

# The Impact of Smartwork Activation on Organizational Performance

## - Focusing on Mediating Effects of Quality of Life and Moderating Effects of Manager's Interest

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### Abstract

**Background/Objectives:** The interest in work-life balance has increased in Korea since the low birthrate problem intensified in the 2000s, and recently, a 52-hour workweek has been implemented depending on the size of the company to ensure work-life balance. Companies are also adopting the direction and policies of the government to spread job redesign or organizational culture that can bring work-life balance. Work-life balance is seen as a paradigm for high performance in modern society. Activation of smart work, which is a system that can work anytime and anywhere without being bound by time and place, is inevitable. It is assumed that the quality of life of the members of the organization will be improved through smartwork activation, and that the improvement of the quality of life will soon increase the organizational performance

**Methods/Statistical analysis:** This study utilizes the original data from the 2018 Smartwork Survey conducted by the Korea Information Society Agency, targeting employees of businesses with five or more business units and CEOs of businesses or heads of departments responsible for introducing and operating smart work. The survey collected samples using stratified sampling methods, and the survey was conducted online and in writing to 1,700 people from October 8, 2018 for 27 days. Finally, 566 data were hypothesized through SPSS 21.0 and AMOS structural model analysis.

**Findings:** As a result of analyzing the effect of smart work on organizational performance through the effect of quality on life, Smartwork activation affects organizational performance, and the improvement of quality of life through time saving and work efficiency due to smartwork affects organizational performance. Managers' interest was found to play a moderating role in the structural relationship between smartwork activation, quality of life and organizational performance.

**Improvements/Applications:** This study suggests smartwork activation by empirically analyzing the effect of smartwork activation on organizational performance by the mediating effect of quality of life for employees of companies working in smart office environment.

**Keywords:** smart work, mobile office, quality of life, organizational performance, manager's interest, smart work activation

### 1. Introduction

Due to the stereotype that we have to work in a certain office and have a meeting, members of the organization have to travel long distances to work and spend a lot of time meeting. Now, there is an urgent need for a new system that can break this stereotype and work anytime, anywhere, without being tied to time and place. Smartwork is a system that can work anywhere anytime without being bound by time and place. The commute time saved through smartwork, and the less time spent physically and mentally, will improve the quality of life of the members of the organization, and the improvement of the quality of life will soon affect the vitalization of the organization. There is a widespread move to

introduce a 'smart work' that takes away existing ideas and takes steps one step further and improves existing ways of working smarter. When working out or on business trips, the company is able to see the company's work as if it is sitting at the same time, and instead of paper documents, electronic payments have been introduced to create an environment where people can work efficiently. Furthermore, it is possible to increase customer satisfaction and work efficiency by receiving customer's request immediately through mobile and tablet PCs, especially for AS demand generated by selling products and moving directly from the AS site to the site. (Kang and Kwon, 2014; Raguseo et al., 2016; Sung, 2013)

The government has also completed the Smart Work as a national strategic task to build a complex administrative city, Sejong City, so that officials in Seoul, Daejeon and Sejong City can work smoothly. The establishment of government-led smart work will spread to private companies, and smart work will be settled naturally. (Sung, 2013; Lee et al., 2016) Therefore, smart work improves the efficiency of work, and if the quality of life of employees is improved, it will be shown to have a positive effect on organizational performance.

## **2. Materials and Methods**

### *2.1 Smart Work*

Smart work is defined as a flexible way of working with other people on a network using information and communication technology, regardless of time or place. Types of smart work tasks can be divided into telecommuting, remote work, flexible work, and smart work center work. Telecommuting is a way for workers to work by accessing a company's information system using a VPN, while mobile work is a way to perform sage work using devices such as smartphones. Work commute is determined, and smart work center works in a remote office. (Sung, 2013; Lee et al., 2016)

#### *2.1.1 Configuration of Smart Work System*

Smart work system can be classified into computer-based system and mobile based system. First of all, computer-based smart work has been developed from the office to the PC, which guarantees mobility, and recently, work methods have been developed into personal devices such as tablet PCs and smartphones. It means to build a mobile office for. As such, it means interworking with the internal system to realize the optimized work environment in the field. Groupware, electronic payment (e-mail, etc.): ERP, etc. are smart work concepts based on computer systems. (Lee et al., 2015)

### *2.2 Quality of Life*

The World Health Organization defines quality of life as a personal awareness of the state of life in relation to its goals, expectations, norms and concerns within the context of the culture and value system in which an individual life (WHO, 2004). Today, interest in the quality of life is growing and the trend of the times when all activities are ultimately valued for individual life by the universal values of the state and society is taken for granted. (Lee et al., 2016; Park and Go, 2014) The concept of quality of life is inconsistent but divided into objective and subjective concepts. Objective concept means the physical condition of life that can be grasped through objective indicators such as health, income, labor, educational environment, the subjective concept is a cognitive evaluation of one's life as much as the present life meets his internal expectations. (Ha and Kim, 1997; Kim et al., 2019; Park, 2019; Kim and Yoo, 2017)

### *2.3 Organizational Performance Concept*

Organizational performance is a dynamic, multi-faceted concept that represents the behavior of practitioners in the role of the organization. It can be defined as the degree to which members have achieved their goals. (Raguseo et al., 2016) In addition, job performance is the outcome of goals that result from organic relationships among members of an organization. In general, job performance is understood as organizational performance. As data showing effectiveness in organizational management. Productivity is represented by factors such as achievement of goals, customer satisfaction, and attachment. (Lee et al., 2015; Park and Go, 2014; Kim and Yoo, 2017; Jin and Jang, 2015)

### *2.4 Research Model and Hypothesis*

#### *2.4.1 Research Model*

This study examines the effects of smartwork activation on organizational performance, identifies the mediation of quality of life in the relationship between smartwork activation and organizational performance, and examines whether managerial attention plays a role as a moderating variable. In other words, assuming that smartwork activation improves the quality of life of employees and the improved quality of life also affects the performance of the organization, the research model is set up as shown in [Figure 1].

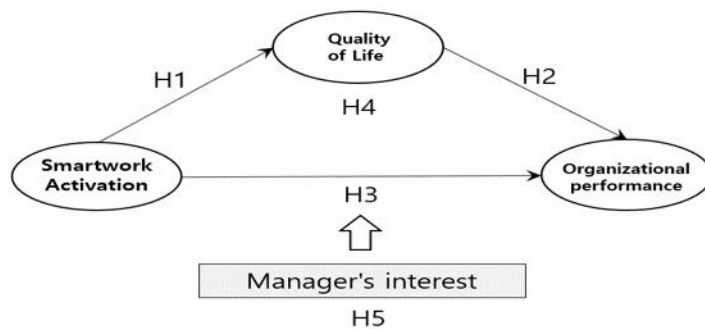


Figure 1. Basic structural model

2.4.2 Research Hypothesis

The hypothesis setting for identifying the research model of this study is shown in [Table 1].

Table 1. Research hypothesis

Research Hypothesis	
H1	Smartwork activation will have a positive impact on quality of life.
H2	Quality of life will have a positive impact on organizational performance.
H3	Smartwork activation will have a positive impact on organizational performance.
H4	Quality of life will mediate the relationship between smartwork activation and organizational performance.
H5	Manager’s interest will moderate in the relationship between smartwork activation and quality of life and organizational performance.

2.4.3 Operational Definition of Survey Tools and Variables

The operational definitions and measurement methods for the variables in this study are as shown in [Table 2].

The survey method for each questionnaire used the Likert 5-point scale, which means "1 is very strongly disagree. 3 is normal. 5 is very strongly agree.

Table 2. Operational definition of variables

Evaluation items	Measurement variable	Operational definition	Measurement methods	Researcher
Smart work activation	D4_2	Mobile office, smart work center, telecommuting, smart office, flexible work environment	Respect for employees' autonomy in the performance of work	Lee MW, Oh MJ, Kim SC (2016).
	D4_1		Recommended level of freedom for the type of smart work in operation	
	D2_4		Establishment of Security System to Use ICT	
	D2_3		ICT work environment creation degree	
	D2_2		How actively employees use ICT to communicate internally	
	D2_1		Aggressiveness of ICT Investment	
Quality of life	E1_1_1	Effects on employees	Reduce commute time	Seong MK, Bang, SH,
	E1_1_2		Reduced overtime or adhere to work hours	

	E1_1_3	after using smart work	Increase self-development time	Kwon SH (2011).
	E1_1_4		Increased housework leisure time	
	E1_1_5		Work-Life Balance (Life with Evening)	
	E1_1_6		Improving quality of life	
Organizational performance	E1_1_8	Effects on the business side	Reduced work perform time	Seong MK, Bang, SH, Kwon SH (2011).
	E1_1_10		Maintain business continuity	
	E1_1_12		Improve work engagement	
	E1_1_14		Increase collaborative communication with colleagues	

#### 2.4.4 Data Collection and Analysis Method

This study was conducted in 2018 by the Korea Information Technology Agency (KISA) for the employees of businesses with five or more businesses in 17 cities (including Jeju Island) and representatives of five or more businesses or heads of departments in charge of introducing and operating smart work. The raw data of the survey were used. The survey, conducted in 2018, collected samples using the stratified sampling method, which was conducted online and in writing for 27 days from October 8 to November 2, 2018, using a structured questionnaire. In this study, the questionnaires that were inadequate among 1,700 participants were excluded. Finally, 566 data were used for statistical analysis using the SPSS 21.0 and AMOS 21.0 programs. Basic statistical analysis was performed to check the general characteristics of the sample, accuracy of data, missing and outliers, and normality. Factor analysis and Cronbach's reliability coefficient were used to test the validity and reliability of the data. Before analyzing the hypothetical relationships among the constructs, we conducted a measurement model analysis to test the suitability of the research model. Finally, structural equation model analysis was conducted for the basic research hypothesis test, the mediation effect test, and the path difference test between groups (Enimola et al., 2019); (Eshetu and Goshu, 2019).

### 3. Results and Discussion

#### 3.1 Empirical Results

##### 3.1.1 Demographic Characteristics Analysis

The total number of samples used in this study was 566, and frequency analysis was conducted to identify the demographic characteristics of the sample in terms of gender, 373 men (65.9%) and 193 women (34.1%) had a high percentage of men. In the case of age, 46 to 55 years old (156, 27.6%): 36 to 45 years old (140, 24.7%): 26 to 35 years old (127, 22.4%): 56 to 65 years old (126, 22.3%) , 25 years old or younger (16 patients, 2.8%): 66 years old or older (one, 0.2%). There were no children (365, 64.5%): and there were (201, 35.5%). In company job, Marketing / Sales / Customer Management (148 people 26.1%): Professional Management / Management (141 people, 24.9%): Research / Development / Planning (121 people, 21.4%): Accounting / General Affairs / Human Resources (102 people, 18.0%), Production / simple labor (42, 7.4%) and others (12, 2.1%). In the form of work 490 full-time workers accounted for 86.1% of the total, with part-time work (37 people 6.5%) and self-employed workers (39 people 6.9%). In the positions, managers (96, 17.0%): managers (91, 16.1%): representatives (88, 15.5%): employees (82, 14.5%): executives (80, 14.1%): deputy general managers (52, 9.2%): chiefs (42, 7.4%): representatives (25, 4.4%): other (10, 1.8 %). The length of employment is 5 years or less (197, 34.8%): 6-10 years (168, 29.7%): 11 ~ 20 years (141, 24.9%): more than 20 years (60, 10.6%) appear.

##### 3.1.2 Descriptive Statistics Analysis

The model of this study consists of latent variables such as smartwork activation, quality of life and organizational performance. Frequency analysis was performed to find the mean, standard deviation, skewness, and kurtosis of the measured variables for the structural equation model analysis. Individual variables were found to be normally distributed because there were no variables with standard deviations greater than 3 and absolute values of skewness and kurtosis greater than 2.

##### 3.1.3 Exploratory Factor Analysis

An exploratory factor analysis was conducted to confirm whether the variables measuring the same concept are grouped into the same factor. Principal component analysis was performed using principal component analysis and Varimax method using rotation method. The KMO measure was .932, and Bartlett's spherical test showed a significant probability of less than .05. Meanwhile, the cumulative variance was 61.605%. Based on previous studies, we have

named Smartwork activation, Quality of life and Organizational performance. The factor loadings were all above 0.4, indicating that the overall measurement tool was justified.

### 3.1.4 Measurement Model Analysis

#### 3.1.4.1 Confirmatory Factor Analysis, Intensive Validity and Reliability Analysis

Measurement model analysis was conducted to confirm whether the latent variables included in the research model were properly estimated before examining the influence of latent variables through structural equation model analysis. The fit of the measurement model was found to be inadequate as  $\chi^2 = 696.900$  ( $df = 62$ ) and  $p = .000$ . However,  $\chi^2$  is sensitive to the number of cases. The suitability of CFI, TLI, and RMSEA was checked by considering the simplicity and simplicity. As a result of the analysis, CFI = .980, TLI = .971 and RMSEA = .051 showed that the measurement model reflects the data well. In addition,  $\beta$  was more than 0.7, CR was more than 0.7, and AVE was more than 0.5. Meanwhile, reliability analysis was performed to verify the internal consistency of each variable. As a result of calculating Cronbach's alpha coefficient of each variable, all of them were over 0.7, indicating that the reliability of the main variables used in this study was good. The analysis results are shown in [Table 3]

Table 3. Confirmatory factor analysis result

Latent variable	Observation variable	Estimate		S.E.	t	P	CR	AVE	Cronbach's $\alpha$
		B	$\beta$						
Smart work activation	D2_1	1.152	.812	.064	18.004	***	.906	.617	.902
	D2_2	1.144	.829	.062	18.354	***			
	D2_3	1.050	.769	.061	17.102	***			
	D2_4	1.129	.797	.064	17.689	***			
	D4_1	1.021	.764	.060	16.997	***			
	D4_2	1	.704						
Quality of life	E1_1_1	1	.690			***	.905	.613	.887
	E1_1_2	1.068	.725	.068	15.756	***			
	E1_1_3	1.174	.782	.070	16.862	***			
	E1_1_4	1.185	.792	.069	17.059	***			
	E1_1_5	1.124	.765	.068	16.531	***			
	E1_1_6	1.172	.762	.071	16.478				
Organizational performance	E1_1_8	1	.694			***	.813	.522	.785
	E1_1_10	1.019	.676	.074	13.808	***			
	E1_1_12	0.987	.669	.072	13.687	***			
	E1_1_14	0.876	.603	.07	12.504	***			
Measurement model Fitness		$\chi^2=696.900, df=62, CFI=.980, TLI=.971, RMSEA=.051$							

#### 3.1.4.2 Discriminatory Feasibility Analysis

Discriminant validity analysis was performed using correlation coefficient and standard error as the concentration validity was secured. As a result of the analysis, it was confirmed that the correlation coefficient  $\pm 2 \times$  standard error value did not include 1. The analysis results are shown in [Table 4]

Table 4. Discriminatory feasibility analysis result

Latent variable 1	Latent variable 2	Correlation coefficient	Standard Error	correlation coefficient - 2 × S. E	Correlation coefficient + 2 × S. E
Smartwork activation	Quality of life	.448	.025	.398	.498
Quality of life	Organizational performance	.836	.028	.780	.892
Smartwork activation	Organizational performance	.504	.025	.454	.554

\* Correlation coefficient ± 2 × standard error value does not contain 1

3.1.5 Test of Hypothesis

Measurement model Fitness was found to be satisfactory with  $\chi^2 = 298.116$  ( $p < .001$ ): CFI = .958, TLI = .95, RMSEA = .059. As a result of structural model analysis, smartwork activation had a significant positive effect on quality of life ( $\beta = .448$ ,  $p < .001$ ). And quality of life did not appear to have a significant effect on organizational performance ( $\beta = .764$ ,  $p > .001$ ). The higher the quality of life, the higher the organizational performance. Smartwork activation was found to have a significant positive effect on organizational performance ( $\beta = .161$ ,  $p < .001$ ). The analysis results are shown in [Table 5] and [Figure 2].

Table 5. Hypothesis test result

Theory	Path	Estimate		S.E.	t.	P	SMC	Result
		B	$\beta$					
H1	Smartwork activation → quality of life	.388	.448	.044	8.775	***	.201	Accept
H2	Quality of life → Organizational performance	.716	.764	.059	12.145	***	.720	Accept
H3	Smartwork activation → Organizational performance	.131	.161	.035	3.776	***	.364	Accept
Measurement model Fitness		$\chi^2 = 298.116$ , $df = 101$ , CFI = .958, TLI = .95, RMSEA = .059						

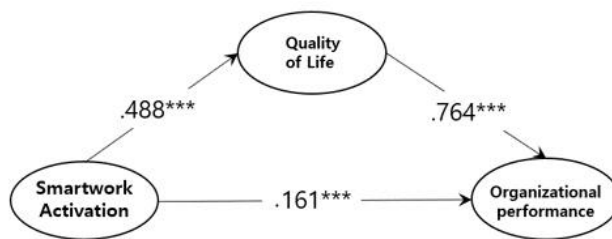


Figure 2. Hypothesis verification result diagram

3.1.6 Mediating Effect Analysis

The mediating effect of quality of life was verified in the relationship between smartwork activation and organizational performance. To verify the mediation effect, Bias Corrected Bootstrapping verification was performed. In the relationship between smartwork activation and organizational performance, quality of life was shown to mediate ( $\beta = .342$ ,  $p < .01$ ). The analysis results are shown in [Table 6] and [Figure 3].

Table 6. Mediation effect analysis result

	Path	Indirect effect ( $\beta$ )	P-value	Result
H4	Smartwork activation $\rightarrow$ Quality of life $\rightarrow$ Organizational performance	.342	.000	Accept

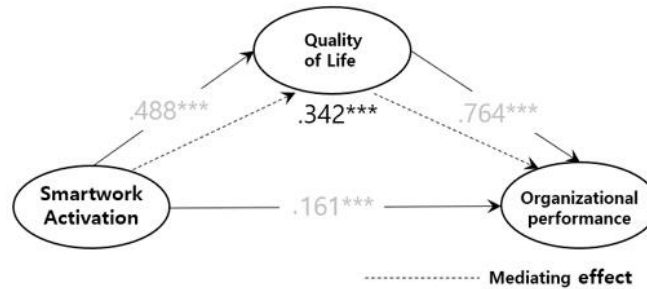


Figure 3. Mediation effect analysis result diagram

3.1.7 Moderating Effect Analysis

Prior to verifying the moderating effects, multi-group confirmatory factor analysis was conducted to confirm whether the managers' interest in the activation of smart work was equally recognized. As a result of the unconstrained model and the measurement weights model with constraints,  $\Delta\chi^2 = 18.877$  (430.748-411.871) and p-value of  $\chi^2$  difference  $.127 > .05$ , even after the constraint that the measurement weights are the same in the non-pharmaceutical model, the model's suitability was not deteriorated and cross-validation between the manager's interest groups was secured.

Cross Feasibility between Manager's interest was secured, so the moderating effect was verified. As a result of the unconstrained model and the measurement weights model with constraints,  $\Delta\chi^2=44.895$  (456.766-411.471) and p-value of  $\chi^2$  difference  $.000 < .05$  Manager's Interest was found to be effective as a moderating variable, so Hypothesis 5 could be adopted. The results of the analysis of the path difference between the Manager's Interest groups are shown in [Table 7] and [Figure 4].

Table 7. Hypothesis test results by multi-group structural equation model analysis by manager's interest group

Path	Manager's High Interest Group				Manager's Low Interest Group			
	$\beta$	P	Result	SMC	$\beta$	P	Result	SMC
Smartwork activation $\rightarrow$ quality of life	.551	***	Accept	.304	.215	***	Accept	.046
Quality of life $\rightarrow$ Organizational performance	.822	***	Accept	.832	.736	***	Accept	.558
Smartwork activation $\rightarrow$ Organizational performance	.148	.050	Accept		.110	.050	Accept	
Measurement model Fitness	$\chi^2=411.871$ , $df=202$ , $CFI=.943$ , $TLI=.932$ , $RMSEA=.043$							

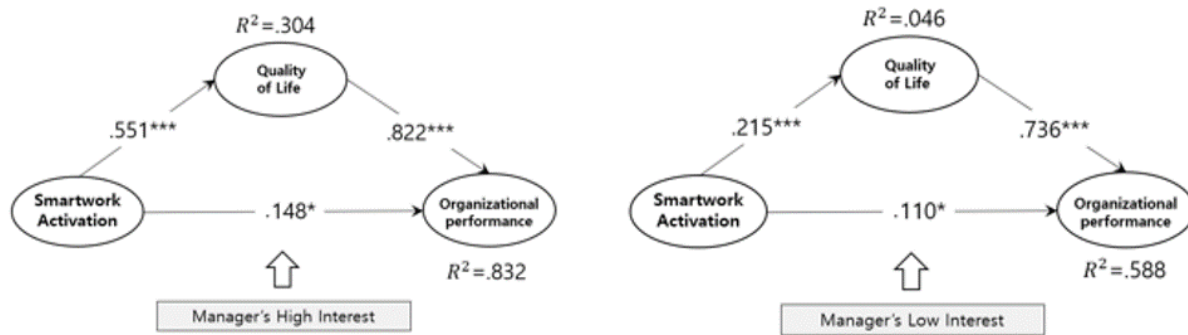


Figure 4. Path diagram verified by MSEM analysis for each manager's interest group

As a result of the hypothesis test, it was verified that the group with a high manager's interest in smart work activation was more influential than the group with a low manager's interest, and the quality of life was 82%, which greatly influenced the organizational performance (Fibriasari, 2019); (Gamba, 2017).

#### 4. Conclusion

Smart work has been shown to affect organizational performance. However, smartwork activation is only an environmental factor, and the smartwork environment itself does not directly affect organizational performance. Therefore, organizations that want to prepare smart work should recognize that building a smart environment is not a result but a means. First, the establishment of smart work environment naturally has a positive effect on quality of life by not limiting the place and time of employees' work. Second, the establishment of smart work environment has a positive effect on organizational performance, which means that employees working in smart work environment can play a leading role in planning and performing their own tasks regardless of time and place. Because there is. Third, the quality of life of the improved employees through the smart work environment has a positive effect on organizational performance. Therefore, the establishment of smart work has a positive impact on organizational performance, and it will be meaningful for each organization to promote smart work at the enterprise level.

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