

# The Causal Relationship between the Acceptance Attitudes and the Expected Effects of Smart Work

Kiho Park\*

## Abstract

This paper explores the causal relationship between acceptance attitudes and expected effects of smart work. With the rapid development of smart technologies, lots of organizations try to innovate in the conventional working styles for maximizing organizational effectiveness and efficiency. Although many organizations wish to foster smart working environment, they don't have confidence in detailed action plans and effects from it. Therefore, this study that explores the causal relationship between acceptance attitudes and effects may have crucial meaning to organizations pursuing smart work.

In this research empirically conducted by questionnaire survey, the acceptance attitudes as predictors and the expected effects of smart work as influenced variables were used. This research analyzed 118 collected data and multiple regression analysis. As a result of analysis, teleworking shows the positive relations to all of dependent variables. And others have a positive or negative influence on effects of smart work. Results of this study may give implications to organizations that want to implement smart work environment.

Keywords : Smart Work, Telecommuting, Flexible Time, Teleworking, Smart Work Center, Telecommuter

## 1. Introduction

Nowadays, firms look to improve and gain a competitive advantage by trying to find out more effective and efficient business activities through smart working that means working with smart. Considering this environment of limitless competition, firms have to comprehend promptly and properly response to rapid wave of changes. For the sake of these circumstances, firms should drastically break away from the traditional working styles and re-engineer their way of conducting business activities by using smart technologies, the rapid development of which can make quality of life better [18, 21]. As female workers and senior citizens increase, working times and the retirement age must be flexible enough to adjust.

Through smart working, firms can save opportunity costs, improve productivity and satisfactory level of workers. Furthermore, these elements may be crucial factors to improve quality of products and services of organizations. Therefore, executives or managers must recognize the importance of smart work as an innovative solution in changing traditional working customs [11, 15]. However, in considering the effectiveness and efficiency of smart work, leaders in charge of an organization may personally have different perspectives [6]. For example, leaders of Korean company that have old, bureaucratic, or authoritative levels may especially have their own preferred working styles. Although they agree on the positive and economic effects of smart work, smart work may not be generally accepted in an organization positively. So, organizations can let members respond against innovative change

through the acceptance attitude of smart working [5, 12, 14, 25].

Considering methodologies of smart work, the flexible working time is one of methodologies that workers can freely choose the working time and places with flexibility. Based on the previous researches, results showed that organizations adopting this system can improve the satisfactory level of employees [22, 27], actively collaborate with other teams [26, 29], decrease the effects of job stress [24], increase the satisfactory level of family [28] and raise the royalty of employees and productivity of working [5, 25]. Also, through smart working, the social cost can be saved and the advantage of national competition can be gone up [8].

Therefore, research concerning the causal relationship between the acceptance attitudes and the effects of smart work has important meaning for the efficient organizational operation. The research results can provide implications to top managers or leaders who want to adopt smart work to innovate the traditional working styles.

The research questions to investigate are as below.

First, what are the predictors that affect the effects of smart work? Second, Which factor (s) affecting the effects of smart work is (are)? Third, which factors negatively affect the effects of smart work? And what are the major reasons about those?

## 2. Theoretical Background

### 2.1 Trends of Smart Work

With the rapid growth of networking infra and

device technologies, smart devices i.e. mobile devices has provided the innovative way of working like mobile offices, smart workplaces, and flexible working time.

Smart work can be defined as the innovative way of working based on the smart technologies. With the effective and efficient using of working process, time, place, technologies and people, organizations pursue positive effects like improving its performance or quality of life. Additionally, this may be future-oriented working paradigm that employees can perform in anyplace beyond office work and anytime like flexible working time [Wikipedia, 2011].

As for the place of working, teleworking includes telecommuting, video conferencing, and working at a smart work center, etc. In the 1970s and 1980s, economic recession and labor issues might have been the major reasons why these working styles developed. In the 1980s and 1990s, many organizations tried to change working styles experimentally and then, through these trials, many firms, public organizations and personals have improved the effectiveness and efficiency in organizational operations [11, 21].

In Europe or America, teleworking or telecommuting is popular, and bigger companies have a higher ratio of teleworking [14]. The number of companies adopting smart work in Europe has increased consistently as the broadband network has expanded [2, 3].

## 2.2 Smart Work Framework

The framework for smart work suggested by

PwC consists of dimensions such as place, people, process and technology [12]. First, working place for smart work allows the employees the flexibility to choose their physical workplace. Smart workplaces such as telecommuting, smart work center or smart offices are the spaces equipped with high definition video conference facilities and personal work spaces. Employees can sign up for smart working, and work at the smart offices nearest to their home.

Second, people and process is dimension related to improve the welfare of employees as human resources. Through smart working, many female employees who struggle to maintain a balance between their childcare and work responsibilities can have the flexibility of working from their homes and increase the efficiencies of working. Consequently, this may raise capabilities of employees and, furthermore, organizational competences [17, 19, 22].

Third, technology dimension means technical infrastructures that make smart working possible. These technologies include technological circumstances such as wired and wireless network, applications, cloud computing, assessment of performance and management system.

Fourth, time dimension is for gaining the rapidity of working and saving time to go to office. Through smart work, workers can perform their duties in not core time but anytime [4] and collaborate easily with others [9, 14, 20, 23]. With smart work, organizations have to escape from a control and administration-centric organizational culture to a networked organizational culture. However, many leaders in organizations cannot discard their own working styles just yet [11, 16, 22].

## 2.3 Smart Work Effects and Issues

The circumstances surrounding firms consistently compel organizations to innovate the traditional working customs as digital technologies develop. Smart technologies especially increase opportunities for mobility and communicability in organizations and in one's personal life [7, 13]. There may be a lot of beneficial aspects for firms and for their employees' personal lives such as reducing the size of the work space, improving productivity, upgrading worker's quality of life, decreasing of traffic jam and saving energy, etc. [1, 30].

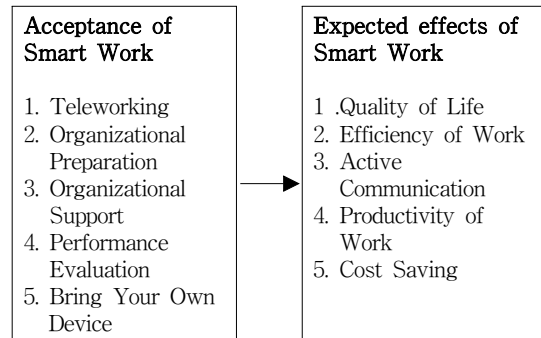
Behind requiring innovative activities towards implementing smart work successfully, there may be side effects such as a negligence of duties, a low degree of productivity, and lack of a reasonable performance evaluation system, etc. that have to be solved. Therefore, the research concerning the side effects of smart work may also be necessary [10, 21].

## 3. Research Methodology

### 3.1 Research Model and Hypotheses

This research aims to examine the causal relationship between acceptance attitudes of smart work and the expected effects. The constructs of independent variables are acceptance attitudes of teleworking, organizational preparation, organizational support, performance evaluation and BYOD (bring your own device). The expected effects as dependent variable are quality of life, efficiency of working, active communication, productivity of work and national/social

cost saving.



〈Figure 1〉 Research Model

#### 3.1.1 Smart Work and Quality of Life

By adoption of smart work, the flexibility of time and place for work can provide the balance of family life and improve relationship among family members [14, 28]. Especially, problems of married female workers such as taking care of their children, doing housework can be solved. Furthermore, good female human resource may be useful for firms and improve satisfactory level and self-efficacy of workers [4, 16, 24, 27].

H1 : The acceptance of smart work is positively related to quality of life for workers.

H1-1 : Teleworking is positively related to quality of life for workers.

H1-2 : Preparation of organization is positively related to quality of life for workers.

H1-3 : Organizational support for device and usage fee is positively related to quality of life for workers.

H1-4 : Difficult management and evaluation of performance is negatively related to quality of life for workers.

H1-5 : BYOD is positively related to quality of life for workers.

### 3.1.2 Smart Work and Efficiency of Work

According to the innovative working styles, efficiency of work will be improved. Under smart work, members of organization may be more diligent in their work for the accomplishment of goals and satisfy their own work [5, 27]. Smart work can increase the satisfactory level of working [27], activate the collaboration among other teams [29], improve productivity [5, 25], increase the national competition power and save the social cost [8].

H2 : The acceptance of smart work is positively related to efficiency of working.

H2-1 : Teleworking is positively related to efficiency of working.

H2-2 : Preparation of organization is positively related to efficiency of working.

H2-3 : Organizational support for device and usage fee is positively related to efficiency of working.

H2-4 : Difficult management and evaluation of performance is negatively related to efficiency of working.

H2-5 : BYOD is positively related to efficiency of working.

### 3.1.3 Smart Work and Active Communication

With rapid development of smart technologies and mobile devices, communication activities in organization will be more active and improve the correspondence of members. Therefore, the flexibility of process in teamwork may be im-

proved [29]. Recently, with the SNS such as real-time conversation, sharing multimedia information, chatting room for discussion, and activities of blogs, communication for work may become more active [3].

H3 : The acceptance of smart work is positively related to activation of communication.

H3-1 : Teleworking is positively related to activation of communication.

H3-2 : Preparation of organization is positively related to activation of communication.

H3-3 : Organizational support for device and usage fee is positively related to activation of communication.

H3-4 : Difficult management and evaluation of performance is negatively related to activation of communication.

H3-5 : BYOD is positively related to activation of communication.

### 3.1.4 Smart Work and Productivity

Through the smart work, creativity of workers and teamwork may be increased. Namely, even though distances between employees become long, smart technologies, high performance devices and network infrastructure can increase the productivity of organization [29]. Also the loyalty of employees to their organization and performance of workers can be improved by smart work [5].

H4 : The acceptance of smart work is positively related to productivity of organization.

H4-1 : Teleworking is positively related to

- productivity of organization.
- H4-2 : Preparation of organization is positively related to productivity of organization.
- H4-3 : Organizational support for device and usage fee is positively related to productivity of organization.
- H4-4 : Difficult management and evaluation of performance is negatively related to productivity of organization.

H4-5 : BYOD is positively related to productivity of organization.

3.1.5 Smart Work and National/Social Cost Saving

Since 2008, NTT reported the effects from adoption of telecommuting such as decreasing of CO<sub>2</sub>, increasing the creativity of work, active communication among family members. In order to overcome and economically manage organization, European nations as well as UK have

<Table 1> Operational Definition of Variables

Variables		Items
Independent variables	Acceptance of smart work	S1. I think that telecommuting or teleworking are proper for smart work. S2. I think that working at a cafeteria or coffee house is more effective. S3. I think that smart work center near home is good place for work. S4. I think that, alternatively, out or inside of office for work is good for smart work. S5. I think that using my own devices for work is better than office devices. S6. I think that organization has to provide devices for work. S7. I think that organization has to support the usage fee of internet for work. S8. I think that productivity of teleworkers will be decreased. S9. I think that teleworking will cause the collaboration problems with others. S10. I think that teleworkers will be lazy in case of outside work. S11. I think that my tasks have high mobility (work outside office). S12. I think that office work for more than one day a week will be necessary even though teleworking. S13. I think that it is easy to effectively use individual time under teleworking. S14. I think that the company information will be flowed out in case of using personal devices for work. S15. I think that working outside of the office is more effective than inside. S16. I think that smart work is the needs of the times. S17. I think that my company has the detailed action plans for smart work. S18. I think that my company has to invest more for smart work. S19. I accept flexible time for smart work. S20. I accept working styles for smart work suggested above. S21. I think that, owing to the characteristics of my tasks, smart work has to be positively carried forward by company. S22. I think that my company well prepared for smart work already. S23. I think that it is difficult to manage teleworkers. S24. I think that it is difficult to evaluate the performance of teleworkers S25. I think that flexible time for working is essential for smart work.
Dependent variables	Quality of Life Efficiency of Work Active Communication Productivity of Work Cost Saving	I think that smart work can improve the quality of life of teleworkers. I think that teleworking can increase efficiency of work. I think that communication will be more active under a smart work environment. I think that smart work can improve the organizational productivity. I think that national and social cost will be saved by teleworking.

tried to adopt the telecommuting. In Korea, by the smart work center where IT infrastructures are prepared for working near home, time saving that workers move to office, decreasing CO<sub>2</sub> from avoiding traffic jam, protecting environmental problems, and social and national cost saving [12, 13].

- H5 : The acceptance of smart work is positively related to national and social cost saving.
- H5-1 : Teleworking is positively related to national and social cost saving.
- H5-2 : Preparation of organization is positively related to national and social cost saving.
- H5-3 : Organizational support for device and usage fee is positively related to national and social cost saving.
- H5-4 : Difficult management and evaluation of performance is negatively related to national and social cost saving.
- H5-5 : BYOD is positively related to national and social cost saving.

### 3.2 Reliability and Validity of Measurements

In order to verify the reliability and validity of the measurements, factor analysis was conducted by using respondent data. For extracting factors, the principal component analysis was performed. Varimax methodology was used for rotating factors.

<Table 2> shows that 16 items were re-grouped into five factors.

The reliability test using Cronbach's alpha showed that each of four variables were in ac-

ceptable level above .7 except for BYOD, but this variable was maintained for the purpose of this research.

<Table 2> Reliability and Validity of Measurements

Items	Dependent Variables					Cronbach's Alpha
	TW <sup>1)</sup>	OP	OS	EV	BYOD	
s20	.783					0.898
s19	.770					0.898
s3	.765					0.898
s16	.755					0.898
s1	.703					0.898
s21	.669					0.898
s15	.667					0.898
s4	.622					0.898
s13	.603					0.898
s22		.725				0.753
s17		.694				0.753
s7			.862			0.728
s6			.818			0.728
s24				.874		0.709
s23				.797		0.709
s5					.831	

1) TW-Teleworking, OP-Organizational Preparation, OS-Organizational Support, EV-Evaluation, BYOD-Bring Your Own Device.

## 4. Research Results

### 4.1 Analysis

To verify the stated hypotheses, this research was conducted using the empirical study with questionnaire survey. Post-hoc verification was conducted using the SPSS 21.0 as a tool of analysis, correlation analysis, and multiple regressions.

Zero Hypothesis  $H_0 : \mu_i = \mu_j (i \neq j)$

Alternative Hypothesis  $H_a : \mu_i \neq \mu_j (i \neq j)$

### 4.2 Correlation between variables

By visiting and providing an e-mail survey,

a total of 118 responded questionnaires were collected. The correlation analysis between independent and dependent variables was conducted. As shown in <Table 3>, correlation between teleworking and five dependents variables was significant positive correlation coefficients. Differently with other variables, the correlation between performance evaluation of teleworkers and quality of life and efficiency of working showed negative relationship. This means that respondents think that there may be no problems in performance evaluation and management of teleworkers.

<Table 3> Correlation Coefficients

	TW <sup>1)</sup>	OP	OS	EV	BYOD
QoL <sup>2)</sup>	<b>.525**</b>	.005	<b>.217*</b>	<b>-.223*</b>	.102
EoW	<b>.625**</b>	.151	.166	<b>-.209*</b>	.161
AC	<b>.464**</b>	<b>.308**</b>	.039	-.128	<b>.341**</b>
PoW	<b>.683**</b>	<b>.521**</b>	.058	.018	.088
CS	<b>.536**</b>	.115	<b>.338**</b>	-.142	.064

\* p < .05, \*\* p < .01.

1) TW-Teleworking, OP-Organizational Preparation, OS-Organizational Support, EV-Evaluation, BYOD-Bring Your Own Device.

2) QoL-Quality of Life, EoW-Efficiency of Working, AC-Active Communication, PoW-Productivity of Working, Cost Saving.

### 4.3 Test of Hypotheses

<Table 4> shows the coefficients of five dependent variables. All of regression models have above 30% of the adjusted R<sup>2</sup> values at significance level of .001.

<Table 5> indicates summary of hypotheses test results. First, concerning increasing of quality of life, teleworking and organizational support for devices and usage fee have the positive relationship. This means that teleworking and organizational support may be necessary for raising the quality of life of workers. Teleworking is the most important predictor of the quality of life. But status of organizational preparation and evaluation problem of teleworkers showed negative relationship. This indicates that respondents think that smart work can raise quality of life, but organizations does not prepare smart work yet and there is no problems in performance evaluation. Therefore, H1-1 and H3-1 have positive causal relationship with the quality of life, but H2-1 and H4-1 have the negative causality.

Second, about national and social cost sav-

<Table 4> Regression Models

Variables	Quality of Life		Cost Saving		Efficiency of Working		Active Communication		Productivity of Working	
	B	t	B	t	B	t	B	t	B	t
Teleworking	.579	<b>6.925***</b>	.516	<b>5.996***</b>	.649	<b>8.078***</b>	.425	<b>4.809***</b>	.585	<b>7.981***</b>
Organizational Preparation	-.260	<b>-3.117**</b>	-.102	-1.183	-.149	-1.863	.064	.720	.279	<b>3.818***</b>
Organizational Support	.158	<b>2.092*</b>	.250	<b>3.208**</b>	.054	.737	-.067	-.832	-.046	-.686
Evaluation Problem	-.183	<b>-2.447*</b>	-.112	-1.459	-.156	<b>-2.171*</b>	-.105	-1.332	.082	1.252
BYOD	.143	1.896	.053	.679	.154	<b>2.123*</b>	.296	<b>3.704***</b>	-.030	-.450
R-square	0.404		0.369		0.450		0.334		0.541	
F-value	15.057***		12.954***		18.138***		11.115***		26.210***	

\* p < .05, \*\* p < .01, \*\*\* p < .001.



〈Table 5〉 Summary of Hypotheses Test

Hypotheses		Results
H1 : Teleworking	H1-1 : Quality of Life H1-2 : Efficiency of Working H1-3 : Active Communication H1-4 : Productivity of Working H1-5 : National and social Cost Savings	Not rejected Not rejected Not rejected Not rejected Not rejected
H2 : Organizational Preparation	H2-1 : Quality of Life H2-2 : Efficiency of Working H2-3 : Active Communication H2-4 : Productivity of Working H2-5 : National and social Cost Savings	Not rejected (Negative) Rejected Rejected Not rejected Rejected
H3 : Organizational Support	H3-1 : Quality of Life H3-2 : Efficiency of Working H3-3 : Active Communication H3-4 : Productivity of Working H3-5 : National and social Cost Savings	Not rejected Rejected Rejected Rejected Not rejected
H4 : Evaluation Problem	H4-1 : Quality of Life H4-2 : Efficiency of Working H4-3 : Active Communication H4-4 : Productivity of Working H4-5 : National and social Cost Savings	Not rejected (Negative) Not rejected (Negative) Rejected Rejected Rejected
H5 : BYOD (bring your own device)	H5-1 : Quality of Life H5-2 : Efficiency of Working H5-3 : Active Communication H5-4 : Productivity of Working H5-5 : National and social Cost Savings	Rejected Not rejected Not rejected Rejected Rejected

ings, teleworking and organizational support indicates the positive causal relationship. This implies that teleworking can save nation-wide and social opportunity cost and organization has to support devices and usage fee of internet for working. So H1-5 and H3-5 cannot be rejected.

Third, in increasing efficiency of working, teleworking and BYOD for working have positive causality but evaluation problem has negative causality. This signifies that respondents agree that teleworking and BYOD can raise efficiency of working but don't agree that there may be some difficulties in performance evaluation. Therefore H1-2 and H5-2 cannot be rejected,

H4-2 influences negatively.

Fourth, concerning active communication and easy collaboration with others, teleworking and BYOD positively influence to dependent variables. Namely, these variables can activate communication and collaborate easily with others. So, H1-3 and H5-3 cannot be rejected.

Fifth, about improving productivity of working, teleworking and well preparation of organization positively influence. Therefore, H1-4 and H2-4 cannot be rejected. This implies that organization can raise productivity of working through teleworking and well prepared smart working.

## 5. Research Limitation and Conclusions

This paper explores the causal relationship between acceptance attitudes and expected effects of smart work. The results of analyses can provide implications to managers who want to adopt smart work to innovate the traditional working styles.

First, this study finds out that teleworking affects the effects of smart work. So, acceptance of teleworking is the most important thing in smart working and can give positive effects of smart work. Second, although many organizations agree the positive effects of smart work, however, they have not prepared the adoption of smart work yet. Third, the organizational positive support for devices and usage fee of infrastructures is necessary for improvement of quality of life and saving cost of nation-wide and society. Fourth, respondents agreed that organization can achieve the quality of life of workers and improve productivity of working through smart working; they also thought that there are no problems in performance evaluation and management of teleworkers. Fifth, the BYOD (bringing your own device) for working can actively communicate with others and raise efficiency of working.

This research has some limitations such that have to complement for further researches. First, samples for data collection consist of Korean companies only. So, for more generalized results, the comparison study among foreign organizations may be necessary. Second, constructs for measuring acceptance of smart work and effects of it have to be sophisticatedly developed based on the previous studies.

The results of this research can provide insights to leaders who want to adopt smart work into their own organization. Among five variables, as telecommuting is critical variable for five effects, therefore organizations have to positively consider adopting the telecommuting working system.

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## ■ Author Profile

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Dr. Kiho Park,  
Associate professor of e-Business  
at New Business Foundation  
Dept. of Hoseo University. He  
received the Bachelor's degree  
in Computer Science and Statistics

from Pusan National University, Masters in Computer Science from Hanyang University, and Doctoral degree in MIS from Hanyang University. He has published research papers in *The Journal of Digital and Management*, *Journal of Digital Policy Research*, *The Korean Small Business Review*, *Journal of Contemporary Management*, etc. His research interests are such as IT evaluation, Analysis of IT impacts in organization, Strategic alignment between IT and business, Self-leadership and IT performances, e-business strategy, Electronic commerce, Digital Convergence, etc..