Knowledge Sharing Behavior of Physicians in Hospitals

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ABSTRACT

Sharing knowledge of Physicians within hospitals can realize potential gains enormously and is critical to be successful and survive in competitive environments. There is a need for empirical research to identify the factors that determine physician's behavior to share knowledge. This study investigates the factors that determine the physician's individual knowledge sharing behavior in his/her department. The purpose of this study is to examine empirically the physicians' knowledge sharing behavior. The research models under investigation are the Theory of Reasoned Action (TRA) model and the Theory of Planned Behavior (TPB) model. These models are empirically examined and compared, using the survey results on physicians' knowledge sharing behavior collected from 286 physicians practicing in 28 departments in 13 tertiary hospitals in Korea. TPB model exhibited a good fit with the data and appeared to be superior to TRA in explaining physicians' intentions to share knowledge. Amended TPB model provided an important improvement in fit over that of original TPB model. In amended TPB model, subjective norms were found to have the strongest total effects on behavioral intentions to share knowledge of physicians through direct and indirect path by attitude. Attitude was found to be the second important factor influencing physicians' intentions. Perceived behavioral control was also found to have effect on the intentions to share knowledge though it was weaker than that of subjective norms or attitude. The implications for physician's knowledge sharing activities are discussed.

Keywords: Knowledge Sharing Behavior of Physicians; Theory of Reasoned Action; Theory of Planned Behavior; Knowledge Management

1. Introduction

Knowledge sharing is the behavior to disseminate and share the acquired valuable knowledge with other members within one's organization. Knowledge sharing is a people-to-people process, and one of the knowledge management processes. In the knowledge management process, how to make individual knowledge into organizational knowledge is a major management issue [18, 25, 27]. The focus of knowledge management is how to share knowledge to create value-added benefits to the organization [21]. The process of identifying, sharing, and using the knowledge and practices inside its own organization is one of tangible manifestations of knowledge management [27].

Knowledge sharing within organizations may cause tremendous synergies, especially for knowledge intensive organizations. We may extend the Sir Bacon's adage of "knowledge is power" as "sharing knowledge is power"

[21]. Physician's medical knowledge is very important to the care for patients, and unique clinical best practices of specialty would be a major determinant for patients' medical use. Particularly, physicians in tertiary hospitals are more research-oriented and creative in medical care and have many opportunities that can be acquired new medical knowledge by organizational learning mechanism (OLM) [22].

Of particular interest of this study is physicians' knowledge sharing behavior by using the existing social psychological theories. Theory of reasoned action (TRA) [15], and theory of planned behavior (TPB) [5] have been found to be useful in predicting a wide range of behavior in social psychology [32]. The TRA and TPB model have not so many been applied to the study of knowledge sharing area. Bock & Kim [9] investigated the TRA model in the knowledge sharing area, and suggested good applicability. However, there should be more extended study for a wide-range domain to provide more accurate explanation on knowledge sharing behavior.

The purpose of this study is to examine empirically the physicians' knowledge sharing behavior. The social psychological models, TRA and TPB model, are examined to identify the applicability for our study. The extended analysis has been carried out by including a causal path, which is subjective norm to attitude, will improve the predictive power of the theory founded in the previous studies in other areas [10, 31, 38, 39]. More specifically, this study intends to answer the following questions about physicians' knowledge sharing behavior:

How well do exogenous latent variables, such as attitude, subjective norms, and perceived behavioral control, influence and predict the intentions to share knowledge?

How well causal path, which is from subjective norms to attitude, will improve the predictive power of the theory in the physicians' knowledge sharing behavior?

2. Theoretical Background

2.1 Knowledge Sharing

In this study, we view knowledge sharing behavior as the degree to which physician can actually shares one's knowledge that is critical to her knowledge works. In practice, knowledge sharing has two aspects: one is behavioral, the other is technological.

Sharing one's individual knowledge is not simply capable [14]. People will not share their knowledge as they think those are not valuable and important. It was showed in the survey that the biggest difficulty in managing knowledge in organizations is "changing people's behavior" [30]. Robertson [29] also showed by comparison of two knowledge sharing systems that knowledge sharing is a human activity, and understanding the humans who will do it is the first step to the success of such systems. Generally, There are several contextual factors that affect success of knowledge sharing systems or knowledge sharing behavior, such as attention to the team structure and workflow issues, collaboration practices, and the nature of documents being shared [29]. Two contextual factors, such as task structure and leadership style, that facilitate physicians' OLMs in hospitals are suggested [22].

Although the emphasis on behavioral aspect of knowledge sharing; empirical study on knowledge sharing of physicians in hospitals has not yet conducted in academics. In recent, the empirical study was conducted to develop an understanding of the factors that support or constrain the individual's knowledge sharing behavior in the four public organizations [9]. Case study on the two information-technology based knowledge sharing systems suggests the importance of understanding of the humans [29]. In healthcare settings, Lipshitz & Popper [22] investigated organizational learning of physicians in internal medicine ward and cardiac surgery ward of a university-affiliated hospital.

Thus, this study firstly investigated physicians' knowledge sharing behavior by using social psychological models, TRA and TPB model.

2.2 TRA and TPB Model

The TRA model suggests that a person's behavior is determined by his/her intention to perform the behavior and that this intention is, in turn, a function of his/her attitude toward the behavior and his/her subjective norm [15]. The TRA model is based on the premise that humans are rational and that the behaviors being explored are under volitional control [16]. According to the theory, a specific behavior defined by a combination of four components: target, action, context, and time (TACT) [3]. Attitudes and subjective norms shape a person's intention to perform a behavior. Finally, a person's intention determines the actually desired behavior. The TRA provides a framework for linking each of the above variables together.

Because of its achievement in developing a model to predict behavior, the TRA model has been the basis of researches and studies in a wide variety of fields, including psychology, management, marketing, and healthcare area [8, 10, 17, 32, 42]. In knowledge management area, Bock and Kim [9] conducted study using the TRA on knowledge sharing behavior in the research institute.

Although the study proved the effectiveness of the TRA model, Sheppard et al. [32] also found that the predictive ability of the TRA model is not valid if the behavior is not under full volitional control. Two problems are pointed out. One is that a variety of factors in addition to one's intentions determine whether the behavior is performed. The other is that there is no provision in the model for considering either the probability of failing to perform one's behavior or the consequences of such failure in determining one's intention [10].

The TPB model extends from the TRA model by incorporating an additional construct, namely perceived behavioral control, to account for situations in which an individual lacks substantial control over the targeted behavior [5]. Even though a person in organization may be highly motivated by his/her own attitudes and subjective norms, he/she may not actually perform the behavior due to intervening organizational conditions. Perceived behavioral control indicates that a person's motivation is influenced by how difficult the behaviors are perceived to be, as well as the perception of how successfully the individual can, or can not, perform the activity. Perceived behavioral control has a direct effect on behavioral intention in TPB model.

In our research context, the TRA and TPB model suggests that physician's intentions to share knowledge is jointly determined by his/her attitude, subjective norms, and perceived behavioral control.

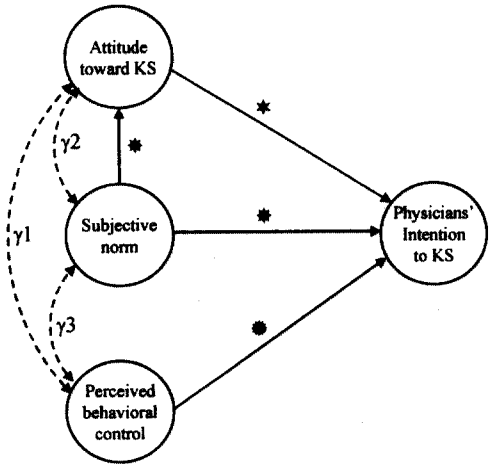
3. Research Design

3.1 Research Scope

In this study, we choose "intention to share knowledge" as the dependent variable for both theoretical and practical reasons. In theoretical point of view, considerable previous studies have reported a strong and significant causal link between behavioral intention and targeted behavior [32, 40]. Given this strong link between intention and behavior, it is theoretically justifiable by using behavioral intention as a dependent variable to examine physicians' knowledge sharing [10, 11, 23]. Also, Agarwal & Prasad [2] argued that given a survey-based research design, intentions are more appropriate than actual usage as "they are measured contemporaneously with beliefs". Thus, the choice of physicians' intention to share knowledge as a dependent variable is considered adequate and desirable.

To the purpose of this study, the investigated models used are all based on behavioral intention, which has emerged as a common anchor for examining individual physician's knowledge sharing behavior. In the social psychological

perspective, the TRA and TPB model have gained substantial empirical support. The specific models examined in this study are TRA, TPB, and amended TPB model that include a causal path from subjective norm to attitude (as shown in Figure 1).



TRA Model: +

TPB Model: + + γ1 + γ2 + γ3

Amended TPB Model: + + + γ3

Figure 1 – Investigated Research Model

3.2 Measurement Development

The measures used to operationalize the constructs included in the research model were mainly adapted from relevant prior research [4, 9, 15] with minor wording changes tailored to the physician's knowledge sharing context. All measures were defined in terms of their target, action, context, and time (TACT) according to the construct guideline [3]. Principles of compatibility, specificity and generality were applied to all constructs. A multiple-items method was used to measure more accurately, and each item was based on a five point Likert scale. Nineteen measured variables were used to reflect the components of the TRA and the TPB model. All operational definitions of instruments and their related literature are summarized in Appendix A.

4. Data Analysis and Results

4.1 Data Collection

The target subjects were the physicians who were practicing at tertiary hospitals in Korea. The samples consisted of 334 physicians in 28 departments of the 13 tertiary hospitals in Korea. The response rates were showed as 33.4% among 1,000 distributed questionnaires.

The data were gathered by means of a questionnaire from August to October of 2002. In the cover of the questionnaire, an encounter letter that explained the purpose of the study and ensured the necessary confidentiality was attached. Personal visits and/or telephone calls or e-mail were then made to these chiefs of departments to provide detailed study information and solicit their support. Twenty-eight of these contacted departments agreed to participate in the study. With the assistance of the chiefs of service, questionnaire packets were delivered to individual physicians practicing in the participating departments. Each packet contained a cover letter stating the purpose of the study and intended use, and. Each subject was asked to return the completed questionnaire to his or her department secretary, from whom the questionnaire was collected at a later time.

Forty-eight of the responded cases were only partially completed, therefore discarded. Thus, we analyzed 286 effective responses. The responded physicians are consisted of 23.4% in internal department, 21.0% in surgical department, and 29.0% in dental department. On average,

the responding physicians had 3.5 years of experience in their respective specialty areas after graduating from medical schools. The descriptive characteristics of respondents are shown in Table 1.

Table 1 - Profile of respondents

Measure	Items	Frequency	%
Career	Over 21 years	18	6.3
	16 ~ 20 years	16	5.6
	11 ~ 15 years	23	8.0
	7 ~10 years	52	18.2
	2 ~ 6 years	177	61.9
Position	Chief	3	1.0
	Director	31	10.8
	Staff	39	13.6
	Fellow	36	12.6
	Resident	177	61.9
Department	Internal	67	23.4
	Surgical	60	21.0
	Obs.& Gyn., Pediatrics	35	12.2
	Occulist & E.N.T.	20	7.0
	Dermatol & Urology	7	2.4
	Dental	83	29.0
	Ancillary	14	4.9
	Total	286	100.0

4.2 Measurement Assessment

Content Validity

All measurement items were adopted from the validated research [36]. Definitions and items of attitude, subjective norms, perceived behavioral control, and intention to share physicians' knowledge were based on the validated original TRA and TPB models [3, 15] which is widely accepted in micro-social level of analysis in social psychology [35].

With satisfactory content validity established, the instruments were further tested for item consistency, ease of understanding, and question sequence appropriateness by the pretest from ten physicians from different specialty areas. Comments on or suggestions about the question sequence, wording choices, and measures were also solicited, leading to several minor modifications to the questionnaire. The final questionnaire items used to measure each construct are listed in Appendix B. Subjects who had participated in the pretests were excluded from the subsequent main study.

Construct Reliability

Construct reliability was assessed by Cronbach's alpha based on the 286 responses from the main survey. The resulting alpha values ranged from .79 to .90, which were above to an acceptable threshold (0.70) suggested by Nunnally and Bernstein [26].

Construct Validity

Construct validity was evaluated by examining the factor loadings within the constructs by confirmatory factor analysis (CFA) as well as the correlation between constructs [7]. The CFA model are as shown in Figure 2.

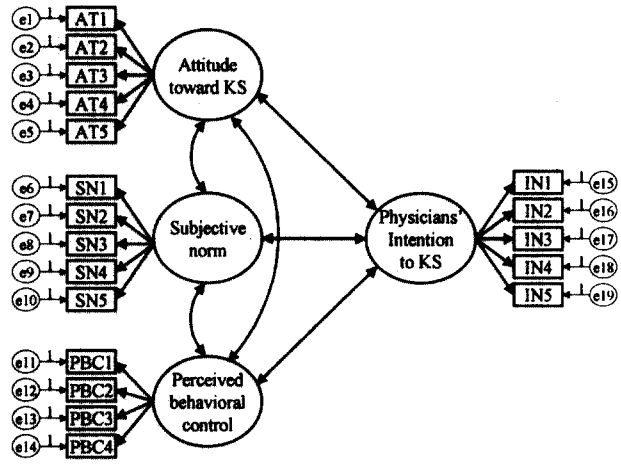


Figure 2 – Confirmatory Factor Analysis (CFA) Model

For discriminant validity, we evaluated the item-to-total correlation that is the correlation of each item to the sum of the remaining items. All items were with item-to-total correlation higher than 0.5. Confirmatory factor analysis model using AMOS adequately reflects a good fit to the data in all three fit measures [20] (See Table 2). The fit of the model was assessed in terms of eight measures from three perspectives: overall fit perspective, comparative fit to a base model perspective, and model parsimony perspective.

Among the absolute fit measures used to evaluate the CFA model are χ^2 statistics divided by its degrees of freedom, goodness-of-fit index (GFI), and root mean square error (RMR). The comparative fit measures used to evaluate research model are normed fit index (NFI), adjusted goodness-of-fit index (AGFI), and comparative fit index (CFI)). Parsimonious fit measures used to evaluate are parsimonious goodness-of-fit index (PGFI) and parsimonious normed fit index (PNFI).

Table 2 - Overall fit indices of the CFA Model

Fit Index	Scores	Recommended cut-off value
Measures of Absolute Fit		
χ^2	426.781	Near to degree of freedom
d.f.	146	The greater, the better
χ^2 / d.f.	2.923**	≤ 2; ≤ 3 or 5
GFI	0.855*	≥ 0.90; ≥ 0.8
RMR	0.036**	≤ 0.05 or 0.08
Incremental Fit Measures		
NFI	0.878*	≥ 0.90
AGFI	0.812**	≥ 0.90; ≥ 0.80
CFI	0.915**	≥ 0.90
Parsimonious Fit Measures		
PGFI	0.657*	The higher, the better
PNFI	0.749**	0.06 ~ 0.09

Acceptability: ** (acceptable), * (marginal)

Convergent validity was checked by the factor loading values. No items were dropped due to factor analysis. The results of measurement assessment, such as number of item, mean, S.D., Cronbach α, and convergent and discriminant validity are shown in Table 3.

Table 3 - Measurement model fit

Latent Constructs	Item	Factor Loading*	Mean	S.D	Cronbach α
Intention to share knowledge (IN)	IN1	0.836	3.93	0.677	0.9074
	IN2	0.820			
	IN3	0.849			
	IN4	0.768			
	IN5	0.795			
Attitude toward knowledge sharing	AT1	0.730	3.92	0.540	0.8074
	AT2	0.860			
	AT3	0.855			
	AT4	0.816			
	AT5	0.809			
Subjective Norm (SN)	SN1	0.660	3.60	0.639	0.8595
	SN2	0.710			
	SN3	0.747			
	SN4	0.772			
	SN5	0.825			
Perceived Behavioral Control (PBC)	PBC1	0.776	3.27	0.701	0.7934
	PBC2	0.868			
	PBC3	0.674			
	PBC4	0.494			

* All factor loadings are significant at p=0.001.

Table 4 shows the correlations between the latent variables. These correlations are in the expected direction and all are significant at level 0.001

Table 4 - Intercorrelations among the latent variables

	1	2	3
1 Intention to KS	-		
2 Attitude toward KS	0.602***	-	
3 Subjective Norms	0.565***	0.521***	-
4 Perceived Behavioral Control	0.479***	0.414***	0.650***

*** All correlations are significant at the 0.001 level (2-tailed).

4.3 Results

Model Comparison

Following the measurement assessment, we examined and compared the investigated models by the structural equation modeling (SEM). Table 5 and 6 summarizes the results of each model. We tested the specification of the models we investigated, and Table 5 shows the overall fit results of the models. The TRA model did not provide good fit goodness-of-fit indices in absolute fit, incremental fit, and parsimonious fit measures. The TPB and amended TPB model exhibited at reasonable levels of overall fit although GFI and NFI did not exceeded their respective common acceptance levels. The amended TPB model exhibited a

better fit than original TPB model in the goodness-of-fit indices, such as χ^2 / d.f., NFI, PGFI, and PNFI.

Table 5 - Overall fit indexes of the investigated models

Fit Index	TRA	TPB	Amended TPB
Measures of Absolute Fit			
χ^2	387.481	426.781	429.033
d. f.	88	146	147
χ^2 / d.f.	4.403*	2.923**	2.919**
GFI	0.846	0.855*	0.854*
RMR	0.098	0.036**	0.036**
Incremental Fit Measures			
NFI	0.866	0.878*	0.877*
AGFI	0.790	0.812**	0.812**
CFI	0.893	0.915**	0.915**
Parsimonious Fit Measures			
PGFI	0.620	0.657*	0.661*
PNFI	0.726*	0.749**	0.754**

Acceptability: ** (acceptable), * (marginal)

TRA: (AT=> IN) + (SN => IN)

TPB: TRA + (PBC=>IN)

Amended TPB: TPB + (SN=>AT)

Path Coefficients

The path coefficients and their respective significance levels for each model are showed in Table 6. All the standardized path coefficients of the three investigated models had relatively acceptable statistical significance levels: 7 of the 10 paths at a 0.001 level, while one path (subjective norm to intention to share knowledge in the amended TPB model) at a 0.05 level, and the remaining two paths (perceived behavioral control to intention to share individual knowledge in the original TPB and amended TPB model) at a 0.1 level. The paths from attitude and subjective norms to behavioral intention were significant in all three models. Perceived behavioral control, on the other hand, showed a barely significant on behavioral intention and similar size of coefficient in both TPB and amended TPB model. In addition, the path from subjective norm to attitude was significant and strong coefficient (0.532 at 0.001 level of significance) in the amended TPB model.

Effects to the Intention

The effects of all the variables to intentions are summarized in Table 6 and examined. The attitude, despite showing the highest direct effect on behavioral intention in TPB model, was the second in its effect on intention in the amended TPB model. In the amended TPB model, direct effect of subjective norm to attitude was 0.532 at a 0.001 level. Total effect of perceived behavioral control to behavioral effect was in the last order. Subjective norm's total effects on behavioral intention exhibited as second in the original TPB, but as first in the amended TPB model. Subjective norm's direct effect and indirect effect through attitude to behavioral intention was 0.260 and 0.217 each.

Table 6 - Significance and strengths of individual paths

	TRA	TPB	Amended TPB
Path Coefficient			
AT → IN	0.476***	0.409***	0.408***
SN → IN	0.375***	0.260***	0.260**
PBC → IN	-	0.141*	0.144*
SN → AT	-	-	0.532***
Effect on Intentions to Share Knowledge			
Direct effect			
AT	0.476	0.409	0.408
SN	0.375	0.260	0.260
PBC	-	0.141	0.144
Indirect effect			
SN	-	-	0.217**
Total effect			
AT	0.476	0.409	0.408
SN	0.375	0.260	0.477
PBC	-	0.141	0.144

*** $p < 0.001$, ** $p < 0.05$, * $p < 0.1$

5. Discussion

The objective of this study was to assess the applicability of two social psychological theories, the TRA and TPB model, to the predicting of physicians' knowledge sharing behavior, and extend the predictability of original TPB model by

including causal path. The result showed that theory of planned behavior is better than theory of reasoned action in predicting knowledge sharing behavior. Amended TPB model was improved the goodness of fit to the data and better than original TPB model in explaining the effect of subjective norms to intention to share knowledge. Our result shows that attitude and subjective norm are not as independent, and is consistent with the previous research in other domains [10, 31, 33, 39].

Subjective norms were found to be the most influencing factor on behavioral intention to share knowledge. This finding was consistent with the prior research [22, 32, 37], but not with Chau & Hu [11] which studied telemedicine adoption in healthcare setting. Taylor & Todd [37] and Chau & Hu [11] commented that the physicians would have specialized training and practice in a highly autonomous profession, both of which are not effects on IT use or telemedicine adoption. However, Lipshitz & Popper [22] suggested two contextual factors which facilitate organizational learning, such as task structure and leadership style. Shortell & Kaluzny [1] asserted that physicians are more dependent on hospital in advances of technology. Therefore, we can interpret the positive and high effect of subjective norms on physicians' behavioral intentions to share knowledge as a results of highly stressed hospital's OLMs or knowledge- and technology-intensive hospital environment.

Attitude was found to be the second factor influencing physicians' intention to share knowledge. This finding may still highlight the crucial role of attitude toward knowledge sharing area, thus suggesting an interesting or subtle characteristic potentially differentiating their knowledge sharing processes from those in other business settings.

Not so consistent with findings from several previous studies [23, 37] in IT, telemedicine area [11], unethical behavior [10], and Ajzen's reviewing study [5], perceived behavioral control was found to have a barely significant direct effect on behavioral intention to share knowledge. The size of this effect was also smaller than that of attitude or subjective norm. Opportunities and resources must exist before they can be performed.

In the case of knowledge sharing of physicians in the hospital, we can conclude that the cultural factors to drive internal knowledge sharing are important and should be prepared appropriately [14, 27]. Especially, their significant others agreed on their knowledge sharing behavior would have significant influence to the intention to share physicians' individual knowledge directly and indirectly through attitude. Without this, their intention to perform the action would be lower, no matter how favorable their attitudes were towards knowledge sharing. We may explain the reason of this result that physicians have been more adaptive to the changing and competitive environments of hospital, such as cost containment policy and competition among hospitals.

The important result showed by this study is that the path from subjective norm to attitude is contributing to the total effect of subjective norm to physicians' intention to share knowledge. This provides a much more solid theoretical basis for the study on physicians' knowledge sharing behavior.

6. Conclusions

This study investigated the physicians' knowledge behavior by applying prevalent psychological social psychology models in physicians in tertiary hospital. Also, this study attempted to evaluate the applicability of the TRA model and the TPB model to the physicians' knowledge sharing behavior domain, and we tested the amended TPB model by adding the path from subjective norm to attitude. Results from the study shed light on several implications in physician's knowledge sharing behavior. First, findings of the study show that the TPB model can be used quite successfully to predict physicians' intention to share knowledge.

Second, the amended TPB model shows that the indirect effects of subjective norm to intention through attitude are significant as the previous study on unethical behavior [10]. Therefore physicians are found to adopt other significant (important or valuable) member's opinion for sharing their knowledge. But this is not consistent with the previous research on telemedicine acceptance of physicians in healthcare setting in which professional nature may influence insignificant effects of subjective norms on behavioral intention. It is possible that the behavioral domain is different and physicians have been changed from authoritative and autonomous profession to organizational çontext-oriented and flexible to the changing social environment.

Third, the study has the merits of conducting a knowledge sharing investigation in a real-world healthcare setting that involved individual physician who has major role in medical care in hospital. From a managerial standpoint, our findings suggest that cultivating positive normative beliefs of significant members and physician's motivation to comply as well as positive attitude for sharing knowledge is important for fostering physicians' knowledge sharing behavior. Therefore, the management should put strong attention to create positive context and attitudes for the individual knowledge sharing of physicians.

Fourth, the behavioral research results on knowledge sharing of physicians will contribute to the improvement and lasting concept of knowledge management in hospitals. In these days, knowledge sharing in organizations including hospitals was not much concerned to the behavioral aspects of that, but focused to applying ICT and AI techniques. There is hype and over-expectations built from knowledge management vendors, and have some potential pitfalls that could squash knowledge management initiatives in the organization [21].

Even though this research has drawn meaningful implications, there are several limitations. First, investigation of physician's knowledge sharing behavior is firstly. The discussed findings and their implications are obtained from one single study that examined a physician's particular context. Thus, cautions need to be taken when generalizing our findings and discussion to other professional groups.

Second, Compared with prior studies examining the TRA and TPB model, the effect of perceived behavioral control has relatively low effect on behavioral intention to share knowledge. In turn, this limitation may suggest a constraint of TPB model in explaining or predicting knowledge sharing behavior, and its mitigation may require the inclusion of additional factor(s) in the respective models. Continued research is needed to address these limitations. In particular, further investigations of constructs that plausibly account for the unexplained variance in behavioral intention to share knowledge are important. Based on the other theoretical background, additional constructs might include perceived voluntariness [1], personal innovativeness [2], and cultural factors [14, 27].

Third, the significantly positive effect of subjective norms to physician's intention to share knowledge may be temporary phenomenon because there had been many government's administrative policies to the hospital, and competitions in healthcare environments in recent years in Korea.

Fourth, Additional longitudinal research efforts are also needed to evaluate the validity of the amended TPB model and our findings. Conducting a series of studies that target a variety of professional contexts also needed. Longitudinal and extended contextual evidence obtained thereby might enhance our understanding of the causality or interrelationships among variables important to knowledge sharing by individual professional.

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Appendix A. Operational definition

Variables	Operational definition	Related literatures

Intentions to share knowledge	The degree to which one believes that one will engage in a knowledge sharing act	Ajzen, 2001; Bock & Kim, 2002; Chang, 1998; Chau & Hu, 2001
Attitude toward knowledge sharing	The degree to which the person has a favorable or unfavorable evaluation of performing the knowledge sharing behavior	Ajzen, 2001; Bock & Kim, 2002; Chang, 1998; Chau & Hu, 2001
Subjective norms	A person's perceived expectation of other people's opinions regarding the knowledge sharing	Ajzen, 2001; Chang, 1998; Chau & Hu, 2001
Perceived behavioral control	The individual's belief concerning how easy or difficult performing the knowledge sharing behavior will be	Ajzen, 2001; Chang, 1998; Chau & Hu, 2001

Appendix B. Questionnaire Items

Construct	Items
Intentions to share knowledge (IN; 5 items)	*I always will* IN1: ...planned to share knowledge with my colleague IN2: ...try to share knowledge with my colleague IN3: ...make an effort to share knowledge with my colleague IN4: ...make an effort to share knowledge with my colleague IN5: ...intend to share knowledge with my colleague, if they ask
Attitude toward knowledge sharing (AT; 5 items)	*If I share my knowledge with other members, I feel* AT1: very harmful.....very beneficial AT2: very unpleasant.....very pleasant AT3: very bad.....very good AT4: very worthless.....very valuable AT5: very unenjoyable.....very enjoyable
Subjective norms (SN; 5 items)	SN1: It is expected of me that I share knowledge *Most physicians who are important to me* SN2: ...think that I should share knowledge with others SN3: ...share their knowledge with others *Physicians whose opinions I value* SN4: ...would approve of my behavior to share knowledge with others SN5: ...share their knowledge with others
Perceived behavioral control (PBC; 4 items)	PBC1: For me to share my knowledge is possible always PBC2: If I want, I always could share knowledge PBC3: It is mostly up to me whether or not I share knowledge
	PBC4: I believe that there are much control I have to share my knowledge with others