

# The Role of Interpersonal Trust in On-line Learning Communities and Application of Knowledge

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## ABSTRACT

Interpersonal trust has become essential for online communities because people have managed to be in a situation without face-to-face encounters. To identify the structural relationships between interpersonal trust and learning performance, we analyzed the relationship between two types of trust, namely, cognitive and affective, as well as two dimensions of learning performance, namely, learning satisfaction and knowledge application. We also identified the moderating role of social norms in the relationship between trust and learning performance. Results of analysis are as follows. First, cognitive trust significantly affected the two dimensions of performance. Second, affective trust exhibited a significant effect on learning satisfaction, but did not affect knowledge application. Third, the relationships between the two performance factors were significant and direct. Lastly, social norms appeared to moderate the effects of cognitive trust on knowledge application and affective trust on satisfaction. These findings suggest that organizations, which would like to optimize task-oriented performance of their learning communities, should consider linking strategies between community satisfaction and practical knowledge application.

*Keywords:* Interpersonal Trust, Community, Satisfaction, Knowledge Application, Social Norms

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## 1. Introduction

When using virtual knowledge communities as a learning tool, it becomes necessary to 'manage invisible people' (Handy, 1995) so interpersonal trust becomes an important variable (McKnight et al., 1998; Newall and Swan, 2000). Although it is difficult to develop interpersonal trust in the virtual situation,

if interpersonal trust is assured in a learning community, it will become possible for the community to utilize the strength of both face-to-face learning based on intimacy and virtual learning based on ubiquity at the same time.

Recent studies have demonstrated that multiple peers can be more effective than expert-novice relationships in terms of knowledge 'refinement' because

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peers are 'closer' to each other and therefore understand each other's perspective better. Experts usually do not 'think' like novices because they have mental models that are not close to those of their pupils (Chase and Simon, 1973; Chi et al., 1981; Cho et al., 2006; King, 2007). Organizations have also identified limitations of repository-based knowledge management system (Leonardi and Treem, 2012) and have started to become interested in community-based knowledge management systems such as CoPs (Communities of Practice).

Moreover, repository-based knowledge management systems need on-going monitoring and updating by experts in every domain of uploaded ideas, but this is not practically possible. Instead, it is easier for people to share and refine knowledge in peer-based knowledge communities. In addition, virtual organizations have been used as a learning tool based on information and communication technologies to learn and cooperate beyond the limitations of time and space (King, 2007; Teigland et al., 2014).

Hierarchies based on expertise do not exist in the learning process based on knowledge communities, so the cognitive and psychological conditions of learners have greater effects on performance than in the expert-novice learning process (Paul and McDaniel, 2004). There have been many studies on the independent variables of learning performance such as internal motivation (e.g., participation, playfulness, personal growth), external motivation (e.g., reciprocity, practicability, reward), and leaders' commitment.

Interpersonal trust has been found as an effective risk reduction mechanism in knowledge sharing and learning environment (George and Jones, 1998; Gefen, 2000; Zhang, 2007; Kim et al., 2009; Jong and Elfiring, 2010). However, the relationship between

specific types of interpersonal trust and task performance in on-line environment has rarely been examined. Therefore, the current study examines the structural relationships between two different types of interpersonal trust and knowledge application performance in online learning communities.

To meet the research goals, we examined prior research and developed a model and hypotheses on the relationship between interpersonal trust and learning performances. In addition to the independent variables of two types of interpersonal trust, we analyzed the moderating effect of social norms on the relationship between interpersonal trust and learning performances because previous studies on human interactions have argued that social pressure can enforce individuals' attitude and behaviors toward knowledge sharing (Bock et al., 2005; Hsu and Lin, 2008). We then gathered data based on a well-structured questionnaire and empirically analyzed them using structured equation modeling methodology.

## II. Prior Research

### 2.1. Interpersonal Trust in Online Learning Communities

Trust is evolving from a means of reducing the initial cost of transaction and covering the imperfection of a contract (Williamson, 1981, 1993) to being a key factor (Goshal and Moran, 1996; Newell and Swan, 2000; Sako, 1998) that affects learning through increasingly vague and non-structural decision-making and the performance of a cooperative relationship involving factors such as innovation (Gefen, 2000; Mason and Mitroff, 1973; Newell and Swan, 2000; Sako, 1998; Zand, 1972).

According to Moon et al. (2011), trust has three perspectives. First, a personality perspective looks at trust as qualitative characteristics that are initially created through experience and are stably maintained (Kee and Knox, 1970; McKnight et al., 1998). Second, a behavior perspective argues that there is trust for a counterpart when one shows trustworthy behaviors in terms of cooperating and taking risks for them (Clark and Payne, 1997; Lewicki et al., 2006). Lastly, a psychological state perspective claims that there is an intention of trusting and cooperating with a counterpart by taking risks based on positive expectation (Mayer et al., 1995; Schoorman et al., 2007). In empirical research, trust is usually uni-dimensional or has two dimensions. Many studies that use two dimensional trust as a variable classifies trust as affect-based/cognition-based (McAllister, 1995) or calculus-based/identification-based (Lewicki and Bunker, 1995).

A number of researchers have presented evidence that trust enhances cooperative behavior, a critical component of collaboration (Axelrod, 1984; Folger et al., 2000; Mayer et al., 1995; McAllister 1995). Jones and George (1998) suggest seven distinct processes that are promoted by trust and may increase interpersonal cooperation and teamwork: broad and flexible role definitions, a communal rather than individualist orientation, high levels of confidence in others, help-seeking behavior, free exchange of knowledge and information, subjugation of personal needs and ego, and high levels of involvement in the activities of others. These processes identify trust as an important factor that enables collaboration.

Trust is considered critical in virtual interactions because collaboration can be effective only if both parties enter into a mutual relationship with a willingness to cooperate in solving a problem and learning (Jarvenppa, 1998). Collaboration requires intensive interaction that creates dependencies, which related

parties could exploit if they so desired. Trust is the key factor that links collaborators by fostering the faith that both parties will contribute and not behave opportunistically (Brown et al., 2004).

Currently, more and more researches have become interested in the role of trust in on-line communities and social media environment. Trust has significant positive effect on knowledge contribution via empathy in patent online communities (Zhao et al., 2013), on knowledge sharing in the virtual teachers communities (Chen et al., 2014), and on platform credibility in multi-brand online communities (Hung et al., 2011). Hakami et al. (2014) present trust as one of the “factors affecting the sharing of knowledge in social media” based on previous studies on knowledge sharing, intellectual capital exchange, on-line transactions, and virtual communities. Palmer and Huo (2013) prove the significant role of trust over time in social media environment.

## 2.2. Performance of Online Learning Communities

Hackman (1987) defined team performance as ‘the scope in which the productive output of a team meets or exceeds the performance standards of those receive and evaluate the output’. Team performance includes teamwork, which is a set of interrelated cognitions, attitudes, and behaviours contributing to its dynamic processes (Salas et al., 2008). Jong and Elfring (2010) suggest that it is positively related to intra-team trust since trust facilitates interaction among team members as they overcome uncertainty and vulnerability. This means that without trust, team members will avoid active interactions and processes to protect themselves from vulnerability, which will negatively affect the team performance (Dirk, 1999; Mayer and Gavin, 2005).

On the other hand, organizational performance is a relevant factor for measuring success and organizational effectiveness. Anderson (2006) describes the concept of effectiveness as a ratio, suggesting two entities used when defining and measuring effectiveness. He also suggests that effectiveness is a degree of goal attainment, which means the achievement of financial profitability goals. Schermerhorn et al. (2002) indicate that performance refers to quality and quantity of individual or group achievement. Hancott (2005) also comments that a number of measurements such as profit growth rate, net or total assets growth rate, return on sales, shareholder return, growth in market share, number of new products, and return on net assets have been used to evaluate organizational performance since the mid-1990s.

Hackman (1987) suggests that team effectiveness as an indicator to evaluate the outcomes of team performance processes relative to some set of criteria. The definitions of performance and effectiveness on the team level are same as the definitions on the individual level - performance refers to the activities executed while completing a task; while effectiveness refers to evaluation of the outcomes of that activity (Fitts and Posner, 1967; Motowildo, 2003). Furthermore, Wong and Burton (2000) argue that technological factors with a greater effect on the facilitation of coordination may have a high performance impact on virtual context teams. Moreover, social factors that might reduce the incurrence of errors will have a higher performance impact on virtually composed teams.

In our review of related researches, most studies examine the relationship between trust and uni-dimensional performance of the community such as knowledge sharing and community satisfaction. Therefore, this research examines the relationship between trust and multi-dimensional performance

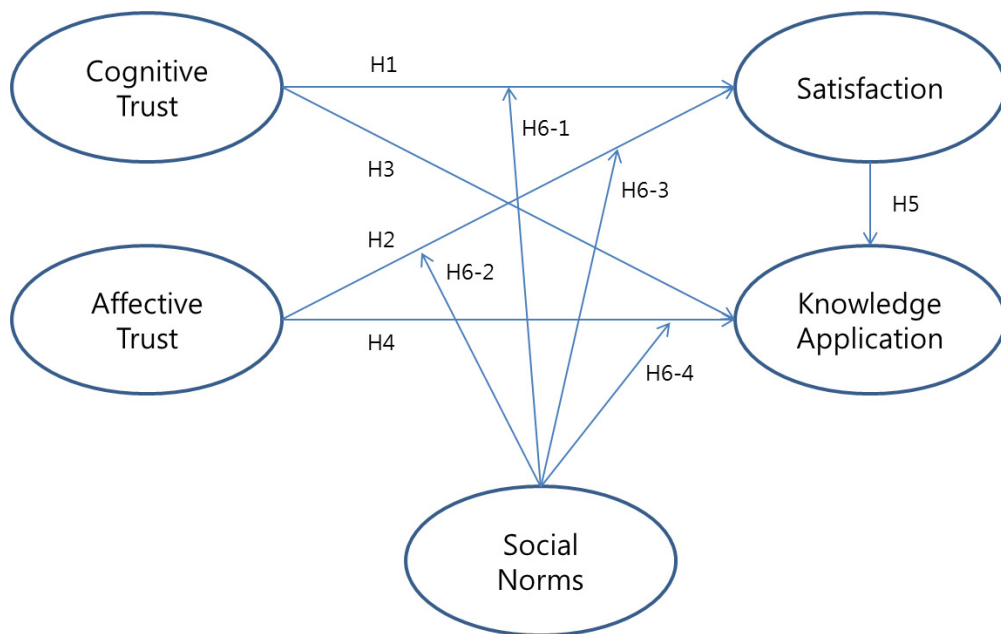
by suggesting additional factors that constitute performance. This will help resolve the limitations that existed in prior research studying the relationship between trust and performance.

### III. Research Model and Hypotheses

Our research model is shown in <Figure 1>. Trust consists of cognitive trust and emotional trust, whereas performance is represented by satisfaction and knowledge application. Our research model shows the causal relationships between the trust factors and multi-dimensional performance. Furthermore, it describes the relationships among the three performance factors. The rationale for the model is discussed and the relevant hypotheses of the model are presented below.

Trust determines the nature of interpersonal relationships (Jarvenpaa et al., 1998). People are more willing to help others and to request help from others in a trusting environment (Luhmann, 1979). If there is trust among the individuals, people are more willing to engage in shared activity (Fukuyama, 1995) and in the virtual community environment such shared activity is in the form of cooperative information exchange. Hence, increased trust would promote increased information sharing and acceptance between members in the virtual community (Ridings et al., 2002).

Previous studies have defined trust as a multi-dimensional construct that has both cognitive (e.g., competence, reliability, and professionalism) and affective (e.g., caring, benevolence, and emotional connection to each other) elements (Lewis and Weigert, 1985; McAllister, 1995). As such, Kanawattanachai and Yoo (2007) define cognition-based trust as team members' beliefs about one another's ability and reli-



<Figure 1> Research Model

ability to execute the required task. Cognition-based trust also refers to the calculative and rational characteristics demonstrated by the trustee.

On the other hand, affect-based trust is considered to involve the emotional elements and social skills of trustees. Care and concern for the welfare of partners has been referred to as the basis for affect-based trust (McAllister, 1995). Affect-based trust has been studied in the context of close social relationships such as couples, family members, and close friends, whereas cognition-based trust was studied mainly in the context of working groups (Boon and Holmes, 1991). Although affect-based trust is typically regarded as important in the context of close social relationships, it also affects the performance and condition of teams working in group environments, such as in cases where one member takes another's problem as their own and is eager to assist the party in need even if help is not asked for (McAllister, 1995).

Trust is often referred to as a key determinant of group performance (Golembiewski and McConkie, 1988) because trust increases the abilities of members in the group to collaborate to achieve better outcome. Both in terms of effectiveness and efficiency, trust is expected to improve the performance of the group by helping individuals to work together in a cooperative relationship (Dirks, 1999). Thus, effectiveness is expected to be positively related to trust. In addition, trust may increase individuals' level of cooperation and motivation to work together, which in turn may enhance the group's execution of its task, thus improving the overall performance (Larson and LaFasto, 1989).

The assumption that a high level of trust increases the possibility that an individual will take a risk in terms of cooperating and sharing information with another party or group is expected to result in higher performance (Dirks, 1999). Dirks and Ferrin (2001) also suggest that trust may moderate the relationship

between group processes and performance rather than affecting performance directly. Trust is considered a multi-component variable including various behaviors such as cooperation and lack of monitoring, supporting the idea of a major positive effect of trust on team performance (Costa, 2003). In the team setting of an organization, performance is evaluated from a management perspective in that team members develop the best understanding of how well their team performs tasks with respect to their objectives. Further, perceived task performance is strongly related to more objective measures and relationship continuity (Smith and Barclay, 1997). This leads to the proposal of a positive relationship between trust in team settings and perceived task performance (Costa, 2003).

### 3.1. Satisfaction as a Dimension of Performance

Customer satisfaction is defined as a customer's cognitive and affective state of fulfillment after the purchase is made (McKinney et al., 2002). Based on prior research (Bhattacharjee, 2001; McKinney et al., 2002), Kim et al. (2009) conceptualize satisfaction as an affective state representing the consumer's emotional reaction to e-commerce transactions through the selling entity on the Internet. Thus, satisfaction is regarded as an output of a customers' judgment resulting from observations of performance (Oliver, 1999). Research by Dwyer et al. (1987) supported a positive relationship between trust and satisfaction. This implies that trust raises the levels of performance, which then leads to higher satisfaction in the future.

In studies of marketing channels, trust has been referred to business partner dependability. Mohr and Nevin (1990) examined the effect of trust on relationship quality, reflected by high levels of cooperation

and satisfaction along with low levels of conflict. Trust is a direct determinant of a firm's satisfaction with its channel partner (Kim et al., 2009). This is consistent with the hypothesis suggested by Grewal et al. (1999) that 'the greater the degree of trust of a firm in its channel partner, the greater will be the satisfaction of the firm with the exchange relationship'. From a customer's perspective, satisfaction is a specialized form of evaluation to analyze the value of what is being provided (Kim et al., 2009). As such, satisfaction is a kind of performance measure. Leimsister et al. (2006) argued that the success of a virtual community can be measured from different perspectives according to the different entities within a virtual community and identified member satisfaction as the indicator used to determine the success of virtual communities in terms of measuring performance. Both satisfaction and commitment have been strongly associated with trust, and there is a strong link between intra-group processes and satisfaction (Gladstein, 1984). Further, Smith and Barclay (1997) argue that trust behaviors of open communication and endurance from taking opportunistic actions lead to mutual satisfaction between partners. In accordance with the studies discussed above, we hypothesize that:

*H1: Cognitive trust positively affects satisfaction*

*H2: Affective trust positively affects satisfaction*

### 3.2. Knowledge Application as a Dimension of Performance

Chen and Huang (2007) defined social interaction as the extent to which organizational members interact with each other based on trust, communication, and coordination. Prior research has recognized the importance of interpersonal social interaction in facil-

itating knowledge management behavior among members in team and group work contexts (Bartol and Srivastava, 2002; Hoegl et al., 2003). Bartol and Srivastava (2002) argued that mutual understanding and a trust relationship among work members enable companies to relinquish information and integrate distributed expertise more efficiently. Thus, trust among the members increases the tendency of participants to exchange and assimilate other's knowledge, which leads to increased knowledge sharing among the individuals involved in the team (Levin and Cross, 2004).

Performance of knowledge transfer has also been examined as an important factor in the online learning environment. Park et al. (2007) emphasize that knowledge transfer from the social network in terms of peers and work groups is vital for successful adoption and use of enterprise resource planning (ERP) systems. They also argue that the users' ability to understand ERP knowledge influences performance through the ability to fully apply the knowledge. Hence, they defined a user's capacity for applying knowledge as the ability to use and share ERP-related knowledge in executing individual tasks.

Knowledge is represented by two categories, that which can be easily codified and transferred (known as explicit knowledge) and that which is internal and not easily codified and transferred (known as tacit knowledge). The creation and application of tacit knowledge can deliver high benefits to a firm (Sarin and McDermott, 2003). Furthermore, the characteristics of team leaders significantly affect work circumstances and learning in teams. Team leaders strongly influence the behavior of individual team members and also the desire and ability of the team members to achieve organizational goals through the application of acquired knowledge (Lovelace et al., 2001). Based on this, we suggest that knowledge appli-

cation determines the performance of online learning communities and that trust among members plays an important role in the application of knowledge to achieve the objectives of the community. Thus, we hypothesize that:

*H3: Cognitive trust positively affects knowledge application.*

*H4: Affective trust positively affects knowledge application.*

### 3.3. Relationships among Performance Factors

Based on our research model shown in <Figure 1> and reviews of prior research on performance in multi-dimensions described above, we suggest the following hypotheses. We believe that if an individual in an online learning community is satisfied, the individual will continue to rely more on knowledge and apply it to their tasks in a work group context. In other words, if an individual shows a high level of satisfaction in online learning communities, he or she will share and utilize knowledge more actively in terms of knowledge application to meet their personal goals. The hypotheses below describe causal relationships among the performance factors of satisfaction and knowledge application.

*H5: Satisfaction positively affects knowledge application.*

### 3.4. Moderating Effects of Social Norms

Researchers argue that cooperation in human interactions is based on social norms, including interactions in modern societies where a certain level of cooperation is enabled due to legal enforcement of rules. Legal enforcement mechanisms work in society based on a broad consensus about the normative legitimacy of rules (Fehr and Gächter, 2000). Thus, researchers have tried to explain social norms in

order to understand human cooperation. Social norms are defined as standards of behavior that are based on broadly shared beliefs of how group members should behave in a given situations (Elster, 1989; Horne, 2001). Hsu and Lin (2008) considered social factors such as social norms and community identification and defined the social norm as the degree to which an individual perceived that others approved of their participation in the blog. Kolstad (2007) defined the social norm as patterns of behavior with certain characteristics. According to Fehr and Gächter (2000), the social norm is a behavior regularity that is based on a socially shared belief of how one should act and which initiates the enforcement of predefined behavior by informal social pressure. Triandis (1971) also suggested that behavior is affected by social norms, which depend on messages and signals received from others and reflect what individuals think they should do in response. Further, Triandis (1980) expanded the term 'social norm' and defined social factors as the individual's internalization of the reference groups' subjective culture and specific interpersonal agreements that the individual has reached with others in specific social situations and working contexts. According to Sliwka (2007), trust is a credible signal of a favorable social norm, and he argued that social norms define specific actions desired by individuals in a reference group. In their research, Jeon and Kim (2005) proposed social factors as important organizational factors that affect knowledge sharing by CoP members in the group work setting.

In a more narrow scope of social factors (social norms), the subjective norm is addressed. The subjective norm is defined as perceived social pressure to perform or not perform a desirable behavior (Ajzen, 1991). Further, the subjective norm has received notable empirical support as an important

factor affecting behavior intention (Mathieson, 1991; Taylor and Todd, 1995). In their research, Bock et al. (2005) argued that subjective norms regarding knowledge sharing affect individuals' attitudes toward knowledge sharing in an organizational setting based on the Theory of Reasoned Action (TRA). Considering the prior research on the social norm discussed above, we are interested in understanding the moderating effects of social norms on the relationship between trust and performance factors. Thus, we suggest the following hypotheses of the social norm as a moderating factor:

*H6-1: Social norms moderate the effect of cognitive trust on satisfaction*

*H6-2: Social norms moderate the effect of affective trust on satisfaction*

*H6-3: Social norms moderate the effect of cognitive trust on knowledge application.*

*H6-4: Social norms moderate the effect of affective trust on knowledge application.*

## IV. Research Methodology

### 4.1. Data Collection

The current research analyzes how interpersonal trust affects individual's learning performance in the on-line learning community. Data were collected from 223 people who had been members of on-line learning communities such as communities of practice (CoP) and six sigma teams for at least 6 months.

We used a well-structured questionnaire for data collection. Most measurement items were adopted from prior studies on learning communities, trust, and IT-based learning, and were customized for our research setting. We interviewed nine practitioners



and scholars who were familiar with on-line learning environments twice via e-mail and refined the questionnaire based on their opinions.

The questionnaires were sent to 300 people via e-mail, and after a week we sent a follow-up e-mail to check whether respondents had any difficulties answering the questions. After 3 months, we collected 225 questionnaires, representing a response rate of 75%. Two were discarded due to incomplete data, thus 223 responses were finally used for empirical data analysis.

Among the respondents, 52 (24%) were in their 40s, 143 (64%) were in their 30s, and 24 (11%) were in their 20s. One person did not give information on age. The population contained 46 (21%) general managers and deputy general managers, 137 (61%) managers, and 41 (18%) individuals working at lower levels. One person did not give information on their position. All respondents had been a member of on-line learning communities for more than 6 months, and the communities covered various topics from studies of foreign languages to process innovation.

We used structured equation modeling methodology to test our research model and hypotheses. We also examined the fitness and parsimony of our research model and the significance levels of our hypotheses.

#### 4.2. Measurement Items

The detailed questionnaire items are shown in <Appendix 1>. Our research model includes two types of trust: cognitive trust and affective trust. Three items were developed for measuring cognitive trust based on measurements from McAllister (1995) and Weber (2008); a sample question is 'I can rely on my colleagues in the community because they always do their tasks professionally.' For affective trust, we developed another three items based on McAllister

(1995) and Johnson and Grayson (2005); a sample question is 'I can talk freely with my colleagues in the community about my problems at work.'

There are two dimensions of learning performance in the current research study: satisfaction and application of knowledge. Four items were developed for satisfaction based on Podsakoff et al. (1996) and Schippers et al. (2003). A sample question is 'I am proud of taking part in this community.' Three items were developed based on information systems studies such as Igbaria et al. (1997), Gefen et al. (2005), Park et al. (2007), and Benbasat et al. (2011). A sample item is 'The learning community increases the productivity of performing tasks compared to before using it'. Measurement items for social norms were developed and modified by adapting the validated measures from Taylor and Todd (1995), Ashforth and Mael (1989), and Bock et al. (2005) to fit the context of our research model. Three items were used to measure social norm as a moderating factor; a sample item is 'The management thinks that I should share knowledge in the knowledge community.'

Structured equation modeling (SEM) was used to test our research model and hypotheses. AMOS 4.0 was used to test the fit of the research model and the hypotheses.

## V. Results

### 5.1. Reliability and Validity Tests

Reliability and validity tests were conducted for each latent variable and indicator. We analyzed reliability using Cronbach's alpha value (Kerlinger, 1986) to ensure the variables' stability. As shown in <Table 1>, the two types of trust - cognitive and affective

- displayed satisfactory Cronbach's alpha values (0.961 and 0.949 respectively). Cronbach's alpha values for two types of performance - satisfaction and application of knowledge - were also satisfactory (0.964 and 0.932 respectively). The moderator, social norms, was also satisfactory in terms of reliability (0.971).

Content and construct validity were also tested. Content validity was established by the adoption of constructs that passed the pilot test. We examined whether the questionnaire items were easy to answer

and reflected their intended meanings. We also used an exploratory factor analysis method to test validity based on factor loading scores and cross-loading scores. All the loading values of items for the relevant latent factors were greater than 0.5, verifying the convergent validity of all items. In addition, there was no serious cross-factor loading of items, therefore the discriminant validity was verified at the item level (Chin, 1998; Hair, 1998).

Additionally, we performed confirmative factor analysis using Average Variance Extracted (AVE)

<Table 1> Reliability and Validity of Research Variables

	Factor				
	Social Norms	Cognitive Trust	Satisfaction	Knowledge Application	Affective Trust
Cogtr1	.366	.693	.365	.266	.207
Cogtr2	.321	.788	.246	.340	.223
Cogtr3	.267	.848	.202	.233	.242
Cogtr4	.129	.880	.232	.187	.244
Emotr1	.102	.272	.409	.154	.804
Emotr2	.257	.329	.300	.209	.801
Emotr3	.378	.348	.336	.335	.653
Satis1	.253	.233	.837	.213	.243
Satis2	.269	.271	.817	.257	.252
Satis3	.372	.262	.704	.292	.344
Satis4	.262	.321	.702	.289	.367
Util1	.356	.346	.273	.736	.140
Util2	.251	.300	.295	.800	.187
Util3	.276	.234	.244	.787	.232
Norm1	.881	.196	.180	.254	.096
Norm2	.887	.238	.215	.130	.074
Norm3	.873	.267	.137	.172	.051
Norm4	.847	.161	.219	.136	.153
Norm5	.843	.080	.147	.179	.293
Norm6	.857	.163	.242	.239	.183
Average	5.378	5.577	5.409	5.182	5.584
Standard Deviation	1.02	.904	.918	1.012	.917
Cronbach's Alpha	.971	.961	.964	.932	.949
AVE	.824	.9	.875	.806	.874
CR	.965	.973	.965	.925	.954

and Composite Reliability (CR) values of all variables of the research model. AVE values for all research variables were greater than 0.5 and all CR values were greater than 0.7. Thus, composite reliability and validity of research variables were satisfactory.

### 5.2. Fitness of the Model

Before testing a hypothesis in an appropriate model, we examined the goodness-of-fit of the research model. The results for various indices of goodness-of-fit are summarized in <Table 2>. We focused on the comparative fit index (CFI), Tucker - Lewis index (TLI) and Root Mean Square Error of Approximation

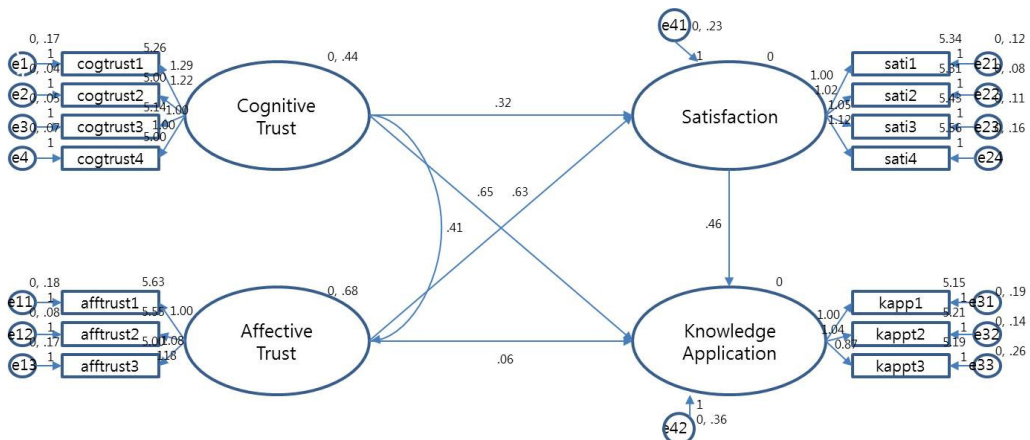
(RMSEA), since they are not very sensitive to the sample size and TLI considers parsimony of the model. Values of CFI and TLI were higher than or close to 0.9 and RMSEA was close to 0.8. Therefore our research model seemed to be acceptable.

### 5.3. Testing the Hypotheses

<Figure 2> and <Table 3> show the results of the hypothesis test. The path from affective trust to knowledge application (H4) was not significant and all other paths were significant and positive. In other words, cognitive trust had a positive effect on two dimensions of learning performance: sat-

<Table 2> Goodness-of-Fit of the Research Model

Index	Value
Chi-square Value (CMIN)	218.452
P-Value	0.000
Degree of Freedom (DF)	71
CMIN/DF	3.076
Comparative Fit Index (CFI)	0.901
Tucker-Lewis Index (TLI)	0.873
Normal Fit Index (NFI)	0.877
Root Mean Square Error of Approximation (RMSEA)	0.086



<Figure 2> Analysis Result of the Research Model

isfaction and knowledge application. Besides, satisfaction had direct effect on knowledge application (H5). Although affective trust did not directly affect knowledge application, it did affect them indirectly via satisfaction.

#### 5.4. Moderating Effects of Social Norms

The moderation effect of social norms was tested using a method proposed by Chin et al. (2003). They suggested that a moderating effect in structured equa-

tion modeling could be tested by creating a path from an interaction term between the independent variable and the moderator to the independent variable.

Model 1 in <Table 4> shows the effect of independent variables and the moderator on two dependent variables: satisfaction and knowledge application. Model 2 and Model 3 show the effect of independent variables, the moderator, and their interaction variables on two dependent variables.

The results show that the interaction effect on the first dependent variable, satisfaction, in Model

<Table 3> Results of Hypotheses Test

Hypothesis			Estimate	S.E.	C.R.	P	
H1	Cognitive Trust	Satisfaction	0.247	0.084	3.797	0.005**	accepted
H2	Affective Trust	Satisfaction	0.625	0.073	8.942	0.000**	accepted
H3	Cognitive Trust	Knowledge Application	0.415	0.11	5.68	0.000**	accepted
H4	Affective Trust	Knowledge Application	0.069	0.109	0.771	0.441	rejected
H5	Satisfaction	Knowledge Application	0.390	0.1	4.573	0.000**	accepted

<Table 4> Moderating Effects of Social Norms

Dependent Variable: Satisfaction						
Independent Variable	Model 1		Model 2		Model 3	
	Coefficient	<i>t</i>	Coefficient	<i>t</i>	Coefficient	<i>t</i>
Cognitive trust	.18	2.724**	.116	1.087	.17	2.574
Affective trust	.572	8.219**	.581	8.577**	-.018	-.154**
Norm	.178	3.341**	.18	.922	-.506	-3.572**
Cognitive trust x Norm			.106	.54		
Affective trust x Norm					1.139	5.054**
Adjusted <i>R</i> <sup>2</sup>	.703		.704		.685	
Dependent Variable: Knowledge Application						
Independent Variable	Model 1		Model 2		Model 3	
	Coefficient	<i>t</i>	Coefficient	<i>t</i>	Coefficient	<i>t</i>
Cognitive trust	.374	5.101**	-.112	-.929	.348	4.807**
Affective trust	.052	.585	.111	1.236	.039	.333
Norm	.172	2.904**	-.359	-2.472**	.177	1.24
Cognitive trust x Norm			0.835	3.708**		
Affective trust x Norm					.02	.088
Adjusted <i>R</i> <sup>2</sup>	.667		.642		.661	

3, and on the second variable, knowledge application, in Model 2, were significant ( $p < 0.01$ ) implying that social norms moderated the effect of affective trust on satisfaction and cognitive trust on knowledge application. Therefore, H6-2 and H6-3 were supported (See <Table 4>).

## VI. Conclusion

### 6.1. Summary of Results

In this study, we developed a model that explains the structural relationship between two types of trust and the performance of on-line learning organizations. Analysis of the results of structured equation modeling showed that our research model was acceptable and 6 out of 9 research hypotheses were statistically significant.

First, cognitive trust had significant effects on two dimensions of performance: satisfaction and knowledge application. This means that community members who trust other members' attitude and professionalism when performing tasks have a tendency to be satisfied with the community and to adopt what they learn in the community to what they do in work. These results support the findings of previous studies such as those by Driscoll (1978) and Paul and McDaniel (2004).

Second, affective trust significantly affected satisfaction, but did not have effects on knowledge application. These results show that when members of the community can communicate what they think and feel about each other they are satisfied with the community, but this does not always lead to application of knowledge to the task situation. This does not correspond with the results of other studies such as those by McAllister (1995) and Podsakoff

et al. (1996), which asserted that trust has an effect on achieving the objectives of learning. While affective trust does not affect knowledge application directly, it does affect knowledge application indirectly via satisfaction.

Third, the relationship between the two performance factors was significant, and lastly, in terms of the moderating effect of social norms on the relationship between interpersonal trust and learning performances, social norms moderate the effect of cognitive trust on knowledge application and the effect of affective trust on satisfaction. This result partly supports previous studies showing that social pressure can enforce individuals' attitude toward knowledge sharing (Brock et al., 2005).

### 6.2. Discussion

We propose a model describing the structural relationships between interpersonal trust and performance of online learning communities. The findings of this research are contributions to scholarly understanding of how interpersonal trust plays a role in on-line learning environment. Two types of interpersonal trust affected differently in the relationship with satisfaction and knowledge application; cognitive trust had direct effect on satisfaction and knowledge application, but affective trust had on satisfaction only and did not affect knowledge application. Specific conceptualization of interpersonal trust in a virtual learning situation could be adapted to other environments such as e-learning and social networking systems (SNS).

In addition, most studies examine the relationship between interpersonal trust and uni-dimensional performance variable limited to the performance of the community such as knowledge sharing and community satisfaction. Therefore, this research examines the

relationship between trust and multi-dimensional performance by suggesting additional factors that constitute performance. This will help resolve the limitations that existed in prior research studying the relationship between interpersonal trust and task-oriented performances.

In terms of practitioners, we found that two types of trust affected satisfaction and knowledge application differently. First, cognitive trust had effect on both satisfaction and knowledge application directly, but affective trust directly affected satisfaction only. Second, social norms moderated the relationship between cognitive trust and knowledge application and between affective trust and satisfaction. Cognitive trust means one's confidence in the competence and fidelity of community members and affective trust means one's feeling free with other members.

These findings implies, first, that if members of a community feel free with other members, they will be satisfied with the community, and some of them will apply what they learn from the community to their tasks successfully. But, for others, satisfaction was not enough for applying knowledge. In other words, when organizations want to maximize the long term and task-oriented performances of learning communities, it is not enough to merely make members of the communities feel happy but it is also necessary to think about strategies to link satisfaction

to practical application of knowledge.

Second, we found the specific role of social norms in community learning environment. When members of a community have high affective trust on their community and perceived social norms from management, boss, and colleagues, their satisfaction will be higher, but social norms has little possibility to make knowledge application of them higher. If the objective of a community is knowledge application in the short term, the community has to invite members who trust each other's competence and fidelity.

The limitations and implications for future research of this research are as follows. We used individuals as the unit of analysis, but we did not consider the personality perspective. Although this can partly be explored with respect to cognitive and psychological factors, the model would be more comprehensive and could have more explanatory power when individual personality variables are considered.

In addition, some of the studies on the relationship between satisfaction and trust in on-line environment think that satisfaction is followed trust (eg. Fang et al., 2014). Most of them focused on trust with vendors or on-line sites not interpersonal trust, we could think about the linear relationship between satisfaction and trust more clearly in the future research.

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## <Appendix A> Measurement Items

### Cognitive Trust

- I can rely on other members of the learning community since they perform tasks with expertise.
- I do not doubt of task-related competence of other members.
- I can confidently depend on other members of the learning community since they may not complicate affairs by careless work.
- The more I have knowledge about other members of the learning community, the more I can rely on them.

### Affective Trust

- I feel free when I communicate with other members of the learning community about our feelings and personal goals.
- I can talk freely with other members of the learning community about my problems at work.
- If I share my problem with other members of the learning community, I feel they would respond caringly.

### Satisfaction

- I am satisfied with other members of the learning community.
- I am satisfied with what I am doing in the learning community.
- I am proud of taking part in the learning community.
- I am happy for taking part in this learning community.

### Knowledge Application

- It is faster to perform tasks using the learning community than before.
- The learning community increases the productivity of performing tasks than before.
- The learning community enhances the effectiveness of performing tasks than before.

### Social Norms

- The management thinks that I should share knowledge in the knowledge community.
- My boss thinks that I should share knowledge in the knowledge community.
- My colleagues think that I should share knowledge in the knowledge community.
- I follow the policy and intent of the management
- I accept and accomplish what my boss decides.
- I respect opinions of colleagues and accomplish them aggressively.

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