatively related to a centralized organizational structure. Organizational commitment is also positively related to communication, goal clearness, and all work features, including feedback, work difficulty/identity, and work resources.

### *Test of Hypotheses*

Table 3 presents the effects of ICT usage on individuals' organizational commitment as well as the moderating effects of the modeling, according to hypotheses 1 and 2. The coefficients of the variables in Model 2 are consistent with those in Model 1 even after the inclusion of the interaction terms. Both models showed that a positive relationship was found between ICT usage and organizational commitment. This finding supports hypothesis 1. In addition, the types of organizational structure have different influences on organizational commitment according to the two models. Centralized organizations are negatively related to organizational commitment. This finding implies that employees' organizational commitment will be reduced when the decision-making process is highly concentrated on the mid- or high-level managers. Individuals can be less motivated to pursue the organizational goals. On the other hand, formalized organizations are positively related to the employees' organizational commitment. Although a higher level of formalization can bring about red tape (Bozeman, 1993) and prevent the employees from developing innovative and risk-taking attitudes (Moon, 1999), in IT usage it may have more advantages. Formalization may give more stability to the work in public organizations, where laws and regulations play an important role.

Following the inclusion of the interaction term in the regression, it should be noted that a centralized organization is a moderator in the relationship between ICT usage and organizational commitment. In other words, a centralized organization will have a stronger effect compared to a decentralized organization. This finding supports hypothesis 2. Hence, IT usage can bring about changes to the organizational structure in one way, and the organizational structure may also influence the employees' attitudes and behaviors in IT environments. Model 2 also showed that no moderating effect could be found between the

formalized organization and organizational commitment. In the two models, the levels of goal clearness, communication within organizations, feedback from the work itself and the organization, work difficulty, and amount of work resources all have a positive impact on organizational commitment. Age is the only demographic variable, however, that has an effect on the dependent variable.

**Table 2. Descriptive statistics and correlations among the variables**

Variables	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Organizational commitment	3.36	0.72	1														
2. ICT usage	3.75	0.59	0.31***	1													
3. Formalized org. structure	3.26	0.70	0.38***	0.34***	1												
4. Centralized org. structure	3.12	0.79	-0.22***	0.02	-0.03	1											
5. Goal clearness	3.44	0.77	0.49***	0.25***	0.34***	-0.11***	1										
6. Communication	3.20	0.71	0.48***	0.30***	0.42***	-0.35***	0.43***	1									
7. Feedback (work)	3.41	0.72	0.37***	0.21***	0.28***	-0.06**	0.26***	0.31***	1								
8. Feedback (organization)	2.78	0.85	0.32***	0.14***	0.27***	-0.20***	0.27***	0.37***	0.37***	1							
9. Work difficulty	3.18	0.89	0.18***	0.07**	0.08**	0.03	0.13***	0.05**	0.24***	0.13***	1						
10. Work identity	3.53	0.78	0.26***	0.22***	0.30***	-0.05*	0.18***	0.23***	0.37***	0.16***	0.19***	1					
11. Work resources	2.96	0.93	0.31***	0.21***	0.27***	-0.16***	0.26***	0.36***	0.20***	0.20***	-0.05*	0.22***	1				
12. Gender	1.32	0.47	-0.03	0.02	0.04	0.05*	-0.02	0.02	-0.03	-0.01	-0.15***	0.01	0.01	1			
13. Age	41.66	8.05	0.15***	0.06**	0.01	-0.01	0.10***	0.03	0.17***	-0.06**	0.07***	0.04*	0.07***	-0.26***	1		
14. Marriage	0.80	0.40	0.08**	0.05**	-0.01	0.02	0.05**	0.02	0.15***	-0.01	0.08**	0.06**	0.07***	-0.21***	0.44***	1	
15. Education	5.87	0.99	-0.01	-0.03	-0.06**	-0.07**	0.01	-0.01	-0.03	0.04	0.19***	-0.01	-0.09**	-0.01	-0.10**	-0.01	1

N=1499; SD=standard deviation

\* p<0.1, \*\* p<0.05, \*\*\* p<0.001

**Table 3. OLS regression results**

Variable	Dependent variable: organizational commitment			
	Model 1 (ICTs on org. commitment)		Model 2 (Interaction term included)	
	Coefficient	Std. err.	Coefficient	Std. err.
ICT usage	<b>0.113</b> ***	0.027	<b>0.110</b> ***	0.027
Formalized organization	<b>0.104</b> ***	0.024	<b>0.099</b> ***	0.024
Centralized organization	<b>-0.091</b> ***	0.020	<b>-0.100</b> ***	0.020
Goal clearness	<b>0.240</b> ***	0.022	<b>0.245</b> ***	0.021
Communication	<b>0.172</b> ***	0.027	<b>0.164</b> ***	0.027
Feedback (work)	<b>0.112</b> ***	0.024	<b>0.110</b> ***	0.024
Feedback (organization)	<b>0.052</b> **	0.020	<b>0.055</b> ***	0.019
Work difficulty	<b>0.074</b> ***	0.017	<b>0.073</b> ***	0.017
Work identity	0.030	0.021	0.029	0.021
Work resources	<b>0.056</b> **	0.017	<b>0.054</b> ***	0.017
Gender	0.007	0.033	0.006	0.032
Age	<b>0.008</b> ***	0.002	<b>0.008</b> ***	0.002
Marriage	-0.005	0.041	-0.003	0.040
Education	-0.001	0.015	-0.001	0.015
Formalized org.* ICT usage	-	-	0.015	0.013
Centralized org.* ICT usage	-	-	<b>0.058</b> ***	0.013
_cons	0.163	0.192	0.223	0.191
N	1498		1498	
R <sup>2</sup>	0.4141		0.4217	
Adj R <sup>2</sup>	0.4085		0.4154	
F	74.86***		67.49***	

\* p<0.1, \*\* p<0.05, \*\*\* p<0.001

### Concluding Remarks

With the great interest and huge investment in the construction of an e-government system, case studies of its impacts in public organizations have long been discussed. Despite the rich body of case studies of the individual e-government system, there is a paucity of empirical studies on the specific effects of ICTs and their interaction with organizational structure

(decentralized vs. centralized structure) on the government outcomes, along with the contingencies that may moderate these effects. To fill the aforementioned gap in the relevant literature, present study examined the moderating effects of the centralized and formalized organization structures on the link between ICT usage and organizational commitment.

First, the findings of this study suggest that the positive perceptions of ICT usage in the South Korean government resulted in a higher level of organizational commitment on the part of the government officers. Computer anxiety and information stress seem to be realized more through the development and successful application of ICT in the South Korean government. Government officers feel more comfortable using IT-related systems. The specific figures of ICT usage, including the frequency of ICT usage, the usefulness of ICT, integrated ICT construction, stable operation, and work efficiency, are above the median (3) (mean=3.87, 3.69, 3.70, 3.56, and 3.83, respectively). In accordance with the positive effect of ICT usage on job satisfaction (Kling, 1978; Millman & Hartwick; Norris & Kraemer, 1996), ICT usage also showed a positive effect on organizational commitment.

Second, the results of this study suggest that the organizational structure should be considered to maximize the effects of ICT usage. Where there is a high level of centralization, ICT's positive impact on organizational commitment will be strengthened. This implies that centralized organizations have more chances to obtain benefits from the optimal use of ICT than decentralized organizations. As individuals' demographic and job characteristics may influence the impact of ICT usage on him/her, such characteristics were controlled in this study, and consistent results were obtained. The future research should attempt to further these findings as well as identify other variables that may moderate these relationships. Also,



the cross-national analysis of this study's framework will bring forth more practical implications for countries in different stages of ICT implementation.

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