

# Intra- and Inter-Team Knowledge Sharing and Team Performance: A Social Capital Perspective

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*The purpose of this study is to further develop an understanding of team-level knowledge sharing in multilevel view. The team-level knowledge sharing is associated with intra-team and inter-team relationships. We investigate both intra- and inter-team knowledge sharing and their impact on team performance, applying both within-group (bonding) and between-group (bridging) social capital concept. We also include IT support as an antecedent for team-level knowledge management. We conduct a field study involving 114 teams of 777 individuals from five firms in South Korea. The PLS analysis results suggest that IT support have positive impacts on intra- and inter-team social capital and inter-team knowledge sharing, but not on intra knowledge sharing. Furthermore, intra- and inter-team knowledge sharing have positive impacts on team performance.*

Field of Research: Management

## 1. Introduction

Knowledge is one of the most important resources in the organization. Separated from traditional resources, knowledge forms organization's competitive edge by being shared within and beyond the organization (Argote and Ingram, 2000; Spender, 1996). The organizations are considering, designing, and building knowledge management -"how to manage knowledge in their organizations"- with both social systems and information technology (IT) systems.

With increasing interest on knowledge management, a series of studies on knowledge management has been emerged. The literature deals with various knowledge processes: using, sharing, integrating and creating knowledge. They can be categorized by their level of analysis: individual, business-unit, organization. Earlier researches focused on causal relationships in single-level, but recently several researches begun to take multi-level approach (Foss et al., 2009).

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As earlier researches approached intra- and inter-organization - individuals in a firm and inter-firm relationship -, team-level knowledge management is associated with intra-team and inter-team relationships. These two kinds of relationships should be considered simultaneously to explain the process of team as social group (Oh et al., 2004). However, most former researches of team-level knowledge sharing have lacked this multi-level perspective of embedded nature of team.

In this study, we examine both intra- and inter-team knowledge sharing antecedents, and its effect on team performance with respect to the multilevel view of team. Our focus is on social capital theory which is one of the most illustrative perspectives for knowledge sharing and team performance among the former studies (Hansen, 1999; Nahapiet and Ghoshal, 1998; Tsai and Ghoshal, 1998; Wasko and Faraj, 2005).

We investigate intra- and inter-team knowledge sharing, applying both within-group (bonding) and between-group (bridging) social capital concept. To test our hypotheses, we conduct an online survey of 114 teams consisted of 777 individuals from five companies in South Korea.

## **2. Theoretical background and hypotheses**

### **Social Capital**

Social capital is defined as resources embedded in social relations between social entities, such as individuals, business units, or firms (Adler and Kwon, 2002; Nahapiet and Ghoshal, 1998). Networking each other, people and groups of people build their social relationships. These relationships tend to support people to make new relationships and facilitate behaviors of network owner or the others. It extends the former concept of resources that was limited on capability of entity to relation between entities. The competitive advantage is not only from resources that a firm owns itself, but also from resources derived from the way the firm linked to others and quality of these links. Expanding its ground, social capital has drawn attention from academics in management research field.

According to Nahapiet and Ghoshal (1998), social capital is composed of three dimensions: structural, relational, and cognitive dimensions. The structure dimension refers to the ties among the actors. The relational dimension refers to the nature and quality of social relations between actors. The cognitive dimension refers to shared

cognitions, such as shared representations, interpretations, systems, and language between actors.

### **Group social capital**

Teams in organizations can be seen from a multi-level view. As a group of employees, a team in an organization forms a network consisted of employees. Differences between structure and quality of social capital embedded in each network may lead different performances. At the same time, a team embedded in a larger network which is organized with other teams. Inter-team relations also may influence a team's output according to the way they interact each other to do their tasks.

To accurately analyze team's performance and their surrounding social context, we adopt both intragroup and intergroup social capital from Oh et.al (2004) to examine knowledge flow within and between teams.

### **Social capital and Knowledge sharing**

Researchers have studied social capital in organizations context with various aspects. Underlying idea that social capital allows actors to gather other resources and utilize them effectively has been diversified by researchers (Robert et al., 2008; Kirsch et al., 2010). As a resource, knowledge can be exchanged and utilized easily with presence of social capital. In a detailed account, knowledge sharing may be more readily bolstered by structural, relational, and cognitive dimensions of social capital. With structural social capital, frequent and in-depth communication is feasible within a team. The more extensive communication provides the more opportunities for knowledge sharing. Considering that knowledge sharing is a complex and interactive process, relational and cognitive dimensions of social capital make the process easily as affective and cognitive catalysts. Trust motivates actors to share knowledge with trustee. Actors can be given an environment to communicate each other for knowledge sharing with presence of shared cognition (Wu et al., 2007; Widen-Wulff and Ginman, 2004; Wang and He, 2008; Staples and Webster, 2008; Huang, 2009).

Knowledge can be shared by team members. We propose a hypothesis that states the relationship between intra-team knowledge sharing and intra-team social capital of team.

H1: Intra-team social capital will be positively associated with intra-team knowledge sharing.

Knowledge flows through teams in an organization. We can extend the same reasoning to team-level interaction with the results based on several prior researches on inter-team knowledge sharing (Makela and Brewster, 2009; Nahapiet and Ghoshal, 1998; Tsai and Ghoshal, 1998).

H2: inter-team social capital will be positively associated with inter-team knowledge sharing.

### **IT support**

Organizations use various forms of information systems to support various activities of their employees. The important role of these systems is to facilitate communication and collaborative practices between and within sub-units in organizations. They also provide storage for knowledge and searching tools. Knowledge sharing accompanies communication between actors. Besides, human brain has limited capacity to store knowledge. These natures of knowledge can be fulfilled and overcome by IT support. Past studies have shown that IT facilitates to share knowledge in teams (Gupta et al., 2009; Widen-Wulff and Ginman, 2004). IT also enables interaction between teams. We hypothesize:

H3: IT support will be positively associated with intra-team knowledge sharing

H4: IT support will be positively associated with inter-team knowledge sharing

The point of view on the relationship between IT support and social capital is bidirectional (Huysman and Wulf, 2006). Well-established social capital leads success in deployment of IT in organizations (Sykes et al., 2009). On the other hand, the formation of social capital is encouraged by networking infrastructure that IT supports. It is illustrative that IT support assists accumulation of social capital both intra-team and inter-team. We hypothesize:

H5: IT Support will be positively associated with intra-team social capital.

H6: IT Support will be positively associated with inter-team social capital.

## **Team performance**

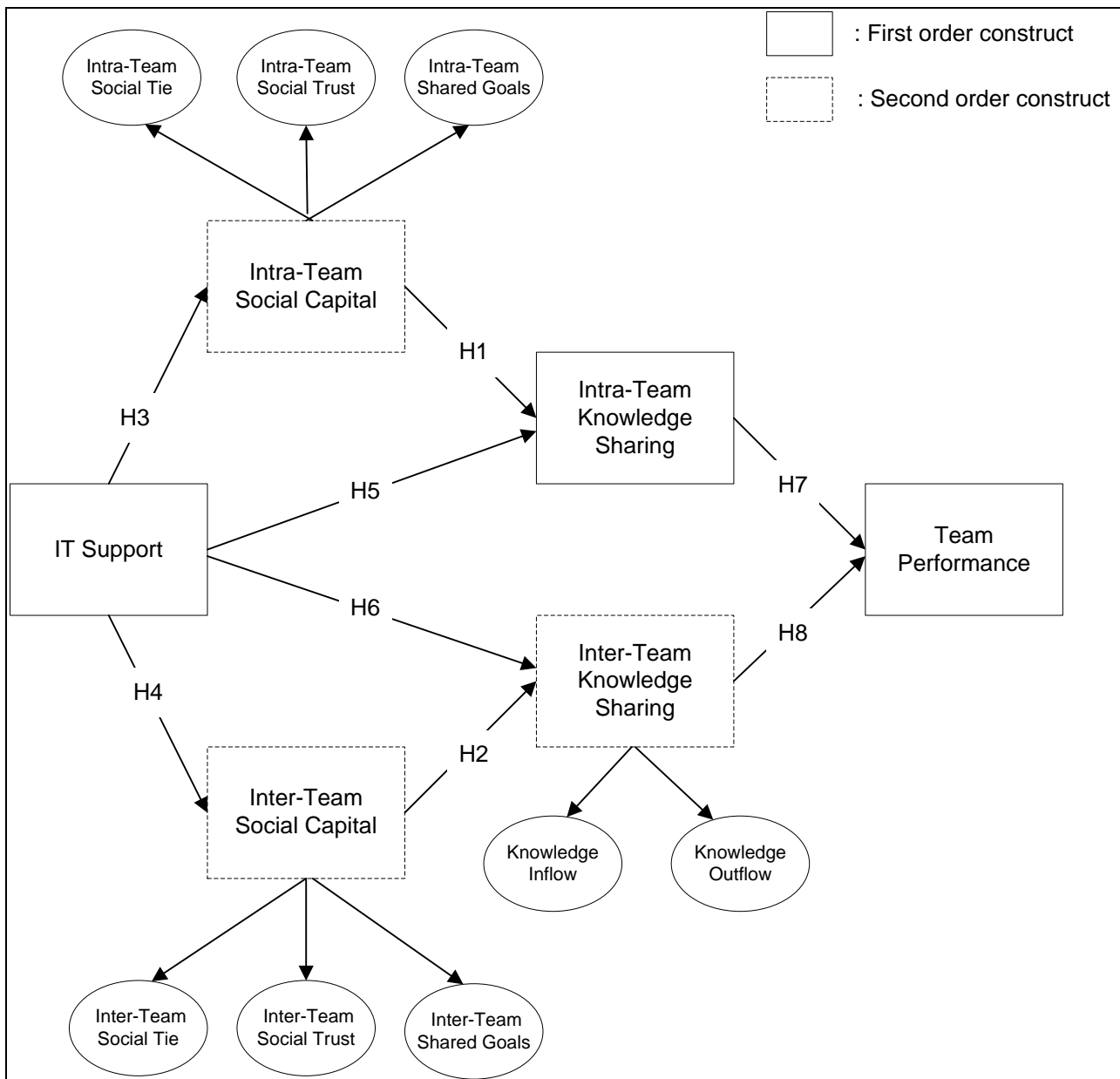
The relationship between team knowledge sharing and team performance has been explored by several researches in various contexts (Argote and Ingram, 2000; Mesmer-Magnus and DeChurch, 2009). Knowledge sharing has been settled as the best practice in organizations with knowledge management:

H7: Intra-team knowledge sharing will be positively associated with team performance

Knowledge doesn't only inflow to the team, but also outflows from the teams. Inflow of knowledge may be beneficial to its performance with ground of external learning (Bresman, 2010) and direct support from studies (Cummings, 2004; Hansen, 2002). Best practices tend to disseminate throughout organization. Knowledge outflow of a team may mean that the source team outperforms. Thus, we hypothesize:

H8: Inter-team knowledge sharing will be positively associated with team performance

## **3. The Methodology and Model**



**Figure 1 Research Model**

## Research model

Our research model is shown in Figure 1. Although all hypotheses state no directional relation, we adopt a sequence of managerial support, KM practice, and performance for strategic implication and convenience in analysis.

## Data collection

We collected 218 team-level data by using an online survey from 5 firms in 4 industries in South Korea from Feb 26<sup>th</sup> to Mar 9<sup>th</sup>, 2010. The firms are the corporation members of the

Knowledge Management Research Centre (KMRC) at KAIST (Korea Advanced Institute of Science and Technology). All these companies have their own KMSs.

We collected data using an online survey system that one of the authors implemented. The knowledge management staff of each firm distributed URL through which participants can access the online survey system and encouraged employees to participate in the survey through e-mail over a period of 12 days (seven business days). A total of 1101 individuals from 218 teams responded. After excluding no variance responses (data consist of only one number to all questions), teams with fewer than three participants, and teams without leader's responses, the remaining data were 777 individuals from 114 teams. Demographic characteristics of the survey participants are shown In Table 1.

Individual				Team			
Characteristics		Freq.	%	Characteristics		Freq.	%
Gender	Male	737	94.9	Company	PublicA	13	11.4
	Female	40	5.1		PublicB	11	9.6
Total		777	100%		Construction	44	38.6
Job position	Director	27	3.5		Service	24	21.1
	General manager	112	14.4		Manufacturing	22	19.3
	Senior manager	171	22.0				
	Manager	176	22.7				
	Assistant manager	251	32.3				
Employee	40	5.1					
Total		777	100%	Total	114	100%	

**Table 1. Demographic Characteristic of Sample**

## Measurement

We derived survey items from measurements of prior researches. IT support was measured by four items from Choi et al. (forthcoming) which are derived from individual-level items of Lee and Choi (2003). These items reflect respondents' perceptions of IT supported collaboration, communication, storage, search and access of information provided by their organizations.

There are two categories of method to measure social capital in prior research stream. More internally valid method is to measure social capital by social network approach (Kang and Kim, 2010; Borgatti et al., 2009; Borgatti and Carboni, 2007). The other one is to ask directly actors' perceptions of social capital they possessed by each dimension of it (Wasko and Faraj, 2005; Chow and Chan, 2008). We adopted direct measuring method

because sample size is quite too large to be measured by network method. We developed two 9-item scales for measuring intra-team and inter-team social capital based on Chow and Chan (2008). Team member and leader ask to assess their team's social capital by the scales. Each 3 items measure each 3 dimension of social capital: social tie, social trust, shared goals.

For measuring intra-team knowledge sharing, we adopted 3-item scale from Choi et al. (forthcoming). To measure inter-team knowledge sharing, we developed 10-item scale based on Bock et al. (2005). Their original 5-item instrument measured the intention to knowledge sharing of individual. We modified their items to measure individuals' perceptions of the extent to which their team share different form of knowledge with other teams. Each 5 items measure inflow and outflow of knowledge with respect to team-level. Finally, team performance was measured by 4-item scales from Hoegl et al. (2003). All items used a 7-point Likert scale, ranging from 1 (strongly disagree) to 7 (strongly agree). All measurement items and the references for them were summarized in the Appendix.

## **Analysis Method**

We tested our hypotheses through structural equation model (SEM) by using PLS (Partial Least Square) Graph version 3.0. Most of distributions of the constructs in our samples did not satisfy the assumption of multivariate-normal distribution for SEM by using LISREL or AMOS. Therefore, PLS was suitable for our study because it places minimal restrictions on residual distributions and sample size (Chin, 1998).

## **4. The findings**

### **Measurement Model**

We checked internal reliability of our measurement items based on Cronbach's alpha. It showed satisfactory levels of internal reliability, ranging from 0.910 to 0.983 as seen in table 2. Confirmatory factor analysis (CFA) was performed by checking both convergent validity and discriminant validity. For verifying the convergent validity, 4 criteria should be met as seen in table 3. For verifying the discriminant validity, the square roots of average variance extracted (AVE) of constructs should exceed the inter-correlations among all constructs. Table 2 shows internal reliability and convergent validity and table 3

summarizes the result of convergent validity checking for our study, showing the satisfactory level of the convergent validity. And Table 4 also provides the satisfactory level of the discriminant validity.

**Table 2. Internal Reliability & Convergent Validity**

Construct	CR	AVE	Cronbach's $\alpha$	Items	Factor Loading	Mean	S. Dev.	T-Value
IT support	0.97	0.90	0.96	ITS1	0.93	0.93	0.019	48.73
				ITS2	0.96	0.96	0.009	102.51
				ITS3	0.97	0.97	0.008	126.71
				ITS4	0.95	0.94	0.017	57.21
Intra-Team Social Tie	0.96	0.88	0.93	WTie1	0.96	0.96	0.010	96.64
				WTie2	0.96	0.95	0.008	117.87
				WTie3	0.91	0.90	0.017	53.38
Intra-Team Social Trust	0.99	0.96	0.98	WTru1	0.98	0.98	0.004	223.74
				WTru2	0.98	0.98	0.004	228.33
				WTru3	0.98	0.98	0.007	139.24
Intra-Team Shared Goals	0.95	0.86	0.92	WSGo1	0.89	0.89	0.019	46.03
				WSGo2	0.96	0.96	0.007	135.20
				WSGo3	0.93	0.93	0.012	76.46
Inter-Team Social Tie	0.95	0.85	0.91	BTie1	0.93	0.93	0.014	69.11
				BTie2	0.96	0.96	0.011	87.82
				BTie3	0.88	0.88	0.025	35.29
Inter-Team Social Trust	0.96	0.90	0.94	BTru1	0.92	0.92	0.020	46.24
				BTru2	0.96	0.96	0.009	103.40
				BTru3	0.97	0.97	0.005	187.96
Inter-Team Shared Goals	0.95	0.87	0.93	BSGo1	0.90	0.90	0.019	46.85
				BSGo2	0.96	0.96	0.007	130.07
				BSGo3	0.95	0.95	0.010	91.63
Intra-Team Knowledge Sharing	0.98	0.93	0.96	WKS1	0.96	0.96	0.007	128.99
				WKS2	0.97	0.97	0.005	183.12
				WKS3	0.96	0.96	0.007	129.05
Knowledge Outflow	0.96	0.81	0.94	KOut1	0.90	0.90	0.016	57.59
				KOut2	0.91	0.91	0.017	54.20
				KOut3	0.91	0.91	0.025	36.88
				KOut4	0.89	0.88	0.022	40.13
				KOut5	0.90	0.90	0.021	42.78
Team Performance	0.98	0.91	0.97	TP1	0.93	0.92	0.018	52.06
				TP2	0.96	0.96	0.012	83.51
				TP3	0.97	0.97	0.009	110.78
				TP4	0.96	0.96	0.012	81.75
Knowledge	0.96	0.84	0.95	KIn1	0.85	0.85	0.035	24.41

inflow	KIn2	0.95	0.95	0.012	77.51
	KIn3	0.95	0.95	0.009	101.88
	KIn4	0.90	0.89	0.021	42.83
	KIn5	0.92	0.93	0.013	68.67

**Table 3. The result of convergent validity checking**

	Criteria	Range
Item Loading	equal 0.60 or higher (Hair et al., 1998)	$0.854 \leq \text{Item Loading} \leq 0.984$
Composite Reliability (CR)	over 0.7 (Fornell and Larcker, 1981)	$0.945 \leq \text{CR} \leq 0.987$
Average Variance Extracted (AVE)	0.5 or higher (Fornell and Larcker, 1981)	$0.814 \leq \text{AVE} \leq 0.962$
T-value	over 1.96 (Gefen and Straub)	$24.4 \leq \text{T-value} \leq 228$

**Table 4 Correlation and Discriminant Validity**

	ITS	WTie	WTru	WSGo	BTie	BTru	BSGo	WKS	KOut	KIn	TP
ITS	<b>0.950</b>										
WTie	0.481	<b>0.940</b>									
WTru	0.552	0.892	<b>0.981</b>								
WSGo	0.604	0.836	0.859	<b>0.927</b>							
BTie	0.443	0.708	0.681	0.737	<b>0.923</b>						
BTru	0.539	0.672	0.688	0.829	0.737	<b>0.948</b>					
BSGo	0.551	0.633	0.610	0.764	0.741	0.768	<b>0.935</b>				
WKS	0.477	0.734	0.750	0.659	0.759	0.627	0.637	<b>0.963</b>			
BKOut	0.511	0.517	0.479	0.505	0.591	0.503	0.512	0.677	<b>0.902</b>		
BKIn	0.366	0.433	0.351	0.568	0.470	0.550	0.598	0.575	0.576	<b>0.915</b>	
TP	0.481	0.668	0.699	0.667	0.762	0.654	0.693	0.683	0.588	0.418	<b>0.953</b>

Note: The bold letters indicate the square root of AVEs

ITS: IT Support WTie: Intra-Team Social Tie, WTru: Intra-Team Social Trust, WSGo: Intra-Team Shared Goals, BTie: Inter-Team Social Tie, BTru: Inter-Team Social Trust, BSGo: Inter-Team Shared Goals, WKS: Intra-Team Knowledge Sharing, KOut: Knowledge outflow, Kin: Knowledge Inflow, TP: Team Performance

## Structural Model

Figure 2 shows the structural model and hypotheses testing results. All the hypotheses except H5 were supported. IT support had significant and positive impacts on intra-team social capital, inter-team social capital, and inter-team knowledge sharing. Both intra-team knowledge sharing and inter-team knowledge sharing were found to positively influence team performance.

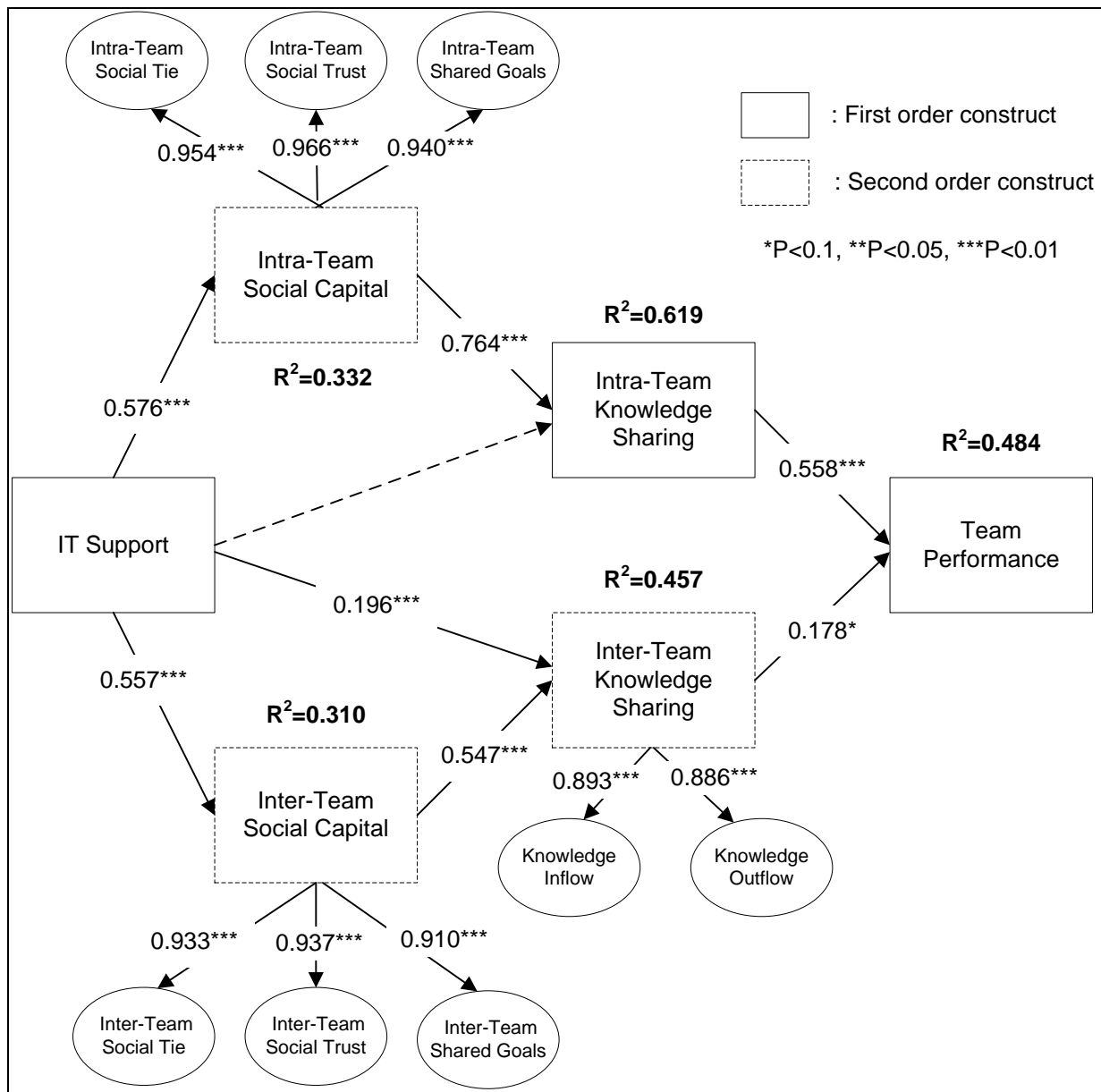


Figure 2 Structural Model and Hypotheses Testing Results

## 5. Summary and Conclusions

Based on 114 team-level data, this study provided empirical evidence that IT support worked as a salient factor to facilitate not only inter-team knowledge sharing but also intra-

and inter-team social capital, which in turn positively influenced team performance. We expect this study to make academic and practical contributions as follow.

For academia, this research sheds a light on how intra- and inter-team social capital leads to team performance. Mediated by intra- and inter-team knowledge sharing, a team's intra- and inter-level social capital were found to play a significant role in increasing team performance. And this study helps to deepen our understanding about the importance of social capital to team knowledge sharing. Social capital is the prominent driver for team knowledge sharing.

This study provides knowledge management practitioners with a strategic guide line on how to increase team knowledge sharing. Providing IT support can be an effective way to increasing team knowledge sharing, mediated by team social capital. Knowledge sharing in a firm is by nature based on interactions among employees. IT support enables team members to interact more conveniently, on which team social capital flourishes.

This research has the following limitations. First, this study is based on the cross-sectional data, so it does not contain the dynamic aspect of team knowledge sharing. Second, team climates or team leader's leadership styles are the important factors to form the team social capital but this study only focuses on IT support. Third, this study collected data from only South Korea. Therefore, it does not reflect the impacts of the cultural gaps on knowledge sharing.

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# Appendix

## Survey Items

Construct	Item	
IT Support	ITS1	Our team is provided with IT support for collaborative works regardless of time and place.
	ITS2	Our team is provided with IT support for communication among team members.
	ITS3	Our team is provided with IT support for searching for and accessing necessary information.
	ITS4	Our team is provided with IT support for systematic storing
Intra-Team Social Capital	WTie1	In general, our team members have a very good relationship with one another.
	WTie2	In general, our team members are very close to one another.
	WTie3	Our team members always have a lengthy discussion with one another.
	WTru1	Our team members know that they will always try and help one another out if they get into difficulties.
	WTru2	Our team members can always trust team members to lend one another a hand if they need it
	WTru3	Our team members can always rely on one another to make their jobs easier.
	WSGo1	Our team members always agree on what is important at work.
	WSGo2	Our team members always share the same ambitions and vision at work.
	WSGo3	Our team members always enthusiastic about pursuing collective goals and missions of the whole team.
Inter-Team Social Capital	BTie1	In general, our team has a very good relationship with other teams.
	BTie2	In general, our team is very close to other teams.
	BTie3	Our team always has a lengthy discussion with other teams
	BTru1	Our team knows that we will always try and help other teams out if they get into difficulties.
	BTru2	Our team can always trust other teams to lend us a hand if we need it.
	BTru3	My team can always rely on other teams to make our jobs easier.
	BSGo1	Our team and the other teams always agree on what is important at work.
	BSGo2	Our team and the other teams always share the same ambitions and vision at work.
	BSGo3	Our team and the other teams always enthusiastic about pursuing collective goals and missions of the whole organization.
Intra-Team Knowledge Sharing	WKS1	Our team members share their work reports and official documents with other team members.
	WKS2	Our team members provide their manuals and methodologies for other team members.

	WKS3	Our team members share their manuals and methodologies for other team members.
Inter-Team Knowledge Sharing	KOut1	My team provides our work reports and official documents to other teams.
	KOut2	My team provides our manuals, methodologies, and models to other teams.
	KOut3	My team provides our experience or know-how from work to other teams.
	KOut4	My team provides know-where or know-whom at the request of members of other teams.
	KOut5	My team provides our expertise from education or training to other teams in a more effective way.
	KIn1	My team gets work reports and official documents from other teams
	KIn2	My team gets manuals, methodologies, and models from other teams
	KIn3	My team gets experience or know-how from work from other teams
	KIn4	My team gets know-where or know-whom at the request of my team members from other teams
	KIn5	My team gets expertise from education or training from other teams in a more effective way
Team Performance	TP1	Going by the current status, this team can be regarded as successful.
	TP2	So far, all team goals have been achieved.
	TP3	The team's output so far is of high quality.
	TP4	The team is satisfied with its performance to this point.