

A Study on the Relationship among Knowledge Sharing, Peer Relation and Supervisor Support of Nuclear R&D Personnel

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1. Introduction

Since nuclear research and development(R&D) is a comprehensive form of engineering incorporating various fields of science and technology, joint research through cooperation is essential. In light of this, nuclear R&D personnel are required to learn and use new knowledge and information continuously, and to share this new knowledge and information with their peers. This process of learning and sharing is a very important feature of nuclear R&D performance.

This study aims to explore the condition to make nuclear R&D personnel actively share knowledge and information related with R&D performance. Knowledge sharing is enhanced by the voluntary intentions of individuals[1]; thus; it is presumed that relationships between nuclear R&D personnel will play a key role in the sharing of knowledge. In this regard, we attempted to verify empirically the effect of supervisor support and peer relation on knowledge sharing of nuclear R&D personnel.

2. Methods and Results

In this section, some of the methods and results of this study are described. To identify the relationship among knowledge sharing, peer relation and supervisor support, a research model inclusive of three variables was set up and analyzed

2.1 Research Model

The purpose of this study was to identify the relationship among knowledge sharing, peer relation and supervisor support in nuclear R&D organization. Supervisor support has been verified as a direct predicting variable of knowledge sharing[2], [3]. Also, peer relation has been studied from the perspective of an antecedent capable of increasing knowledge sharing[4]. Based on these previous studies, we created a research model comprising three variables; knowledge sharing as a dependent variable, peer relation and supervisor support as independent variable.

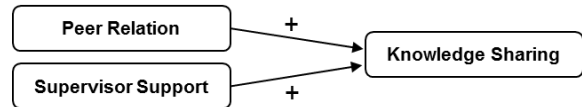


Fig. 1. Research Model

2.2 Data Analysis

In this study, we used response data(190 cases) from a 2018 KAERI educational needs survey. The general characteristics of the response data are presented in Table1.

Table 1: Data Characteristics

Job Characteristics		Frequency	Ratio
Type	Researcher	150	78.9%
	Technician	40	21.1%
Position	Principal	87	45.8%
	Senior	63	33.2%
	Junior	40	21.1%

In total, there are eight measurement items; two knowledge sharing(KS) items, four peer relation(PR) items, and two supervisor support(SS) items. To achieve the research objectives of this study, descriptive statistics, a difference analysis, and a correlation and regression analysis were used.

Table 2: Analysis Items Description

Var	Items
KS	- Job performance know-how
	- New knowledge and information
PR	- Friendly atmosphere within team
	- Participate in relationship activity
	- Trust with team members
SS	- Trust with other colleagues
	- Provide opportunity to lead own job
	- Encourage learn about new knowledge and information

2.3 Descriptive Statistics

The results of the descriptive statistics are shown in Table3. Knowledge sharing was high at 4.00, and peer relation and supervisor support were also high at 3.83 and 3.85, respectively.

Table 3: Descriptive Statistics

Var	Mean	SD	Item	Mean	SD
KS	4.00	.619	KS1	4.18	.634
			KS2	3.83	1.003
PR	3.85	.639	PR1	3.61	.944
			PR2	3.90	.774
			PR3	3.89	.956
			PR4	3.99	.825
SS	3.83	.820	SS1	3.89	.956
			SS2	3.77	.923

2.4 Difference Analysis

To analyze the differences according to job characteristics, an independent t-test and one-way ANOVA were conducted, the results of which are described in Table 4.

There was a statistically significant difference only in the perception of supervisor support. Technicians had a higher perception of supervisor support than researchers did. In addition, those nuclear R&D personnel who are of a low position within the organization perceived supervisor support highly.

Table 4: Difference Analysis

Job Characteristics		KS	PR	SS
Type	Researcher	3.98	3.81	3.75
	Technician	4.08	4.01	4.11
	T-test	-	-	Sig ¹⁾
Position	Principal	3.94	3.79	3.70
	Senior	3.99	3.80	3.82
	Junior	4.14	4.04	4.11
	ANOVA	-	-	Sig ²⁾

Note 1): $t=-3.102^{**}$ ($p<0.01$)

Note 2): $F=3.538^{*}$ ($p<0.05$ / Post-hoc test: Junior > Principal)

2.5 Correlation & Regression Analysis

The results of correlation analysis among variables are shown in table 5. The correlation coefficients were between 0.398 and 0.774, and were statistically significant at the significance level of 0.01. This means that there is positive relationship among knowledge sharing, peer relation and supervisor support of nuclear R&D personnel

Table 5: Correlation Matrix

Var	KS	PR	SS
KS	-		
PR	.405 ^{**}	-	
SS	.398 ^{**}	.774 ^{**}	-

Note: ^{**} $p<0.01$, ^{*} $p<0.05$

Meanwhile, the results of linear regression analysis were as follows: by setting the knowledge sharing as a dependent variable, peer relation and supervisor

support as independent variables. Based on standardized coefficients, peer relation and supervisor support were calculated to be .242, and .211 with statistically significant predicting variables. This means that the more peer relation and supervisor support increase, the more R&D personnel actively participate in knowledge sharing. Two independent variables described knowledge sharing 18.2% (17.3% based on R^2_{adj}), which was statistically significant at a significance level of 0.01.

Table 6: Regression Analysis

Var		B	Beta	t
Y	X			
KS	PR	.234	.242	2.313 [*]
	SS	.160	.211	2.024 [*]

$R=.427$, $R^2=.182$, $R^2_{adj}=.173$, $F=20.811^{**}$

Note: ^{**} $p<0.01$, ^{*} $p<0.05$

3. Conclusions

In this study, we have identified empirically that peer relation and supervisor support enhance knowledge sharing of nuclear R&D personnel. Knowledge sharing in nuclear R&D organization is an important factor affecting R&D performance. Therefore, considering the results of this study, it is necessary to provide opportunities to improve the intimacy and reliability between members of nuclear R&D organization. In addition, it is necessary to operate programs to develop leadership competence in supervisors. Such a program would support nuclear R&D personnel in taking the initiative in exploring new knowledge and information.

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