The Impact of Expectation and Climate on Attitude and Beliefs to Knowledge Sharing among Hospital Physicians

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Physicians are likely to seek information and knowledge about treating patients from other doctors. The shared knowledge among hospital physicians is critical to increasing the hospital's knowledge base and assuring the quality of care. This study investigates factors affecting physicians' attitudes and beliefs about sharing knowledge within hospital department, by employing social exchange theory, theory of climate, and theory of planned behavior. Three regression models, based on the survey results of physicians practicing in 13 tertiary hospitals in Korea, were estimated to test the eight research hypotheses.

Physician's expected covert rewards (such as association and contribution) were a significant positive factor in the attitude toward knowledge sharing, while expected overt rewards were not. Autonomy, management support and trust were found to have significant influences on the physician's subjective norm and perceived behavioral control to knowledge sharing.

Implications can be grouped into two categories: managerial and technological. From the managerial perspective, the managers and chief knowledge officers (CKOs) of hospitals should pay more attention to create an environment where physicians can have positive subjective norms and attitude towards knowledge sharing such as autonomy, trust, and management support. Incentive systems should be executed cautiously to motivate physicians to share their knowledge. Covert reward would be more effective rather than overt reward. From the technological point of view, hospitals should establish knowledge management systems, based on all these factors, in such a way that they function in a more effective manner. Particularly, those responsible for knowledge management systems should pay attention to increasing the accessibility of physicians to workplace communication in an autonomous environment.

Keywords: Knowledge sharing behavior of hospital physicians; Expectations; Climates; Knowledge management

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. Introduction

Knowledge sharing of physicians is very important in hospitals, which are knowledge-intensive organizations. Nowadays, hospitals are developing clinical methods with more knowledge intensive directions, and stresses evidence-based medicine. In these environments, knowledge management may be adopted to enhance the quality and efficiency of patient care in large-scale tertiary hospitals. The quality and efficiency of care is started from physician in most of the care for patients. Thus, the medical knowledge of an experienced physician is critical to the patient care, and would be important intellectual capital of hospital. Physicians in hospital are most likely to seek information and knowledge of treating patients from other doctors for teaching and patient care (Covell et al., 1985; Dawes & Sampson, 2003; Smith, 1996). The demand for evidence-based medicine implicitly calls for knowledge management through knowledge transfer (Wyatt & Faraj, 2000).

There is a need for further studies to provide more empirical-data-based confirmatory explanation of knowledge sharing behavior of individual professional knowledge-work groups such as physicians in hospitals. Physicians as professional knowledge workers are the sources and creators of much information and knowledge in hospitals. Through their experience in the hospital's key processes, they create, find, and accumulate medical knowledge. Physician's medical service is knowledge-intensive, and the medical knowledge is developing and evolving rapidly. Physicians in hospitals can acquire the medical

knowledge through various formal organizational learning mechanisms (Lipshitz & Popper, 2000) and informal processes. Asking colleagues is the second source of information of physicians (Dawes & Sampson, 2003). However, much of the knowledge remained in the control of individual who initially created or acquired it (Jarvenpaa & Staples, 2001). For physicians, lack of time, cost, poor organization and non-availability of sources, and "a glut of sources of differing reliability" were seen as the barriers to finding information (Covell et al., 1985).

We are to examine the factors that motivate or influence attitude and beliefs to knowledge sharing of physicians within subunit in hospitals. This study is based on the theories and previous research that consist of theory of planned behavior (TPB), theory of social exchange, and theory of climate (Ajzen, 1991; Hall, 2001; Ryu et al., 2003).

This article proceeds as follows. As background, we begin with a section in which we review knowledge sharing in organization and related theories. Following this, we present the research model and measurement development. Then the methodology and results of the study are discussed in section four. In section five, we discuss the results to explain the implications of this study. Finally, we conclude with the implications, limitations, and contributions of this study.

. Background

1. Knowledge Sharing

Knowledge sharing is defined as activities of transferring or

disseminating knowledge from one person or group to another, in an organization or among distributed organizations. Knowledge sharing is one of the main issues or processes of knowledge management and organizational learning.

Knowledge sharing activity is emphasized in knowledge management from many researchers and practitioners. Also, they argued that individual predispositions, expectations and culture or climate factors are motivating to share knowledge (Gurteen, 1999). Knowledge sharing is a people-to-people process. Therefore, the willingness and accessibility of the participants should be promoted through intrinsic motivation and technical and social connectivity.

Intra-organizational knowledge sharing refers to collective beliefs or behavioral routines related to the spread of learning among different units within an organization (Hult, 1998; Moorman & Miner, 1998; Zaltman et al., 1973). It keeps alive the knowledge and information gathered from various sources and serves as a reference for future action (Lukas et al., 1996). Some scholars argue that learning does not really occur unless an organization has an effective and efficient system for sharing and reexamining information (Moorman & Miner, 1998). Intra-organizational knowledge sharing does not simply refer to obtaining information from various sources, but it includes systematic reexamination and structuring of information. Experience and lessons must be shared across departments and stored in organizational memory. In this study, knowledge sharing behavior is viewed as the degree to which physicians actually share their knowledge with their colleagues for professional tasks.

Sharing one's individual knowledge is not simply carried out (Davenport & Prusak, 1998). People are not likely to share their

knowledge unless they think it is valuable and important. A previous survey showed that the biggest challenge organizations face in knowledge management is that of "changing people's behavior" (Ruggles, 1998). Robertson (2002) also shown in his comparison of two knowledge sharing systems that knowledge sharing is a human activity and that understanding the humans who will do it is the first step to the success of such systems. In general, there are several contextual factors that affect the 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 (Zaltman et al., 1973).

Researcher argued that knowledge creation and sharing activity can be motivated or impeded by the factors such as incentive systems (Hall, 2001; Ruggles, 1998), culture or climate (Davenport & Prusak, 1998; Hauschild et al., 2001; McDermott & O'Dell, 2001; Ruggles, 1998; Stephen & Stephen, 1990), information and communication technology (ICT) like intranet (Hall, 2001; Leidner, 2000). In the context of professional knowledge transfer, monitoring and metering can be prohibitively expensive or, in some contexts, impractical (Sharma, 1997). Knowledge sharing is motivated by more on altruism, trust, and self-control rather than by rational expectations (Ghoshal & Moran, 1996).

Recently, an empirical study was conducted to develop the understanding of the factors that support or constrain knowledge sharing behavior in four public organizations (Bock & Kim, 2002). Another case study on the two information-technology based knowledge sharing systems underscored the importance of understanding human behaviors (Robertson, 2002). Sole & Applegate (2000) conducted to explain the effectiveness of knowledge sharing from particular technology in

dispersed and cross-functional teams.

The factors to motivate people to share knowledge have been identified as a priority area for individual organizations (Ruggles, 1998; Smith & Farquhar, 2000). The encouragement of employees to contribute knowledge is more important than the issues related to its capture, storage, and dissemination (Boisot & Griffiths, 1999). Among the motivating factors of knowledge sharing, incentive system as extrinsic rewards system and organizational factors are importantly suggested (Hall, 2001; Nonaka & Takeuchi, 1995; O'Dell & Jackson Grayson, 1998; Von Krogh, 1998). Hall (2001) examined the appropriateness of each type of incentives such as explicit or hard rewards, soft rewards and organizational factors.

However, many of the firms that have tried to capture the potential of knowledge sharing have faced major defeats. The most pervasive explanation offered in the literature to date has been that these organizations fail to align their incentive systems with their ambition of creating corporate value through knowledge sharing (Hall, 2001). In spite of the positive expectation of many researchers of expected economic rewards, Bock & Kim (2002) showed that attitude toward knowledge sharing is negatively related to the expected rewards. Thus, motivating factors to the knowledge sharing should be reexamined furthermore for the extensive field settings.

In healthcare settings, physicians as a principal profession are working with other healthcare personnel, thus they should have rigorous and good knowledge in caring patients. Knowledge sharing among them is necessary for ensuring the quality and efficiency of care. Lipshitz & Popper (2000) investigated organizational learning of physicians in internal medicine ward and cardiac surgery ward of a university-affiliated

hospital. They found two contextual factors that facilitated organizational learning: task structure, and leadership style. Despite the emphasis placed on behavioral aspect of knowledge sharing, more empirical studies are needed to explore factors influencing knowledge sharing of physicians in hospitals. Diwan et al. (1997) explored the influencing situational factors on information transfer within community health center in Sweden, and suggested the influencing factors such as profession, professional hierarchy and gender.

2. Theory of Planned Behavior (TPB)

The TPB model extends from the theory of reasoned action(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 (Ajzen, 1991). The TRA works most successfully when applied to behaviors that are under a person's volitional control, but an organizational person's behavior is not fully under volitional control. Even though a person in an 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. The TPB model was developed to predict behaviors in which individuals have incomplete volitional control, especially individuals in specific organizational environments. According to the TPB model, an individual's behavior can be explained by his or her behavioral intention, which is jointly influenced by attitude, subjective norms, and perceived behavioral control. Perceived behavioral control also has a direct effect on behavioral intention.

Perceived behavioral control is determined by two factors; control

beliefs and perceived power. 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. If a person holds strong control beliefs about the existence of factors that will facilitate a behavior, then the individual will have highly perceived control over a behavior. Conversely, the person will have a low perception of control if he/she holds strong control beliefs that impede the behavior.

In this research, we employed the TPB model as a basis by following the previous research (Ryu et al., 2003), which explained that physician's intentions to share knowledge is jointly determined by his or her attitude, subjective norms, and perceived behavioral control.

3. Climates

The complexity and multi-level phenomenon gave difficulty to the study of climates in organizations. However, the progress has been made in conceptualizing climate constructs (Schneider & Reichers, 1983). Climate theories provide the theoretical foundations for the study. Psychological and organizational climate concepts are differentiated. The former is studied at the individual level of analysis, while the latter is studied at the organizational level.

Koys & DeCotiis (1991) derived and suggested eight dimensions of psychological climate: autonomy, trust, cohesiveness, pressure, support, recognition, fairness, and innovation. These results clarified the dimensionality of psychological climate.

The culture or climate (subculture) of organization facilitate or inhibit the knowledge sharing behavior (Constant et al., 1994; Gurteen, 1999;

Hall, 2001; Hauschild et al., 2001; McDermott & O'Dell, 2001, Ruggles, 1998). McDermott & O'Dell (2001) suggested that to create a knowledge sharing culture, make a visible connection between sharing knowledge and practical business goals, problems or results.

The climates believed to be conducive to knowledge sharing are identified as those capabilities that (Hall, 2001; O'Dell & Jackson Grayson, 1998):

- make knowledge sharing as an explicit responsibility
- encourage experimentation
- value all contributions
- promote communities for knowledge sharing

4. Social Exchange Theory

Social exchange theory is based on a central premise: that the exchange of social and material resources is a fundamental form of human interaction. In social exchange theory, people take rewards and costs into account when deciding whether to help. The philosophical roots of social exchange begin with the assumptions of utilitarian economics, broaden to include the cultural and structural forces emphasized by classical anthropologists, and enter sociology after further input and modification from behavioral psychology. The various disciplines of sociology, microeconomics, behavioral psychology and anthropology have developed social exchange theory in the extent to which they assume a rational actor model, derived from microeconomics. One significant aspect in which social exchange theory differs from classical microeconomic theories is that long-term relationships are of interest, whereas classical microeconomic theories were developed on the

assumption that exchanges take place between people who do not know one another (Hall, 2001).

The basic principles underlying the conception of exchange may be briefly summarized. An individual who supplies rewarding services to another obligates him. To discharge this obligation, the second must furnish benefits to the first in turn. Concern here is with extrinsic benefits, not primarily with the rewards intrinsic to the association itself, although the significance of the social "commodities" exchanged is never perfectly independent of the interpersonal relation between the exchange partners. If both individuals value what they receive from the other, both are prone to supply more of their own services to provide incentives for the other to increase his supply and to avoid becoming indebted to him. As both receive increasing amounts of the assistance they originally needed rather badly, however, their need for still further assistance typically declines (Blau, 1964).

. The Research Model

In this section we derived operational constructs step by step from the theoretical constructs and linking constructs based on the theoretical background (See Figure 1).

Research model is depicted as in figure 2. We hypothesized that expectations will have positive effects on the physician's attitude to share knowledge, and organizational climates to the beliefs of hospital physicians to share knowledge. The based research model is TPB model, which was tested for hospital physicians in the previous research (Ryu et

Figure 1. Research Framework
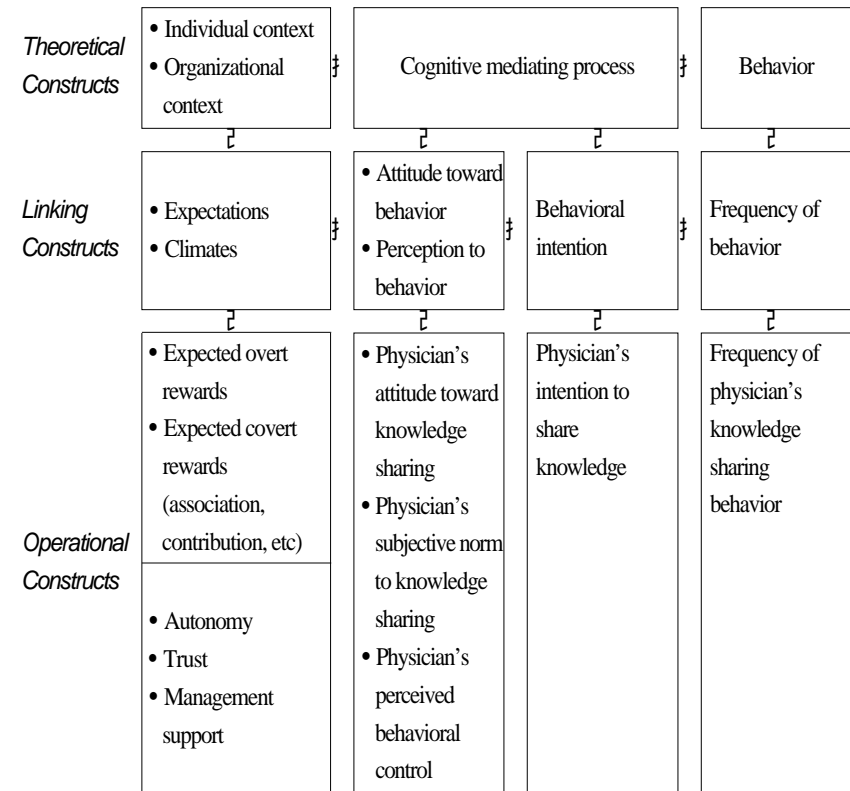
al., 2003). Hence, we hypothesized that hospital physician's attitude and beliefs to share knowledge is influenced from the antecedent factors each such as expectations and perceived climates. The derivation of detailed hypotheses is in the following section.

1. Expected Overt and Covert Rewards

Although TPB model may explain the behavior of knowledge sharing of physicians, there are context variables that determine the knowledge

Figure 2. The Research Model

KS: Knowledge sharing
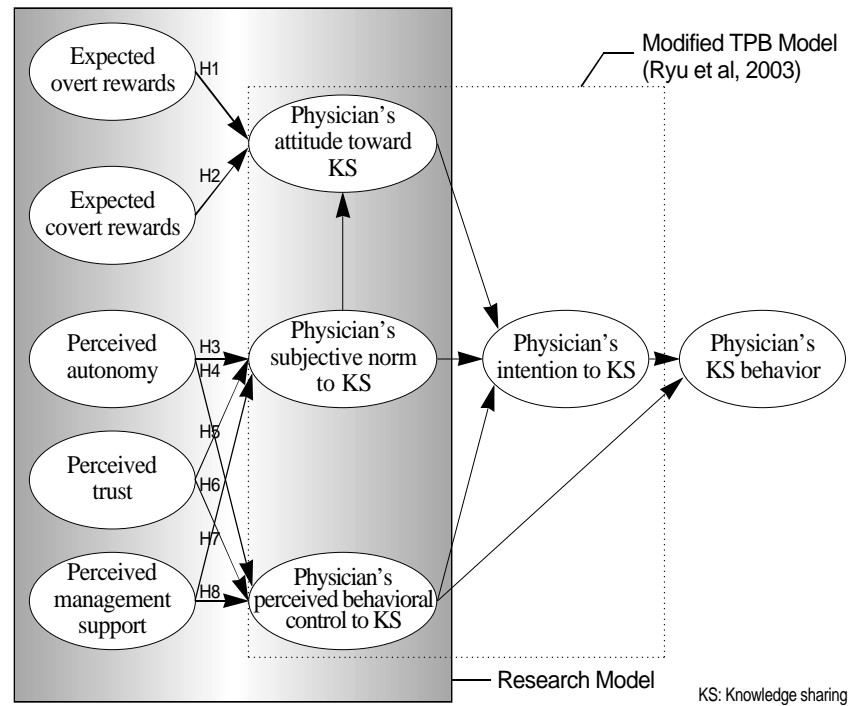
sharing behavior of individuals and teams (Constant et al., 1994; Ruggles, 1998).

Knowledge sharing is a kind of social interaction among people. In management and organizational studies, some researchers have started to look more closely at knowledge sharing with reference to social exchange theory (Nahapiet & Ghoshal, 1998). Information sharing will occur when its rewards exceed its cost [13]. That is why many researchers have emphasized incentive systems for successful knowledge management. The capture of knowledge involves more than simply making it easier for employees to articulate their idiosyncratic experiences and know-how. It is needed to create an incentive structure making it worth doing so

(Boisot & Griffiths, 1999; Hall, 2001; Husted & Michailova, 2002).

The rewards have been classified as explicit or hard or overt rewards and implicit or soft or covert rewards (Gurteen, 1999; Hall, 2001). The overt or explicit reward might be in the form of hard tangible benefit, such as economic rewards (Beer & Nohria, 20000), access to information and knowledge (Dyer & Nobeoka, 2000; Powell, 1998; Smith & Farquhar, 2000; Wasko & Faraj, 2000), and career advancement and/or security (Dyer & Nobeoka, 2000; Hargadon, 1998). The covert or implicit reward might be in the form of enhanced association: acknowledgement from peers (Robertson, 2002) and higher visibility and winning the reputation of being an attractive work colleague (Hargadon, 1998). Recently, Bock & Kim (2002) have shown that the effects of expected overt rewards to individual's attitude toward knowledge sharing are not significant to the sample data of the four public organizations in Korea, but could be a facilitating condition. However, they revealed that covert rewards like expected association and expected contribution have positive effect on knowledge sharing significantly. There exists inconsistency partially in that the rewards system would be a good motivation to individual and group knowledge sharing behavior.

In this study, the overt and covert rewards based on social exchange theory physician were tested in the data to the physicians of hospitals. If physicians have expectations about overt and covert rewards by sharing his/her knowledge, they would develop a more positive attitude toward knowledge sharing.

H1: Physician's expected overt rewards have a positive effect on his or her attitude toward knowledge sharing.

H2: Physician's expected covert rewards have a positive effect on his or her attitude toward knowledge sharing.

H2.1: Physician's expected associations have a positive effect on his or her attitude toward knowledge sharing.

H2.2: Physician's expected contributions have a positive effect on his or her attitude toward knowledge sharing.

2. Organizational Climates

Previous research has suggested the cultural factors that motivate and change people to share their knowledge for the benefit of other and organizations (Ruggles, 1998; Smith & Farquhar, 2000). Various dimensions of psychological climate have been suggested as enabling factors to knowledge sharing. The climates and IT capability believed to be conducive to cooperative behavior are autonomy, commitment, explicit responsibility or management support, innovativeness, learning orientation, and trust (Constant et al., 1994; Davenport, 1997; Jones & James, 1979; Von Krogh, 1998). By reviewing the previous research, we have chosen three psychological dimensions of climate: autonomy, trust and management support. We are to examine the effects of these factors on the physician's subjective norm and perceived behavioral control on knowledge sharing.

Autonomy

Autonomy is referred to as the extent to which the member of the department perceives self-determination with respect to work procedures, goals, and priorities (Koys & DeCotiis, 1991). Nonaka & Takeuchi (1995) and Von Krogh (1998) suggested that organizations provide autonomy in knowledge creation and sharing, so that people are able to step out of their designated roles as they wish in pursuit of new

knowledge. O'Reilly (1989) proposed that when the members perceive they have authority to make decisions and freedom to act in a way they want to experiment, they were empowered to actively search for new ways of doing things and to aggressively achieve innovative performance.

Professional people have the special privilege of freedom from the control of outsiders. Their autonomy is justified by the degree of skill and knowledge, and self-regulation (Freidson, 1988). Generally, physician is very autonomous in her or his care for patients and highly resistant to restrictions on the independence of their decision (Armstrong, 2002). Hence, we tentatively propose the following hypothesis for physician's knowledge sharing behavior.

H3: Physician's perceived departmental autonomy has a positive effect on his or her subjective norm to knowledge sharing.

H4: Physician's perceived departmental autonomy has a positive effect on his or her perceived behavioral control to knowledge sharing.

Trust

Trust is defined as the perception of freedom to communicate openly with members at higher organizational levels about sensitive or personal issues with the expectation that the integrity of such communications will not be violated (Koys & DeCotiis, 1991). Trust is defined as the belief that the results of somebody's intended action will be appropriate from our point of view. Previous research demonstrates where relationships are high in trust, people are more willing to engage in social exchange in general, and cooperative interaction in particular (Fukuyama, 1995; Ring & Van De Ven, 1992). Trust secures communication and dialogue, and may both open up access to people for the exchange of intellectual capital

and increase anticipation of value through such exchanges. We can find this view in other research that where there are high levels of trust, people are more willing to take risks in such exchange (Nahapiet & Ghoshal, 1998). Trust may also indicate greater openness to the potential for value creation through exchange and combination. Boisot & Griffths (1999) highlight the importance of interpersonal trust for knowledge creation in contexts of high ambiguity and uncertainty and the creation of environments where trust is strong. Where trust is strong, participants in knowledge sharing exchange relationships are more willing to expose themselves (Hall, 2001). Hence, we hypothesize:

H5: Physician's perceived departmental trust has a positive effect on his or her subjective norm to knowledge sharing.

H6: Physician's perceived departmental trust has a positive effect on his or her perceived behavioral control to knowledge sharing.

Management Support

Top management usually exerts influence over the members of an organization through its shared perspective of environmental events and organizational capabilities (Lyles & Schwenk, 1992).

Encouragement and formalism of knowledge sharing activity can be generated through various activities (Hall, 2001). There are many means of making knowledge sharing by management intervention: organizing proactive training and project debriefings, lead by examples, set time aside specifically for people to share one another, and senior management buy-in (Davenport & Prusak, 1998; O'Dell & Jackson Grayson; Smith & Farquhar, 2000). Top management's strong commitment is crucial to participants to be committed to the knowledge-creating project (Nonaka & Takeuchi, 1995). Thus, top managers play an important role of

providing leadership for the members to create and share the knowledge. Hence, we argue that management support strongly to physician's subjective norm and perceived behavioral control of knowledge sharing.

H7: Physician's perceived departmental management support has a positive effect on his or her subjective norm of knowledge sharing.

H8: Physician's perceived departmental management support has a positive effect on his or her perceived behavioral control of knowledge sharing.

Ⅲ. Methodology

1. Sample and Data Collection

The target subjects were physicians who were practicing at tertiary hospitals in Korea. The 1,000 sample questionnaires were mailed to the chiefs of Graduate Medical Education (GME) Department of the 43 tertiary hospitals in Korea. Finally, 334 responses were received from the 28 types of subunits in 13 hospitals representing a response rate of 33.4 percent.

The survey questionnaires were gathered between August and October 2002. In the cover of each questionnaire, an encounter letter was attached to describe the purpose of the study and ensure the necessary confidentiality. Personal visits and/or telephone calls or e-mail were made to the department chiefs to request them to provide detailed information. 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 subject was asked to return the completed questionnaire to his or her department secretary, from whom the questionnaire was collected at a later time.

Of the responded cases, 48 incomplete cases and 73 cases of an insignificant within-group inter-rater agreement index ((WG(J)) were discarded, leaving a total of 213 completed questionnaires. The respondents consisted of internists (27.2%), surgeons (15.5%), dentists (24.9%) and other specialty physicians (32.4%). On average, the responding physicians had 6.0 years of experience in their respective specialty areas after graduating from medical schools. The descriptive characteristics of the respondents are shown in Table 1.

2. Measurement Development

The measures used to operationalize the constructs in the research model were mainly adopted from some of the related studies conducted in the past [2, 8], with minor wording changes tailored to the physician's knowledge sharing context. All measures, which are about attitude, subjective norm, and perceived behavior control, were defined in terms of their target, action, context, and time (TACT) according to the construct guideline (Ajzen, 2002). Principles of compatibility, specificity and generality were applied to all constructs. A multi-item method was used to increase the accuracy of measurement, and each item was based on a five point Likert scale. Nineteen measured variables were used to reflect the components of the TRA and TPB models.

Table 1. Profile of Respondents

Measure	Item	Frequency	Percent (%)
Career	Over 21 years	11	5.2
	16 ~ 20 years	5	2.3
	11 ~ 15 years	12	5.6
	7 ~10 years	35	16.4
	2 ~ 6 years	150	70.4
Position	Chief	2	0.9
	Director	23	8.9
	Staff	19	12.7
	Fellow	27	12.6
	Resident	142	66.7
Department	Internal medicine	58	27.2
	Surgical	33	15.5
	Ancillary and others	69	32.4
	Dental	53	24.9
	Total	213	100.0

Items for independent variables of physician's expectations about knowledge sharing (expected rewards, expected associations, and expected contribution(were based on the social exchange theory and prior studies on knowledge sharing (Blau, 1964; Bock & Kim. 2002; Hall, 2001).

The measures about psychological climates used to operationalize the constructs in the research model were mainly adopted from some of the previous organizational studies (Freidson, 1988; Gold et al., 2001; Hall, 20011; Koys & DeCotiis, 1991). Definitions and combinations of items were based on the previous research. The measurement items were further tested for consistency, ease of understanding, and sequential appropriateness by a pretest of 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. All operational definitions of instruments and their related literature are summarized in Appendix A.

3. Measurement Assessment

Content Validity

Content validity of the survey instrument was established through the adoption of validated instruments by other researchers in the literature (Straub, 1989). Definitions and items concerning attitude, subjective norms, perceived behavioral control, and intention to share physicians' knowledge are based on the original TRA and TPB models (Ajzen, 2002; Fishbein & Ajzen, 1975) that are widely accepted in micro-social level of analysis in social psychology (Stephen & Stephen, 1990).

With satisfactory content validity established, the measurement items were further tested for consistency, ease of understanding, and sequential appropriateness by a pretest of 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. Subjects who had participated in the pretests were excluded from the subsequent main study.

Internal Consistency Reliability

This study measures the research factors by multi-items to enhance the accuracy of measurement. Internal consistency reliability to test uni-dimensionality was assessed by Cronbach's alpha and item-total correlations. The resulting alpha values ranged from .79 to .91, which were above the acceptable threshold (0.70) suggested by Nunnally and Bernstein (Nunnally, 1994). Two items with item-total correlation lower than 0.5 were dropped from perceived behavioral control and expected rewards each (See Table 2).

Table 2. Test Results of Internal Consistency Reliability

Construct	Items	Mean	S.D	Cronbach's	Item-to-total Correlation
Attitude toward KS	5	3.915	.5395	.9074	.6956, .8123, .8024, .7648, .7554
Subjective norm	5	3.602	.6390	.8595	.6047, .6777, .6684, .7009, .7305
Perceived behavioral control	4	3.267	.7008	.7934	.6350, .7202, .6239, 4551
	3	3.323	.7750	.8131	.6519, .7416, .5990
Expected overt rewards	4	2.707	.7590	.8449	.7277, .7940, 4750, .7627
	3	2.487	.8440	.8879	.7831, .8161, .7452
Expected associations	4	3.764	.6752	.9017	.7867, .8154, .7878, .7297
Expected contributions	5	3.738	.6308	.8855	.6808, .7259, .7484, .7655, .6972
Autonomy	4	3.284	.8250	.9078	.7643, .7943, .8153, .7917
Trust	4	3.316	.8408	.9278	.8532, .8219, .8529, .7970
Management support	5	3.404	.7801	.9224	.7927, 8434, .7567, .7636, .8358

* KS: Knowledge Sharing

Construct Validity

For psychological and organizational climate factors, convergence and discriminability were evaluated by means of factor analysis (Bagozzi et al., 1991; Hauschild et al., 2001) and intercorrelations among research constructs. Since each factor was measured by the multi-item construct, factor analysis with varimax rotation was conducted to check the discriminant validity among conceptual factors.

The factor analysis was performed on 13 items that measured the determinants of physician's intention to share knowledge, 13 items for the expectations to share knowledge, and 13 items for the psychological

climates, which were hypothesized to influence physician's belief-based factors. All values were above the recommended level of factor loading, 0.60 (Chin, 1998) (See Table 3, 4 and 5).

Table 3. Rotated Factor Matrix for Attitude, Subjective Norm and Perceived
    Behavioral Control

Variables	Factor loadings		
	Factor 1	Factor 2	Factor 3
Attitude towards KS			
att1	**0.800**	0.169	-0.018
att2	**0.851**	0.130	0.143
att3	**0.847**	0.177	0.052
att4	**0.850**	0.147	0.155
att5	**0.780**	0.231	0.238
Subjective norm to KS			
sn1	0.418	**0.623**	0.116
sn2	0.286	**0.752**	0.066
sn3	0.054	**0.784**	0.231
sn4	0.137	**0.806**	0.104
sn5	0.136	**0.799**	0.254
Perceived behavioral control to KS			
pbc1	0.176	0.310	**0.778**
pbc2	0.182	0.279	**0.829**
pbc3	0.041	0.037	**0.847**
Eigenvalues	3.775	3.184	2.259
Cumulative %	29.038	53.533	70.913

Note: 1) Extraction Method: Principal Component Analysis.
     2) Rotation Method: Varimax with Kaiser Normalization. Rotation converged
        in 5 iterations.

Table 4. Rotated Factor Matrix for Expectations

Variables	Factor loadings		
	Factor 1	Factor 2	Factor 3
Expected overt rewards			
e-o-rew1	0.004	0.045	**0.904**
e-o-rew2	0.048	0.020	**0.920**
e-o-rew3	0.137	0.041	**0.863**
Expected associations			
ass1	0.234	**0.850**	0.050
ass2	0.230	**0.861**	0.050
ass3	0.185	**0.849**	0.107
ass4	0.293	**0.796**	-0.075
Expected contributions			
con1	**0.768**	0.274	0.009
con2	**0.816**	0.161	0.105
con3	**0.845**	0.140	0.064
con4	**0.801**	0.293	0.060
con5	**0.787**	0.217	0.038
Eigenvalues	3.479	3.075	2.451
Cumulative %	28.992	54.621	75.044

Note: 1) Extraction Method: Principal Component Analysis.
     2) Rotation Method: Varimax with Kaiser Normalization. Rotation converged
        in 5 iterations.

Assessment of Within-group Interrater Agreement

An index of within-group inter-observer consensus or agreement is of particular relevance to the composition model for climate. There are many methods, techniques, and areas of investigation that rely on interrater agreement as an indicator of perceptual convergence. Among them, interrater reliability and within-group agreement index ($r_{wg(J)}$) are widely used (Kozlowski & Hattrup, 1992). Interrater reliability is focused on a consistency of the variance among raters. In contrast, within-group

Table 5. Rotated Factor Matrix for Organizational Climate

Variables	Factor loadings		
	Factor 1	Factor 2	Factor 3
Autonomy			
aut1	0.064	0.169	**0.859**
aut2	0.141	0.165	**0.875**
aut3	0.183	0.099	**0.877**
aut4	0.222	0.086	**0.853**
Trust			
tru1	**0.177**	0.892	0.129
tru2	**0.259**	0.864	0.099
tru3	**0.223**	0.873	0.166
tru4	**0.208**	0.856	0.151
Management support			
mgt1	0.868	**0.088**	0.098
mgt2	0.896	**0.112**	0.117
mgt3	0.717	**0.346**	0.208
mgt4	0.795	**0.278**	0.164
mgt5	0.812	**0.312**	0.192
Eigenvalues	3.659	3.425	3.207
Cumulative %	29.148	54.495	79.164

Note: 1) Extraction Method: Principal Component Analysis.
    2) Rotation Method: Varimax with Kaiser Normalization. Rotation converged
       in 5 iterations

agreement index focused on the interchangeability among raters; it addresses the extent to which raters make essentially the same ratings (James et al., 1993; James et al., 1984; Kozlowski & Hattrup, 1992).

This study measured expectations and organizational climates from the physician's individual perception level to examine their impact on his or her attitude and beliefs toward sharing knowledge at the individual level. Within-group interrater agreement index ($r_{wg(J)}$) for multiple scales is

applied to this study, because research constructs in this study about organizational climates were measured by four to six items; J is four to six. The within-group interrater agreement indexes were computed for the group with more than two raters.

The results of assessment of 39 within-group interraters' agreement are shown in Table 6, where 53 cases of 11 groups demonstrated that they were not in good agreement at least in one construct. Therefore, 213 cases remained for further analysis after dropping 73 cases, including 20 single cases, which were below the moderate level of agreement 0.7. Hence, the samples we tested may have agreement about their climate constructs.

Table 6. Pearson Correlations and Within-group Inter-rater Agreement Index

Variables	$r_{wg(J)}$	1	2	3	4	5	6	7	8	9
1. Attitude	-	1.0								
2. Subjective norm	-	0.458**	1.0							
3. Perceived behavioral control	-	0.325**	0.458**	1.0						
4. Expected overt rewards	-	0.079	0.207**	0.241**	1.0					
5. Expected association	-	0.375**	0.379**	0.304**	0.095	1.0				
6. Expected contribution	-	0.538**	0.414**	0.335**	0.143*	0.511**	1.0			
7. Autonomy	.883	0.116	0.272**	0.252**	0.132	0.095	0.268**	1.0		
8. Trust	.910	0.223**	0.185**	0.325**	0.178**	0.147*	0.193**	0.000	1.0	
9. Management support	.917	0.129	0.166*	0.251**	0.124	0.267**	0.291**	0.000	0.000	1.0

Note: $r_{wg(J)}$: Within-group inter-rater agreement index created by James et al.(1993, 1984)
* p<0.05, ** p<0.01

4. Regression Model Fitness

Multiple regression analysis was adopted to test hypotheses. Regression models were performed separately for each dependent variable: physician's attitude, subjective norm, and perceived behavioral control to knowledge sharing.

Before performing the regression analysis, we examined the assumptions in multiple regression analysis such as linearity of the measures, constant variance of the error terms, independence of the error terms, and normality of the error term distribution (Hair et al., 1998). The correlation matrix among all variables is shown in Table 7. Correlations among independent variables are ranged from 0.000 (among physician's perceived trust, management support, and IT capability) to 0.538 (between expected contribution and attitude toward knowledge sharing).

The homoscedasticity can be diagnosed with residual plots or simple statistical test. In this study, the plotting of the studentized residuals against the predicted criterion values showed that there was no heteroscedasticity. We also examined the independence and normality of the variables by residual plot and normal histogram of residuals. The test results showed no violations. The goodness of fit of was significant for all regression models.

Two of the measures for assessing both pairwise and multiple variable collinearity are the tolerance value and variance inflation factor (VIF). Generally, any variables with tolerance values below .19 (or above VIF of 5.3) would be correlated more than .90 (Hair et al., 1998). The tolerance values of the variables were ranged from .730 to 1.000 that is higher than the common cut-off thresholds. The range of VIF values was from 1.000 to 1.370, which is lower than the common cutoff threshold values (see Table 7).

The fitness of the regression models was proven to be significant by the F statistics, ranging from 10.968 to 30.229.

Table 7. F Statistic, Tolerance and VIF Values of Regression Model

Regression model	F Statistic	Tolerance value	VIF
Model 1:			
ATT =	30.229 (.000)		
+ $_1$E_ORW		.979	1.021
+ $_2$E_ASS		.738	1.355
+ $_3$E_CON		.730	1.370
Model 2:			
SN =	10.968 (.000)		
+ $_1$AUTO		1.000	1.000
+ $_2$TRST		1.000	1.000
+ $_3$MGSU		1.000	1.000
Model 3:			
PBC =	23.944 (.000)		
+ $_1$AUTO		1.000	1.000
+ $_2$TRST		1.000	1.000
+ $_3$MGSU		1.000	1.000

Note: ATT: Physician's attitude toward knowledge sharing (KS); E_ORW: Physicians' expected overt rewards by KS; E_ASS: Physicians' expectations about association among members by KS; E_CON: Physicians' expectations about contributions by KS; SN: Physician's subjective norm to KS; PBC: Physician's perceive behavioral control to KS; AUTO: Autonomy in subunit; TRST: Trust in subunit; MGSU: Management support in subunit.

. Results

The hypotheses were tested by the three multiple regression models. In model 1, the effects of the three expectations to physician's attitude toward knowledge sharing were tested. In model 2, the effects of the three organizational climates to physician's subjective norm to knowledge sharing were tested. In model 3, the effects of the three organizational climates to physician's perceived behavioral control to knowledge sharing were tested. Table 8 summarizes adjusted R^2 for the each regression model, the coefficients, t-value, and significance level.

Expected reward is not positively significant to the physician's attitude toward knowledge sharing (= -.001, t = -.017, p=0.987), which does not support H1.

Expected association is positively significant to physician's attitude toward knowledge sharing (= .136, t = 2.024, p<0.05), which supports H2 1.

Expected contribution is the most positively significant predictor of physician's attitude toward knowledge sharing (= .468, t = 6.923, p<0.01), which support H2 2.

Autonomy is positively significant to physician's subjective norm to knowledge sharing (= .272, t = 4.232, p<0.01), which supports H3. Also, autonomy is positively significant to physician's perceived behavioral control to knowledge sharing (= .272, t = 4.551, p<0.01), which supports H4.

Trust (= .185, t = 2.880, p<0.01) is positively significant to physician's subjective norm to knowledge sharing, which does support H5. Trust also has positively significant to physician's perceived behavior control to knowledge sharing (= .363, t = 6.087, p<0.01), which support H6.

Management support has positively significant to physician's subjective norm to knowledge sharing (= .166, t = 2.589, p<0.05), which support H7. Management support does not significantly related to physician's perceived behavioral control to knowledge sharing (= .224, t = 3.750, p<0.01), which support H8.

Table 8. Summary of Regression Results

Model	Model 1	Model 2	Model 3	Results
Dependent variable	Physician's attitude toward knowledge sharing	Physician's subjective norm to knowledge sharing	Physician's perceived behavioral control to knowledge sharing	-
Adjusted R^2	.293	.213	.257	-
Expected overt rewards	= -.001 t = -.017	-	-	H1: Not supported
Expected association	= .136 t = 2.024**	-	-	H2.1: Supported
Expected contribution	= .468 t = 6.923**	-	-	H2.2: Supported
Autonomy	-	= .272 t = 4.232***	= .272 t = 4.551***	H3: Supported H4: Supported
Trust	-	= .185 t = 2.880***	= .363 t = 6.087***	H5: Supported H6: Supported
Management support	-	= .166 t = 2.589*	= .224 t = 3.750***	H7: Supported H8: Supported

* p<0.1, ** p<0.05, *** p<0.01

. Discussion

In the first model, we examined the effect of physician's expectations by exchanging knowledge to the attitude toward knowledge sharing. Physician's expected covert rewards such as association and contribution had significant positive effect on the attitude toward knowledge sharing. The strength of effect to the attitude was higher in expected contribution than expected association. However, expected overt rewards like economic rewards were, unlike many researchers suggested, not positively significant for the physician's attitude toward knowledge sharing. But, these results are the same as Bock & Kim (2002), and Gurteen (1999).

While reward system for individuals in knowledge sharing activity is emphasized by many previous research and management cases, physicians are not motivated from expected rewards. We may understand this result by considering hospital physician's task environments. First, knowledge sharing in hospital is performed through various learning mechanisms (Lipshitz & Popper, 2000), and it may not be motivated solely by explicit rewards. Second, since the knowledge sharing behavior of physicians in hospitals were executed for a long time, it may have already passed the initial effective times that rewards motivate physicians to exchange knowledge (Blau, 1964). Lastly, rewards may break off good relations between members (Kohn, 1993), physicians would not consider the explicit rewards.

Expected contributions are the highest effect to attitude among the

three expectation constructs. Shared knowledge of physicians will be utilized in their practice (especially knowledge receivers), and the value of the knowledge would feedback immediately. Within their professional autonomy, the signals among physicians would be used to evaluate or regulate their work or fame (Freidson, 1988). Physician's positive relationship of expected association to attitude toward knowledge sharing also can be interpreted as the expected contribution.

In model 2 and 3, we examined the influence of organizational climates to subjective norm and perceived behavioral control to share physician's knowledge. We explored to identify effect of major organizational climates that is supported in the previous research in physician's knowledge sharing context.

Autonomy, trust, and management support have been positively significant to physician's subjective norm and perceived behavioral control to knowledge sharing. As expected in the previous research in other business organizations (Hall, 2001;O'Dell & Jackson Grayson, 1998; Ruggles, 1998), the results of this paper also proved that trust, autonomy, and management support would form affirmative environments to encourage physician's beliefs to share his/her knowledge.

. Conclusions

The main contribution of this study is that it explored the impact of the factors on the physician's beliefs and attitude towards knowledge sharing behavior. Social exchange theory and theory of climates are proven to be

effective in explaining the knowledge sharing behavior of hospital physicians. First, we found that physician's expected overt rewards about knowledge sharing were not positively significant in the physician's attitude, and these results support the previous studies of Bock & Kim (2002), and Gurteen (1999). However, these results are not consistent with other research that emphasized the incentive systems. While overt reward system for individuals in knowledge sharing activity are emphasized by many previous research and management cases, physicians are not motivated from expected overt rewards. We may understand these results by considering hospital physician's task environments like the existence and long history of many learning mechanisms (Blau, 1964; Lipshitz & Popper, 2000). Expected covert rewards such as contributions and association have the positive effect to physician's attitude toward knowledge sharing. These results can be understood within their professional autonomy, the signals among physicians would be used to evaluate or regulate their work or fame (Freidson, 1988).

Trust, management support and autonomy have been positively significant to physician's subjective norm to knowledge sharing. Trust and autonomy have been positively significant to physician's perceived behavior control to knowledge sharing. As expected in the previous research in other business organizations, trust management support and autonomy would form affirmative environments to encourage physician's knowledge sharing behavior (Hall, 2001; O'Dell & Jackson Grayson, 1998; Rugles, 1998).

Two types of implications can be drawn : managerial and technological. First, from the managerial aspect, the managers and CKOs of hospitals should pay more attention to create an environment where physicians can have positive subjective norms and attitude towards knowledge sharing such as autonomy, trust, and management support. Incentive systems should be executed cautiously to motivate physicians to share their knowledge. Explicit rewards are not adequate to the positive attitude of physician's knowledge sharing, but covert reward would be more effective such as association among members and the hospital performance as results of their activity. Hence, government should give desirable environments to encourage knowledge sharing by hospital policy, and there should be effective strategy for physicians to share knowledge in hospital that create automotive climate.

From the technological point of view, hospitals should establish the knowledge management systems, based on all these factors, in such a way that they function in a more effective manner. Particularly, those responsible for knowledge management systems should make more efforts to enhance the accessibility of physicians to workplace communication in their self-control climate.

Even though this study has drawn theoretically and practically meaningful implications, there are a number of limitations. First, the relevance of this study remains confined by and large to the area of knowledge sharing behavior among one particular professional group: physicians. Thus, the findings and implications drawn from this study cannot be readily generalized to other professional groups.

Second, despite the rigorous examination on the credibility and appropriateness of the collected data, this study may have some common method bias, as is often the case with survey research studies.

Lastly, there should be considered the network computing environments, which may facilitate to transfer and disseminate the knowledge within organizations (Sole & Applegate, 2000).

As has been implied, there is a need for further research efforts focused on accumulating further empirical evidence and data and surmounting the limitations of the present study. These efforts should involve studies identifying the hospital physician specific cultural factors for knowledge sharing. Also, special attention should be geared towards finding differences in knowledge sharing behaviors of physicians that may stem from leadership style of different departments in a hospital and the size of hospital.

Appendix A. Operational Definition

Variables	Operational definition	Related literatures
Physician's expected rewards to knowledge sharing	The degree to which physician believes that he can have extrinsic incentives due to his knowledge sharing	Blau (1964), Bock & Kim (2002), Constant et al., (1994), Hall (2001)
Physician's expected associations to knowledge sharing	The degree to which physician believes that he can improve the relationship through his knowledge sharing	Blau (1964), Bock & Kim (2002), Hall (2001)
Physician's expected contributions to knowledge sharing	The degree to which physician believes that he can improve the organization's performance through his knowledge sharing	Bock & Kim (2002)
Physician's perceived autonomy	The degree of perception of self-determination with respect to work procedures, goals, and priorities	Hall (2001), Freidson (1988), Koys & DeCotiis (1991)
Physician's perceived trust	The degree of perception of freedom to communicate openly with members at higher levels about sensitive or personal issues	Hall (2001), Koys & DeCotiis (1991)

<Appendix A> Continued

Variables	Operational definition	Related literatures
Physician's perceived management support	The degree of perception of top manager's understanding the specific benefits of KS and supporting KS activity	Gold et al. (2001), Hall (2001)
Physician's attitude toward knowledge sharing	Degree to which a physician has a favorable or unfavorable evaluation of performing the knowledge sharing behavior	Ajzen (2002, 1991), Bock & Kim (2002), Chang (1998), Chau & Hu (2001)
Physician's subjective norm to knowledge sharing	Degree of a physician's perceived social pressure to perform or not to perform the knowledge sharing behavior	Ajzen (2002, 1991), Chang (1998), Chau & Hu (2001)
Physician's perceived behavioral control to knowledge sharing	Degree of physician's perceived ease or difficulty of performing the knowledge sharing behavior	Ajzen (2002, 1991), Chang (1998), Chau & Hu (2001)

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Summary

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