

# KNOWLEDGE SHARING IN VIRTUAL TEAMS: A RESEARCH IN INFORMATION TECHNOLOGY COMPANIES IN VIETNAM

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## ABSTRACT

Nowadays, virtual teams bring both benefits and drawbacks to companies, especially to information technology companies. Improving virtual team performance is a requisite to speed up the development of information technology companies. This article conducts a quantitative research on virtual team members in Vietnam's information technology companies to investigate the relationships between social capital, risk of opportunistic behaviors, knowledge sharing, and team performance in the situation of virtual teams. The study uses SPSS and AMOS to analyze data collected from 268 valid samples. We find out a reliable 15-variable scale which can be used to measure structural social capital, cognitive social capital, rational social capital, risk of opportunistic behaviors, knowledge sharing and virtual team performance. The results show positive effects of structural social capital and cognitive social capital on knowledge sharing and virtual team performance. The findings also reveal negative effects of risk of opportunistic behaviors on knowledge sharing and virtual team performance and a positive correlation between knowledge sharing and virtual team performance. This article can be used as reference for managers to build solutions for improving virtual team performance in information technology companies in Vietnam.

**Keywords:** knowledge sharing; social capital; risk of opportunistic behaviors; team performance; virtual team.

## 1. Introduction

Successful organizations are increasingly using information technology (IT) as a primary trigger to adapt more quickly to ever-changing competitive landscapes and customer requirements (Davidow & Malone, 1992; Jarvenpaa & Ives, 1994). In the context of the increasing de-centralization and globalization of work processes, many organizations have responded to the dynamic environments by introducing virtual teams.

Virtual team (VT) is “a group of people who interact through interdependent task guided by common purpose” and “works across space, time, and organizational

boundaries with link strengthened by webs of communication technologies” (Lipnack & Stamps, 1997). According to Henry & Hartzler (1998), VT is “a group of people who works closely together even though they are geographically separated by miles or even continents” and as “intact workgroups or cross functional groups brought together to tackle a project for a finite period of time through a combination of technologies” A growing number of organizations are implementing VTs or plan to implement VTs in the near future (Lipnack & Stamps, 1997; McDonough *et al.*, 2001) and the use of VTs is expected to continue to grow (Carmel & Agarwal, 2001;

McDonough *et al.*, 2001).

VTs are usually formed for various reasons. Basically, they help improve the organization's ability to source the best talent and to benefit the organization's clients by providing geographically specific services or knowledge (DeRosa & Lepsinger, 2010). VTs also allow organizations to respond faster to increased competition, and provide greater flexibility to individuals working from home or on the road (B. S. Bell & Kozlowski, 2002). Furthermore, improvements in collaborative technology allow VTs to work together in ways that seem impossible to them in the past. Organizations sometimes form VTs through more opportunistic drivers, responding to a particular event or need (DeRosa & Lepsinger, 2010).

While offering a wide range of potential benefits to organizations (Townsend *et al.*, 1998), the implementation of VTs will be risky if organizations fail to adequately address the many challenges present in the virtual context (Iacono & Weisband, 1997; Victor & Stephens, 1994). In Vietnam, many companies have been using VTs as a new form of teamwork. As VTs are still something new, managers should be aware of how to apply this form to their business. IT companies are among those which use VTs most regularly. So, it is necessary to conduct a research on VTs especially in IT companies in Vietnam.

Knowledge sharing is considered a fundamental activity through which employees can contribute to knowledge application, innovation, and ultimately the competitive advantage of the organization (Jackson *et al.*, 2006). Knowledge sharing between team members allows organizations to exploit knowledge-based resources (Cabrera & Cabrera, 2005; Damodaran & Olphert, 2000; Davenport & Prusak, 1998). Much research has shown that knowledge sharing is positively correlated to reduction of production costs, faster completion of new product development projects, team

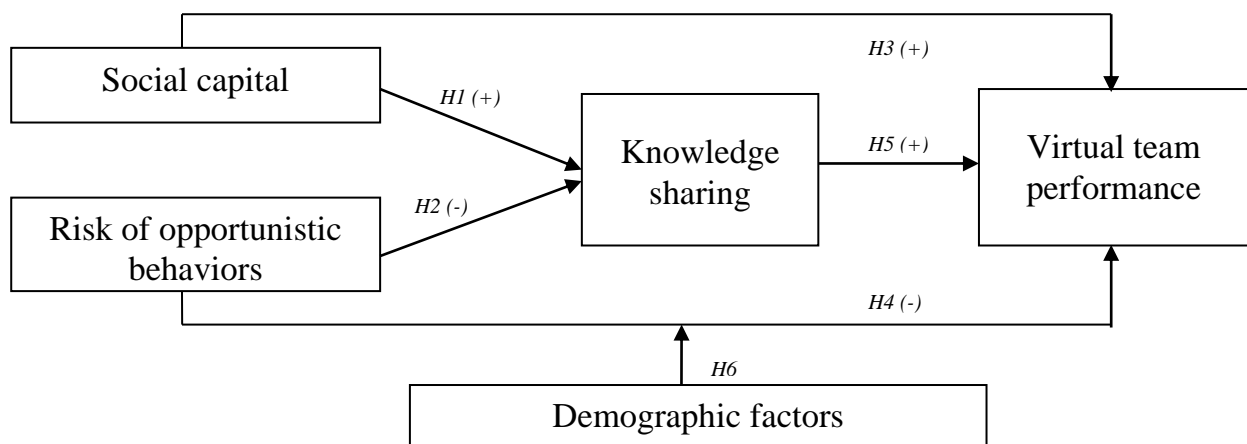
performance, firm innovation capabilities, and firm performance including sales growth and revenue from new products and services (e.g., Arthur & Huntley, 2005; Collins & Smith, 2006; Cummings, 2004; Hansen, 2002; Lin, 2007; Mesmer-Magnus & DeChurch, 2009). Knowledge sharing is vital for effective collaboration in VTs. Hence, organizations need to make efforts to ensure a sufficient share of knowledge among teams. A successful agile VT needs shared knowledge on the tasks and how to get information such as team members, its goal and development process. Though knowledge sharing helps enhance communication and collaboration, VTs face many challenges in terms of values and norms, lack of face-to-face communication, time-zone differences, and difficulties in building and maintaining trust (Moe *et al.*, 2016). The unique characteristics of VTs make it more difficult to share knowledge among the geographically separated members. It is necessary to address this issue by looking at how the process of knowledge transfer takes place in a VT (Hong & Vai, 2008). Hence, conducting a research on knowledge sharing in VTs can be useful both in literature and in reality.

Social capital is an important motivation of knowledge sharing in teams. Social capital typically emphasizes on resources for accomplishing goals and how to allocate these resources in networks of individuals, groups, organizations, or communities (Burt, 2000; Inkpen & Tsang, 2005; Nahapiet & Ghoshal, 1998). Resources arising from social capital are both actual and potential resources that can be exploited in the future (Bourdieu, 1986). Social capital in teams include resources such as information accessibility, mutual trust, and emotional support located in social relationships among team members (Oh *et al.*, 2004). Until now, most research on team social capital has focused on examining the relationship between social capital and team performance (Gupta *et al.*, 2011; Oh *et al.*, 2004; Pil & Leana, 2009; Reagans *et al.*,

2004; Reagans & Zuckerman, 2001; van Emmerik & Brenninkmeijer, 2009). Many studies show a positive relationship between team social capital and team performance, and more recently, between team social capital and virtual team performance. For examples, Robert Jr *et al.* (2008) found that structural and cognitive capital were more important to knowledge integration when communicating by lean digital network than communicating directly by team members; relational capital directly impacted knowledge integration equally, regardless of the communication media used by the team. Knowledge integration, in turn, affected team decision quality, suggesting that social capital influences team performance in part by increasing a team's ability to integrate knowledge. According to Fuller & Summers (2017), a major impact from turnover and the ensuing inconsistency in VT membership is the loss of human and social capital which with ensuing effects on relational development, individual interactions, and behaviors that support the healthy exchange of ideas. Hence, in this article, we examined social capital with its three dimensions (structural, relational, and cognitive) as an antecedent of knowledge sharing, and also virtual team performance.

Inter-organizational relationships are

inherently temporal, unstable, and disfavored (Williamson, 1991). The stability of inter-organizational relationships is affected by factors such as opportunism, complexity in monitoring behaviors, and difficulty in coordination among partners (Park & Ungson, 2001). These characteristics are relevant to knowledge exchange between VT members and affect the success of the cooperative relationship. Depending on the participants' private incentives, inter-organizational relationships may generate either cooperative or competitive behaviors between partners (Gulati, 1995). Cooperative inter-organizational relationships may fail due to opportunistic hazards that arise as each firm pursues its own individual interests rather than collective interests. Opportunistic behaviors may allow immediate gratification of short-term goals of a partner without the need of facing the uncertainty of long-term returns. The vulnerability due to a partner's self-interested behaviors is exacerbated when relevant resources and behaviors are not readily transparent (Park & Ungson, 2001). Concerns about this kind of risk may inhibit VT members from sharing knowledge. Hence, in this article, we suppose that risk of opportunistic behaviors does not facilitate knowledge sharing behavior in VTs and thus negatively affects virtual team performance.



**Figure 1.** Conceptual framework

## 2. Definitions and scales

### 2.1. Social capital

Social capital (SC) has been discussed by many scholars since the seminal works of Bourdieu (1986) and Coleman (1988). It highlights the concerns about cohesion in social dynamics as an important social resource. According to Bourdieu (1986) and Coleman (1988), SC is a reciprocal expectation of economic benefits among individuals and groups through cooperation. Accordingly, many studies have examined the role of SC from different perspectives since economic performance, to human capital development, as well regions and countries development (Nahapiet & Ghoshal, 1998). All of them generating commonalities and at the same time a variety of definitions, because of the broad scope that the subject encompasses: complex network connections between social and economic perspectives (Robison *et al.*, 2002). Recently, many studies have proven the effect of SC on virtual team performance (Chua *et al.*, 2012; Clopton, 2011; Hyejung Lee *et al.*, 2013; Lind & Culler, 2011; Maurer *et al.*, 2011; Powell & Eddleston, 2013; Sparrowe *et al.*, 2001; Stam *et al.*, 2014; Vila *et al.*, 2013; Yu & Junshu, 2013).

Nahapiet & Ghoshal (1998) define three dimensions of SC - structural, cognitive and relational. The structural SC (SSC) is defined as the social interactions, including the patterns and strength of ties, among the members of a collective (Pearson *et al.*, 2008). It includes the number and intensity of available relationships, how members address each other, and the proportions of strong, weak or conflicting relationships. The cognitive SC (CSC) is several resources providing shared representations, interpretations, and systems of meaning among parties (Nahapiet & Ghoshal, 1998). Moreover, it comprises the group's shared vision and purpose, its unique language, and deeply embedded narratives and culture (Pearson *et al.*, 2008). In other

words, the cognitive dimension refers to the way members perceive their reality. Lastly, the relational SC (RSC) comprises the resources created through personal relationships including trust, norms, obligations, and identity (Nahapiet & Ghoshal, 1998).

In this article, SSC is measured using four items adapted from Chow & Chan (2008) and Nahapiet & Ghoshal (1998) including: *"In general, I have a very good relationship with my partners"* (SSC\_1), *"My partners know what knowledge I have at my disposal"* (SSC\_2), *"I know what knowledge could be relevant to which partner"* (SSC\_3), *"In my VT, I know who has knowledge that is relevant to me at their disposal"* (SSC\_4). CSC is measured using three items adopted from Chow & Chan (2008) including: *"My partner and I always agree on what is important at work"* (CSC\_1), *"My partners and I always share the same ambitions and vision at work"* (CSC\_2), *"My partners and I are always enthusiastic about pursuing the collective goals and missions of the whole organization"* (CSC\_3). RSC is measured using a four-item scale derived from Chow & Chan (2008) and Nahapiet & Ghoshal (1998) including: *"I feel connected to my partners"* (RSC\_1), *"I know my partners will always try and help me out if I get into difficulties"* (RSC\_2), *"I can trust my partners to lend me a hand if I need it"* (RSC\_3), *"I can rely on my partners when I need support in my work"* (RSC\_4). The SC items are rated on a five-point Likert scale ranging from 1 ("strongly disagree") to 5 ("strongly agree").

### 2.2. Knowledge sharing

Knowledge sharing (KS) is a process of communication between two or more participants involving the acquisition and provision of knowledge (Heeseok Lee & Choi, 2003; Lin, 2007). KS processes can be classified into knowledge collecting (KC) and knowledge donating (KD) (Van den Hooff & de Leeuw van Weenen, 2004; Van Den Hooff

& De Ridder, 2004). KC entails “consulting colleagues in order to get them to share their intellectual capital” (Van Den Hooff & De Ridder, 2004, p.118) whereas KD entails “communicating to others what one’s personal intellectual capital is” (Van den Hooff & De Ridder, 2004, p.118).

In this article, a three-item scale developed by Van den Hooff & Van Weenen (2004) is used to measure KC including: “*I share information I have with partners when they ask for it*” (KC\_1), “*I share my skills with partners when they ask for it*” (KC\_2), “*Partners in my VT share their skills with me when I ask them to*” (KC\_3). KD is measured using a three-item scale adapted from an investigation by Van den Hooff & Van Weenen (ibid), including: “*When I have learned something new, I tell my partners about it*” (KD\_1), “*When they have learned something new, my partners tell me about it*” (KD\_2), “*KS among partners is considered normal in my VT*” (KD\_3). The items are rated on a five-point Likert scale ranging from 1 (“strongly disagree”) to 5 (“strongly agree”).

### 2.3. Risk of opportunistic behaviors

Opportunism (opportunistic behaviors) means self-interest seeking with guile, involving some kind of deliberate deceit and the absence of moral restraint (Williamson, 1985). It could include deliberately withholding or distorting information, performance shirking, or failing to fulfill promises and obligations. It occurs in business transactions especially where performance measures are ambiguous, and where goals of trading partners are incongruent (Ouchi, 1980). Risk of opportunistic behaviors (ROB) is an inherent threat in any inter-organizational relationship – e.g. VTs. To the extent a dyadic relationship entails KS between VT members, the very exchange process is vulnerable to this risk. This is the case motivated by self-interest in any dyadic exchange scenario – the self-interest case.

In this article, ROB is measured using

four-items adapted Parkhe (1993), including: “*Complete honesty does not pay when dealing with my partners*” (ROB\_1), “*Sometimes my partners alters the facts of VT process in order to get what they need*” (ROB\_2), “*My partners has sometimes promised to do things without actually doing them later*” (ROB\_3), “*My partners seem to feel that it is OK to do anything in their means that will help further their interests*” (ROB\_4). The items are rated on a five-point Likert scale ranging from 1 (“strongly disagree”) to 5 (“strongly agree”).

### 2.4. Virtual team performance

The extent to which a team's output meets or exceeds its key stakeholders' standards is a core indicator of team performance (Hackman & Walton, 1986). In this article, we rely on assessments from each VT member's response to evaluate virtual team performance (VTP). These responses are based on their perception of their VTP. Using a five-point agreement scale ranging from 1 (“strongly disagree”) to 5 (“strongly agree”), each VT member scored his/her VT on four-items: “*I was 100% satisfied with the outcome of this VT*” (VTP\_1), “*Based on my satisfaction with this year's audit, I am very likely to recommend this VT to other partners*” (VTP\_2), “*This VT communicated effectively (i.e., in a timely, clear, concise, non-confrontational way) with me*” (VTP\_3), “*This VT was excellent in communicating the value of it to me*” (VTP\_4).

### 2.5. Demographic factors

Team members’ characteristics affecting team performance are of interest to researchers and practitioners (e.g., S. T. Bell, 2007; Carpenter *et al.*, 2004). A particular interest is how diversity on team member demographic variables (e.g., race, age, educational background) is related to team performance (e.g., Ancona & Caldwell, 1992; Kochan *et al.*, 2003; Mannix & Neale, 2005; Milliken & Martins, 1996; Pelled *et al.*, 1999). The increased attention paid to demographic diversity is primarily due to the

changing nature of the workforce and to social policy concerns surrounding diversity issues (Jackson *et al.*, 1995).

To study the effects of demographic diversity on VTs, 07 demographic factors (DFs) are examined including: (1) characteristics of individual such as Sex (DF\_S), Position in VT (DF\_P), Age (DF\_A); (2) characteristics of VT such as Team size (DF\_TS), Team lifespan (DF\_TL); (3) characteristics of company such as Company's size (DF\_CS).

### 3. Hypotheses

10 hypotheses about 03 groups of relationships are made including:

- Hypotheses about the relationships between SC, ROB and KS: [H1a] SSC has a positive effect on KS; [H1b] CSC has a positive effect on KS; [H1c] RSC has a positive effect on KS; [H2] ROB has a negative effect on KS.

- Hypotheses about the relationships between SC, ROB and VTP: [H3a] SSC has a positive effect on VTP; [H3b] CSC has a positive effect on VTP; [H3c] RSC has a positive effect on VTP; [H5] ROB has a negative effect on VTP.

- Hypotheses about the relationships between KS and VTP: [H4] KS has a positive effect on VTP.

- Hypotheses about the moderating effect of demographic factors: [H6] There are differences in CSC, SSC, RSC, ROB, KS and VTP depending on DFs.

### 4. Research methodology

Research objects are individuals. A quantitative research is conducted by sending questionnaires via Google docs to VT members who are working in VTs at IT companies in Vietnam. Non probability – convenience sampling, using 02 sort-out questions in the beginning of questionnaire, including: [Q1] Being a member of (at least) a VT in an IT company in Vietnam; [Q2] Spending (at least) 50% of working time on doing tasks in that VT. Only the answers who

say "Yes" to both these 02 questions are chosen as research objects.

In the middle section of questionnaire, the ratings of agreement on 25 variables are collected (including 04 variables for SSC, 04 variables for RSC, 03 variables for CSC, 03 variables for KC, 03 variables for KD, 04 variables for ROB, and 04 variables for VTP).

The last section of questionnaire contains 06 questions about DFs. There are 268 valid samples (excluded 26 invalid samples) meeting the requirement of minimum sample size. After being coded and cleaned, data are analyzed by SPSS and AMOS with these statistical tools: descriptive statistics, exploratory factor analysis (EFA), confirmatory factor analysis (CFA), structural equation modeling analysis (SEM), and analysis of variance (ANOVA).

## 5. Research results

### 5.1. Descriptive statistics

#### 5.1.1. Characteristics of individual

(1) *Sex (DF\_S)*: 155 male (57.84%) and 113 female (42.16%).

(2) *Position in VT (DF\_P)*: 20.15% managers of at least 01 VT; 79.85 % not a manager of any VT.

(3) *Age (DF\_A)*: 35.07% from 26 to 35; 22.39% from 36 to 45; 20.52% from 46 to 55; 16.79% under 26; and 5.22% above 55.

#### 5.1.2. Characteristics of VT

(1) *Team size (DF\_TS)*: 52 VTs have 7 members (19.40%); 50 VTs have 6 members (18.66%), 47 VTs have 5 members (17.54%); 37 VTs have 4 members (13.81%); 26 VTs have 10 members (9.7%); 21 VTs have 3 members (7.84%); 16 VTs have 8 members (5.97%); 11 VTs have 9 members (4.1%); and 8 VTs have more than 10 members (2.99%).

(2) *Team life-cycle (DF\_TL)*: 85 VTs exist from 3 months to under 6 months (31.72%); 72 VTs exist more than 1 year (26.87%); 61 VTs exist from 6 months to under 1 year (22.76%); 33 VTs exist from 1 month to under 3 months (12.31%); 17 VTs exist under 1 month (6.34%).

### 5.1.3. Characteristics of company

Company's size (DF\_CS): 215 respondents are working in small sized companies (80.22%), 53 respondents are working in medium sized companies (19.78%), no respondents works in large sized companies.

## 5.2. Research model and hypothesis testing

### 5.2.1. Exploratory factor analysis (EFA)

KMO coefficient is  $0.841 > 0.5$ , Barlett's

accreditation is 6367.827 with  $\text{sig} = 0.000 < 0.05$  thus EFA is appropriate to research data. EFA result is 6 components extracted from 22 variables, just as research models have been proposed. EFA factor loadings of 22 variables are from 0.641 to 0.951 ( $> 0.5$ ). The total average variance extracted (AVE) is 72.49% explaining more than 70% of the variation of the data set (Table 1).

**Table 1**

The results of exploratory factor analysis (EFA) and Cronbach's Alpha analysis

Latent variables	Observable variables	EFA	Cronbach's alpha	Eigenvalues
Structural social capital	SSC_1	0.719	0.823	4.176
	SSC_2	0.739		
	SSC_3	0.748		
	SSC_4	0.780		
Cognitive social capital	CSC_1	0.829	0.823	1.263
	CSC_2	0.775		
	CSC_3	0.780		
Rational social capital	RSC_1	0.681	0.815	2.930
	RSC_2	0.829		
	RSC_3	0.811		
	RSC_4	0.754		
Knowledge sharing	KC_1	0.779	0.868	8.685
	KC_2	0.876		
	KC_3	0.915		
	KD_1	0.861		
	KD_2	0.903		
	KD_3	0.917		
Risk of opportunistic behaviors	ROB_1	0.850	0.814	1.558
	ROB_2	0.803		
	ROB_3	0.702		
	ROB_4	0.643		
Virtual team performance	VTP_1	0.942	0.903	2.553
	VTP_2	0.875		
	VTP_3	0.925		
	VTP_4	0.729		

### 5.2.2. Reliability analysis by Cronbach's Alpha

Cronbach's Alpha coefficients of all components are from 0.709 to 0.935 ( $> 0.70$ ). In each scale, corrected item-total correlation  $> 0.40$ , each Cronbach's Alpha if item deleted is not greater than Cronbach's Alpha of scale. Thus, all components meet requirements (Hair *et al.*, 2014).

### 5.2.3. Confirmatory factor analysis (CFA)

CFA is carried out to test how well the measured variables represent the number of constructs. First CFA result shows that the prob. of a type-I error of ROB\_4's is  $0.48 < 0.5$  thus ROB\_4 is eliminated. Continuing to

use CFA, relying on MI to eliminate KC\_2, KC\_3, VTP\_2, VTP\_3, RSC\_3, KS\_2, RSC\_4, SSC\_3, and ROB\_2. The improved scale are compatible with the data with Chi-square ( $\chi^2$ )/dF = 3.605; GFI = 0.904; TLI = 0.894; CFI = 0.928; RMSEA = 0,090 (Byrne, 2010). CFA loadings of all variables are from 0.621 to 0.951.

Average variance extracted (AVE) of all components are from 0.510 to 0.742 ( $> 0,5$ ) thus the scale establishes convergence validity (Fornell & Larcker, 1981). Because AVE of all components are greater than  $r^2$ , all components establish discriminant validity (Hair *et al.*, 2014) (Table 2).

**Table 2**

The scale of social capital, risk of opportunistic behaviors, knowledge sharing and virtual team performance

Latent variables	Observable variables		CFA	CR	AVE
Structural social capital	SSC_1	<i>In general, I have a very good relationship with my partners</i>	0.621	0.757	0.742
	SSC_4	<i>In my VT, I know who has knowledge that is relevant to me at their disposal</i>	0.706		
	SSC_2	<i>My partners know what knowledge I have at my disposal</i>	0.823		
Cognitive social capital	CSC_3	<i>My partners and I are always enthusiastic about pursuing the collective goals and missions of the whole organization</i>	0.711	0.779	0.564
	CSC_2	<i>My partners and I always share the same ambitions and vision at work</i>	0.777		
	CSC_1	<i>My partners and I always agree on what is important at work</i>	0.852		
Rational social capital	RSC_1	<i>I feel connected to my partners</i>	0.758	0.817	0.510
	RSC_2	<i>I know my partners will always try and help me out if I get into difficulties</i>	0.723		
Knowledge sharing	KC_1	<i>I share information I have with partners when they ask for it</i>	0.744	0.800	0.681
	KD_3	<i>KS among partners is considered normal in my VT</i>	0.815		



Latent variables	Observable variables		CFA	CR	AVE
	KD_1	<i>When I have learned something new, I tell my partners about it</i>	0.951		
Risk of opportunistic behaviors	ROB_1	<i>Complete honesty does not pay when dealing with my partners</i>	0.823	0.785	0.527
	ROB_3	<i>My partners has sometimes promised to do things without actually doing them later</i>	0.811		
Virtual team performance	VTP_4	<i>This VT was excellent in communicating the value of it to me</i>	0.945	0.810	0.650
	VTP_1	<i>I was 100% satisfied with the outcome of this VT</i>	0.906		

#### 5.2.4. Structural equation modeling analysis (SEM)

SEM result with ML estimation shows that the model conforms to Chi-square ( $\chi^2$ )/dF = 1.474 (<3) with  $p=0.000$ , AGFI=0.839 (>0.8); TLI = 0.928, CFI = 0.936 (>0.9); RMSEA = 0.043 (<0.08). CSC has a positive effect on KS with  $\gamma = 0.241$  ( $p = 0.001$ ), CSC has a positive effect on VTP with  $\gamma = 0.380$  ( $p = 0.000$ ), thus [H1a] and [H3a] are supported. SSC positively affects KS with  $\gamma = 0.261$  ( $p = 0.000$ ) and SSC positively affects VTP with  $\gamma = 0.232$  ( $p =$

0.000), thus [H1b] and [H3b] are supported. KS positively affects VTP with  $\gamma = 0.267$  ( $p = 0.001$ ), thus [H5] is supported. ROB negatively affects KS with  $\gamma = -0.231$  ( $p = 0.008$ ), ROB negatively affects VTP with  $\gamma = -0.345$  ( $p = 0.000$ ), thus [H1c] and [H3c] are supported. Although RSC has a negative effect on KS with  $\gamma = -0.199$  ( $p = 0.102$ ) and RSC has a negative effect on VTP with  $\gamma = -0.120$  ( $p = 0.209$ ), but  $p > 0.05$ , so these effects are not statistically significant, [H1c] and [H3c] are not supported (Hair *et al.*, 2014) (Table 3).

**Table 3**

The relationships between components of scale

Hypothesis	Relationship	Estimate - $\gamma$	SE	CR	p-value	Result
H1a	KS <- SSC	0.241	0.072	3.232	0.001	Supported
H1b	KS <- CSC	0.261	0.096	3.495	***	Supported
H1c	KS <- RSC	-0.199	0.107	-1.753	0.102	Not supported
H2	KS <- ROB	-0.231	0.057	-2.637	0.008	Supported
H3a	VTP <- SSC	0.380	0.096	5.568	***	Supported
H3b	VTP <- CSC	0.232	0.116	3.797	***	Supported
H3c	VTP <- RSC	-0.120	0.127	-1.260	0.209	Not supported
H4	VTP <- ROB	-0.345	0.070	-4.622	***	Supported
H5	VTP <- KS	0.267	0.074	5.411	***	Supported

### 5.2.5. Analysis of variance (ANOVA)

ANOVA test is used to analyze the differences of SSC, CSC, RSC, ROB, KS, and VTP depending on DFs. The result shows differences among CSC depending on Sex (DF\_S); differences among KS depending on Position in VT (DF\_P); differences among

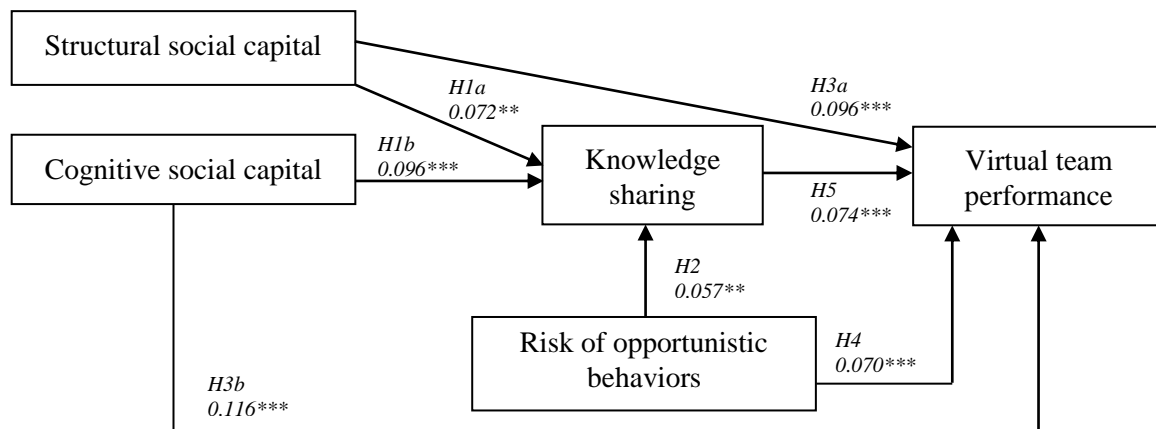
RSC and among KS depending on Age (DF\_A). There's no difference among components depending on Team size (DF\_TS), Team lifespan (DF\_TL) and Company's size (DF\_CS). Differences of few components depending on DFs, [H6] are not supported (Table 4).

**Table 4**

The differences of components depending on DFs

DFs	SSC	CSC	RSC	ROB	KS	VTP
DF_S	-	X**	-	-	-	-
DF_P	-	-	-	-	X**	-
DF_A	-	-	X***	-	X*	-
DF_TS	-	-	-	-	-	-
DF_TL	-	-	-	-	-	-
DF_CS	-	-	-	-	-	-

In sum, 7 out of 10 hypotheses are supported, including [H1a], [H1b], [H2], [H3a], [H3b], [H4], and [H5].



**Figure 2.** Theoretical model after tested (\*p<0.05; \*\*p<0.01; \*\*\*p<0.001)

## 6. Theoretical contributions and limitations

This article investigates the effects of social capital, risk of opportunistic behaviors and knowledge sharing on virtual team performance based on the fact that virtual-teamwork is increasingly popular while there was too few research on this topic. Based on the theories of social capital, risk of opportunistic behaviors, knowledge sharing and virtual team performance, we conduct a

quantitative research using SPSS and AMOS to analyze the data collected by questionnaire.

The result employs a reliable 15-variable scale to measure structural social capital, cognitive social capital, rational social capital, risk of opportunistic behaviors, knowledge sharing and team performance in virtual team. The result reveals positive effects of structural social capital and cognitive social capital on knowledge sharing and virtual team

performance as well as positive effects of knowledge sharing on virtual team performance. It also shows negative effects of risk of opportunistic behaviors on knowledge sharing and virtual team performance as well as negative effects of rational social capital on knowledge sharing and virtual team performance. However, these results are not statistically significant.

Although we use sort-out questions, data is obtained conveniently so it should not be equal and random. Besides, quantitative research should be conducted at team level instead of at individual level to enhance the validity of the result. However, future studies should approach these concepts from multidimensions to investigate insight into the effects of social capital, risk of opportunistic behaviors and knowledge sharing on virtual team performance. The result can be improved by adding more observable variables into the model, expanding sample size, changing sample selection method, performing qualitative research before quantitative research to better adjust the scale of IT companies in Vietnam.

### **7. Practical implications and conclusions**

It is essential for organizations to be more flexible and adaptable in their operations due to stricter competitive environment. This leads to an increase in organizations using virtual environments, especially using virtual teams in their work. Many researches have examined the nature of virtual teams with special interests in improving virtual team interactions and subsequent performance. However, few researches were conducted to better understand social- psychological contributors affecting virtual teams, especially in Vietnam. This

article, therefore, can serve as a useful reference for managers to build solutions to improve virtual team performance in information technology companies in Vietnam.

This research gives both team leaders and members the practical and valuable insight into issues affecting virtual teams. First, the findings show a positive relationship between knowledge sharing and virtual team performance. We suggest that knowledge sharing behavior is an important mediator for transforming social capital of members to virtual team performance. Two resources of social capital (resources for providing shared representations, interpretations, meaning systems among members and resources from personal relationships such as trust, norms, obligations, and identity) considerably affect the communication process between members sharing the knowledge. Second, the findings suggest that managers pay special attention to the risks of opportunistic behaviors within virtual team because of their negative effect on both knowledge sharing and virtual team performances. The risks include deliberately withholding or distorting information, performance shirking, or failing to fulfill promises and obligation.

In conclusion, this article shows that virtual teams can be helped improve their performance by developing a dynamic knowledge sharing capability, structural and cognitive social capital. Besides, it also proves that reducing opportunistic behaviors is necessary to enhance both knowledge sharing capability and virtual team performance. Hopefully, the results can be referred to as valuable tool for both researchers and managers interested in virtual team performance■

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