

What Makes Open Innovation Processes Better? A Focus on IT Professionals' Attitudes

Juyeon Ham^a, Dan J. Kim^b, Byounggu Choi^c, Jae-Nam Lee^{d,*}

^a Ph.D. Student, Korea University Business School, Korea

^b Professor, College of Business, University of North Texas, USA

^c Associate Professor, College of Business Administration, Kookmin University, Korea

^d Professor, Korea University Business School, Korea

ABSTRACT

A recent trend in innovation paradigm is the shift from closed innovation to open innovation principles. This trend is characterized by the use of purposive inflows and outflows of knowledge not only to accelerate internal innovation, but also to expand the markets for external use of innovation. However, the Not-Invented-Here (NIH), and Not-Sold-Here (NSH) or Only-Use-Here (OUH) syndromes are the most common challenges encountered in open innovation processes. Therefore, this study has the following main aims: 1) propose a research model that explains the factors that influence NIH and NSH/OUH attitudes based on motivation theory with perceived organizational fairness and commitment, 2) investigate their impacts on NIH and NSH/OUH attitudes, and 3) provide useful theoretical and practical insights. The proposed research model was empirically tested using survey data collected from information technology (IT) professionals in Korea. One of the major findings indicates that IT professionals' perceived organizational fairness has a negative effect on NIH attitudes in open innovation process. Theoretical and practical contributions of this study are also discussed.

Keywords: Open Innovation, Not-Invented-Here (NIH), Not-Sold-Here (NSH), Only-Use-Here (OUH), IT Professionals, Innovation Processes

I . Introduction

As the business environment rapidly changes, product or service life cycles get shorter. Also, R&D investment performance has declined because of increasing technology development costs and the shortening of product life. In other words, for several reasons (e.g.,

stronger global competition, increased technological complexity, and greater availability and mobility of highly skilled R&D personnel), the "do-it-yourself" principle of closed innovation is not sustainable in many industries these days. In response, many companies and researchers are doing a variety of efforts to help come up with answers to this phenomenon.

This work was supported by the National Research Foundation of Korea Grant funded by the Korean Government (NRF-2014S1A5A2A03064953).

*Corresponding Author. E-mail: isjnlee@korea.ac.kr. Tel: 82232902812

They have realized that valuable ideas and technologies do not need to originate within one's own firm, and that presenting them to the market does not have to rely on the firm's own activities. To generate radical innovations or build new businesses, firms often depend on external knowledge sources (Amesse and Cohendet, 2001; Dyer and Singh, 1998; Lichtenthaler and Ernst, 2006). Integrating external R&D sources is a pressing need that has prompted many firms to shift from using a closed innovation model to an open innovation model, which uses external ideas and knowledge (or technologies) in conjunction with internal R&D to achieve and sustain innovation (Chesbrough, 2003b). In other words, open innovation is a holistic approach to innovation management; open innovation not only uses external and internal knowledge sources to accelerate internal innovation, but also uses external paths to markets for internal knowledge (Chesbrough et al., 2006). It is "systematically encouraging and exploring a wide range of internal and external sources for innovation opportunities, consciously integrating that exploration with firm capabilities and resources, and broadly exploiting those opportunities through multiple channels" (West and Gallagher, 2006, p. 320).

Chesbrough (2003b) described an innovation paradigm shift from a closed to an open innovation model, characterized by the use of purposive inflows and outflows of knowledge to both accelerate internal innovation and expand the markets for external use of innovation. Recently, numerous companies, such as IBM, Intel, and P&G, have started to adopt the concept of open innovation. However, despite the success of these firms, most companies still hesitate to adopt open innovation because they want to avoid problems that might hinder its successful execution in their organizations. Especially, employees from well-reputed, knowledge intensive organizations

demonstrate blind faith in their own ability to generate the highest quality knowledge. Such attitudes can severely limit the infusion of new ideas into the organization and shortchange it with respect to innovation and the serendipitous success that open knowledge sharing organizations rely on for their competitive edge (O'Neill and Adya, 2007). Actually, there are many barriers in companies' attempts at executing the open innovation process, such as employees' perceptions and attitudes toward knowledge transactions (i.e., inflows and outflows of knowledge), which are the most common problems. The Not-Invented-Here (NIH), and Not-Sold-Here (NSH) or Only-Use-Here (OUH) syndromes have been identified as the most commonly faced crucial attitudes to knowledge in open innovation (Chesbrough, 2006; Chesbrough, et al., 2006; Huizingh, 2011). The *NIH syndrome* is defined as "an attitude to the external acquisition of knowledge that is more negative than an ideal economic attitude would be" (Lichtenthaler and Ernst, 2006, p. 375) or which had led researchers to reject any externally originated idea/knowledge (Katz and Allen, 1982). Whereas the *NSH* or the *OUH syndrome* is defined as "an attitude to the external exploitation of knowledge that is more negative than an ideal economic attitude would be" (Lichtenthaler and Ernst, 2006, p. 377). As Katz and Allen (1982) found that when research and development staff is inflicted with the NIH syndrome, performance suffers from insularity and failure to keep up with advances in wider scientific and industrial communities (Landau and Drori, 2008).

There are several motivations of the study. In recent years, many researchers have explored open innovations. However, most of them simply investigate its basic concepts (e.g., characteristics, best practices, and managerial challenges based on case studies) and the difference between closed and open

innovations. Only a few studies try to understand what factors affect the NIH and the NSH/OUH attitudes (Lichtenthaler and Ernst, 2006; Lichtenthaler et al., 2010) in the organizational level. Although different levels of analysis have been addressed in previous open innovation studies, the evolving debate is about missing a key element, i.e., the people side of the equation (Herzog, 2011). Individual level open innovation has not been received much attention in previous studies (Herzog, 2011).

Even within a firm setting, understanding the drivers and consequences of individual employees' attitudes toward open innovation is very critical because individual employees carry a large portion of responsibility for the actual adoption of open innovation. If the individual employee is misaligned with the organization's desire to implement new practices in open innovation, the firm will be faced significant challenges which may threaten its survival (Huston and Sakkab, 2006; Lucas and Goh, 2009). This is important because "attitudes are individual predispositions to respond to given objects which ultimately affect the actual behavior of people (Fishbein and Ajzen, 1975)" (de Araújo Burcharth et al., 2014, p. 150). Consequently, if a firm seeks to implement new ways of organizing innovative activities, such as the open innovation approach, its employees' attitudes may play a dominant role either legitimizing or hindering such new initiatives in being adopted and implemented. Attitudes can be either important foundations or major barriers to development of organizational capabilities for open innovation in the firm (Chesbrough et al., 2006; de Araújo Burcharth, et al., 2014). Moreover, NIH and NSH/OUH syndromes originate from the level of employees (individuals). Therefore, there is a need for a deeper understanding of the influencing factors in the individual level of open innovation process.

Individuals also make decisions every day for their organizational lives. Some decisions deal with routine business tasks, while others are related to non-routine ones. These decisions have both economic and socio-emotional consequences (Cropanzano and Schminke, 2001). Individuals assess the decisions they made with a very critical eye based on the question whether it was fair or not (Colquitt, 2001). Therefore, from the view of organizational justice theory (Colquitt, 2001), it is important to investigate the effect of employees' perceived fairness on NIH and NSH/OUH attitudes and behaviors in the context of open innovation processes.

The purpose of this study is three-fold: 1) to propose a research model that describes factors influencing NIH and NSH/OUH attitudes drawing upon three theories (i.e., motivation theory, organizational justice theory and three types of organizational commitments); 2) to investigate their impacts on NIH and NSH/OUH attitudes; and 3) to provide theoretical and practical insights. The specific research questions are the following:

Research Question 1: What are the factors that influence NIH and NSH/OUH attitudes in open innovation processes?

Research Question 2: What are the relationships between the factors?

This paper is organized as follows. In the next section, we provide a literature review and a theoretical background on open innovation. Based on the literature review, we identify key factors to develop our research model and hypotheses. Then, we describe the research model and its hypotheses. Next section covers the research methodology, including measurement item development and detailed data collection procedure. After presenting data analysis

and results, we conclude the paper with findings, contributions and limitations.

II. Theoretical Background

2.1. Open Innovation

Companies develop new technologies by themselves for their own products and/or services (Ahlstrom, 2010; March, 1991). Thus, most companies mainly pursue closed innovation strategies, meaning limited interactions with the outside environment or sources. In recent decades, these strategies have begun to change as companies across industries have increasingly acquired external technologies to complement their internal knowledge bases. For instance, for the purpose of strategic alliances or in-licensing, it involves acquiring the right to use external knowledge (Beamish and Lupton, 2009; Cassiman and Veugelers, 2006; Teece, 1986; Von Hippel and Von Hippel, 1988). A similar development has been observed recently in the areas of knowledge exploration and exploitation. Firms across industries have

started to actively commercialize their technological knowledge, either exclusively or in addition to using it internally for their own products through licensing or strategic alliances, where firms allow external partners to use some of their own technology. On this basis, firms may achieve monetary benefits (e.g., licensing revenues) and non-monetary benefits (e.g., access to external technology through cross-licensing) (Gassmann, 2006; Grindley and Teece, 1997).

Chesbrough (2003b) used the term “open innovation” to describe innovation processes in which firms extensively interact with their environment, leading to a significant amount of external knowledge exploration and exploitation (Chesbrough, 2003b; Van De Vrande et al., 2006). According to Chesbrough et al. (2006), open innovation is defined as “the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively” (p. 1). That is, open innovation emphasizes that companies should use more external ideas, technologies, and knowledge in their own business while letting their unused ideas to be used by other companies. This requires each company to open up

<Table 1> Closed Innovation vs. Open Innovation (Chesbrough, 2003a, p. 38)

Closed Innovation Principles	Open Innovation Principles
<ul style="list-style-type: none"> • The smart people in our field work for us. • To profit from R&D, we must discover, develop, and ship it. External R&D can create significant values. We need to keep internal R&D to ourselves. • If we discover it ourselves, we will get it to the market first. • If we are the first to commercialize an innovation, we will win. • If we create the most and the best ideas in the industry, we will win. • We should control our intellectual properties (IPs) so that our competitors do not profit from our ideas. 	<ul style="list-style-type: none"> • Not all of the smart people work for us so we must find and tap into the knowledge and the expertise of bright individuals outside our company. • External R&D can create significant values. Internal R&D is needed to claim some portion of those values. • We do not have to originate the research in order to profit from it. • Building a better business model is better than getting to the market first. • If we make the best use of internal and external ideas, we will win. • We should profit from others’ use of our IP, and we should buy others’ IP whenever it advances our own business model.

its business model to let more internal knowledge flow to outside. Open innovation offers the prospect of lower costs for innovation, faster time in going to the market, and the chance to share risks with others (Chesbrough, 2006). Effectively bringing ideas from the “outside in” taps into tremendous potentials for identifying and creating new values. Likewise, companies leading ideas from the “inside out” (i.e., enabling others to use unused ideas inside) realize a new way of capturing more values and sustaining themselves in these times of increasing global market competition. The underlying assumption of the closed innovation model is that “successful innovation requires control” (Chesbrough, 2003b), while the basic assumption of the open innovation is the complementarity between internal and external knowledge (Chesbrough, 2003a; Herzog, 2011). The contrasting principles of closed and open innovations are summarized in <Table 1> (Chesbrough, 2003a; Chesbrough, 2003b).

2.2. NIH and NSH/OUH in Open Innovation

Companies increasingly maintain knowledge outside their organizational boundaries over time, and this dynamic perspective points to inter-organizational relationships as an extension of firms' internal knowledge bases (Grant and Baden-Fuller, 2004). Despite the growing importance of this perspective, many companies still experience severe challenges in actively managing the processes of open innovation (Lichtenthaler, 2008; Van de Vrande et al., 2009). Even successful firms have to overcome major challenges at the beginning of their open innovation initiatives (Laursen and Salter, 2006), and there are major inter-firm differences on how to manage open innovation successfully .

In addition, embracing an open business model is not easy. There are significant barriers and costs that most firms encounter for their open innovation processes. Like the NIH syndrome, employees' behaviors inhibit a firm's ability to search for external sources of ideas that could advance their open business model. From the NIH syndrome's viewpoint, employees' behaviors may influence the firm's ability in two ways: 1) “employees look for new information (e.g., screening out those of outside origin when they challenge their attitudes)” and 2) “the way in which they assess it, eventually leading to the rejection of external knowledge due to its source and not based on its content per se (in terms of the feasibility, quality, usefulness and other related rational criteria)” (de Araújo Burcharth, et al., 2014, p. 151). These protective attitudes are expected to create judgmental biases about the valuation of the knowledge from outside throughout the search in inbound open innovation processes, which in turn favors internal production and leads to resistance to technological knowledge from the outside of the firm (de Araújo Burcharth, et al., 2014; Lichtenthaler and Ernst, 2006; Lucas and Goh, 2009). The NSH or the OUH syndrome keeps potentially valuable internal ideas inside a firm. If an employee who is not in favor of exploiting ideas from outside would “1) easily miss out potential opportunities, 2) be prepared to respond negatively to any novel situation he encodes as an opportunity for external knowledge sharing, and 3) make negative inferences and judgments about it (i.e., considering that giving away potential value will invariably dilute the organization's core competences)” (de Araújo Burcharth, et al., 2014, p. 151).

Therefore, these NIH and NSH/NSH attitudes induce the evaluation of inter-firm knowledge sharing as harmful (de Araújo Burcharth, et al., 2014). Building and growing a strong innovation system

requires overcoming these barriers (Chesbrough, 2006). <Table 2> summarizes the possible antecedents and the potential consequences of the NIH and the NSH/OUH syndromes.

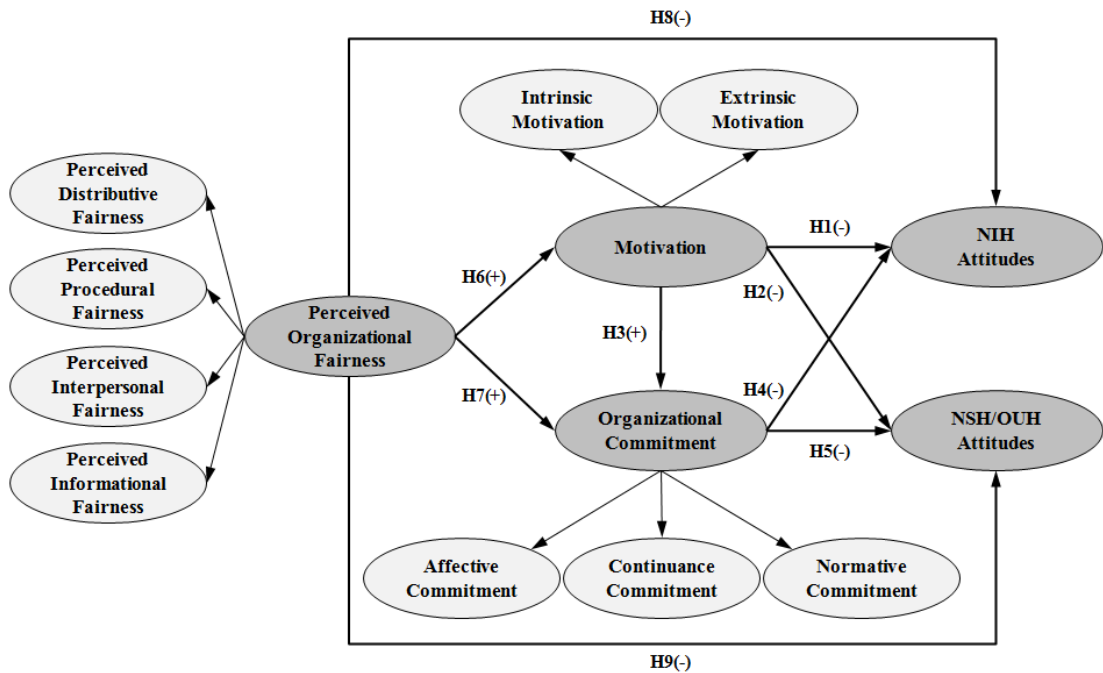
2.3. Identifying Key Factors of NIH and NSH/OUH

Based on the in-depth literature review summarized in <Table 2>, we learned that motivation theory (Herzog, 2011) is mainly used to explain individual

level human attitudes and behaviors (e.g., NIH and NSH/OUH in this study). Prior research mentioned that inadequate incentive systems and employees' interactions with other people are important antecedents of NIH and NSH/OUH attitudes (Katz and Allen, 1982; Lichtenthaler and Ernst, 2006). According to behavioral literature in organizations including human resource management and psychology, the main reason of human's attitudes and behaviors can be traced back to their motivation. Along with motivations, many prior studies also revealed that employ-

<Table 2> Possible Antecedents and Consequences of NIH and OUH Syndromes

Syndrome	Definition	Possible antecedents	Potential consequences	Key Theories
Not-Invented-Here (NIH)	An attitude toward the external acquisition of knowledge that is more negative than an ideal economic attitude would be (Lichtenthaler and Ernst, 2006)	<p>[Firm/Individual level]</p> <ul style="list-style-type: none"> • Inadequate incentive systems • Influence of social environment • Aim to reduce insecurity (Katz and Allen, 1982) 	<p>[Firm level]</p> <ul style="list-style-type: none"> • No or suboptimal use of external technology, resulting in inflexibility and preventing the realization of a firm's potentials • Failures or delays in the innovation process (Katz and Allen, 1982) • Inappropriate evaluations of external technology • Failure to identify new business ideas, which may result from a combination of internal and external knowledge. <p>[Individual level]</p> <ul style="list-style-type: none"> • Screening out new information of outside origin when they challenge their attitudes • Protective attitudes toward outside knowledge • Resistance to technological knowledge from the outside 	<ul style="list-style-type: none"> • Resource based view (Herzog, 2011) • Motivation theory (Herzog, 2011)
Not-Sold-Here (NSH)/ Only-Use-Here (OUH)	An attitude toward the external exploitation of knowledge that is more negative than an ideal economic attitude would be (Lichtenthaler and Ernst, 2006)	<p>[Firm level]</p> <ul style="list-style-type: none"> • Overemphasis on strengthening • Competitors and negatively affecting core competencies • Supposed legal and organizational difficulties of commercializing disembodied knowledge • Traditional focus on internal knowledge exploitation • No or little experience in external knowledge commercialization <p>[Firm/Individual level]</p> <ul style="list-style-type: none"> • Inadequate incentive systems • Influence of social environment 	<p>[Firm level]</p> <ul style="list-style-type: none"> • Underutilization of monetary and strategic potentials inherent to external knowledge commercialization • Underutilization of the intellectual property portfolio • Failure to establish own technologies as industry standards • Difficulties in gaining access to external knowledge (bi-directional knowledge transfers) <p>[Individual level]</p> <ul style="list-style-type: none"> • Easily miss out potential opportunities • Make negative inferences and judgments about outside knowledge 	<ul style="list-style-type: none"> • Resource based view (Herzog, 2011) • Dynamic capability (Lichtenthaler, et al., 2010) • Motivation theory (Herzog, 2011)



<Figure 1> Research Model

ees' commitment and their perceived fairness are important factors affecting their attitudes and behaviors.

Considering factors related to NIH and HSH/OUH in literatures, we identified four major categories that can be used to answer our research questions: four types of organizational fairness (i.e., distributive, procedural, interpersonal, and informational fairness), two types of motivation (i.e., intrinsic and extrinsic motivation), three types of organizational commitment (i.e., affective, continuance, and normative), and two types of behavioral attitudes (i.e., NIH and NSH/OUH).

III. Research Model and Hypotheses

Synthesizing few theories (i.e., organizational justice theory, motivation theory, and organizational commit-

ment theory) from literatures on inter-firm knowledge sharing for open innovation, we propose a research model including several categorical factors that influence employees' NIH and NSH/OUH attitudes in a context of IT form's open innovation process. As depicted in <Figure 1>, the research model is designed to study the relationships between the influencing factors and their impacts on NIH/OUH attitudes.

3.1. Motivation of Employees

Since people lead innovations in many companies, companies provide incentives or rewards to encourage their employees to be innovative. Regarding incentives, both *intrinsic* and *extrinsic motivations* have to be taken into account (Angle, 1989). Intrinsic motivation is defined as "the motivation to work on something because it is interesting, involving, exciting, satisfying,

or personally challenging” (Amabile, 1997) (p. 39). As intrinsic motivation drives self-initiated activities, high levels of intrinsic motivation are assumed to result in high levels of spontaneous, innovative behaviors from innovation team members. Whereas intrinsic motivation has been demonstrated to play a crucial role in enhancing creativity and in innovative behavior, the role of extrinsic motivation has been discussed controversially. Extrinsic motivation is “the motivation to work primarily in response to something apart from the work itself” (Amabile et al., 1994, p. 950). Goals of outside specific work tasks, for example, are meant to achieve for a promised reward or promotion. Amabile et al. (1996) showed that extrinsic motivators can undermine intrinsic motivation and in turn, lower creativity. Extrinsic motivators have a detrimental effect on intrinsic motivation, wherein employees work not because of interest in the work, but because of a reward or recognition. This detrimental effect occurs primarily when work performed by employees is challenging and when they perceive that they do not have a choice on how to behave (Eisenberg, 1999). Some scholars (e.g., Kanfer, 1991; Kim et al., 2010; Ryan and Deci, 2000) have argued that the performance of extrinsic motivators can be enhanced when they are administered properly. However, Angle (1989) noted that providing powerful extrinsic incentives and rewards to trigger innovative behavior is not straightforward. The challenge is, to provide incentives and rewards in a systematic and timely manner; these incentives and rewards must be valued by each individual employee. In this study, we interpret this value as the employees’ perceived fairness by receiving incentives and rewards. Based on the harmony of intrinsic and extrinsic motivations, employees have a more positive attitude toward outside technology or knowledge sourcing. Thus, we hypothesize that:

H1: Employees’ motivation is negatively related to NIH attitudes.

H2: Employees’ motivation is negatively related to NSH/OUH attitudes.

H3: Employees’ motivation is positively related to organizational commitment.

3.2. Organizational Commitment

Organizational commitment is crucial in explaining employees’ attitudes and behaviors in organizations (Meyer and Allen, 1991). Meyer and Allen (1991) define, organizational commitment as the degree of employees’ affective attachment to an organization. Based on prior literature, they conceptualized commitment in three approaches and suggested a three-component framework on organizational commitment, namely, *affective*, *continuance*, and *normative commitment*. “Affective commitment refers to the employee’s emotional attachment to, identification with, and involvement in the organization. Continuance commitment refers to an awareness of the costs associated with leaving the organization. Normative commitment reflects a feeling of obligation to continue employment” (Meyer and Allen, 1991, p. 67). These organizational commitments can affect employees’ attitudes and behaviors, and have an interaction with employees’ motivation. According to prior studies, organizational commitment affects the level of internal resistance or avoidance from innovation. Also, employees’ strong attachment to an organization leads to attitudes that are centered on the organization, which might lead to a lesser or reduced degree of NIH and NSH/OUH. Thus, we hypothesize that:

H4: Organizational commitment is negatively related to NIH attitudes.

H5: Organizational commitment is negatively related to NSH/OUH attitudes.

3.3. Organizational Fairness

It is important to understand influencing factors to NIH and OUH attitudes in an open innovation process from an organizational justice perspective. Studies on the organizational justice theory started with Adams (1963)'s equity theory (Cohen-Charash and Spector, 2001). After the equity theory came out, researchers tried to expand its application, applying the same to help understand employees' attitudes toward and behaviors in organizations. As a result, studies, called "organizational justice," were conducted (Greenberg, 1987). Basically, there are three types of justice in an organization.

The first is *distributive justice*. Based on Adams's equity theory (Adams, 1963) in the early 1960s, which focuses on perceived fairness in outcome distribution in an organization. According to Greenberg (1990), distributive justice involves employee assessments of fairness of rewards and inducements received in exchange for contributions at work. Prior research and theory on social exchange and distributive justice suggest that when employees receive inducements that are commensurate with their knowledge, skills, and abilities, they are more likely to think that their outcomes, such as pay, benefits, and terms of work, are fair and just. In contrast, if employees feel that outcomes are not congruent with their human capital, they will make lower distributive justice judgments (Ang et al., 2003).

The second is *procedural justice*, which was introduced in the 1970s. It focuses on perceived fairness in procedure and in related institutional systems for output distribution in an organization. Procedural justice involves employee assessments of the extent

to which decisions are based on fair methods and guidelines (Bang and Lee, 2013). In other words, employees evaluate the extent to which they feel processes used to make decisions that influence them are just (Niehoff and Moorman, 1993). Prior research and theory on social exchange and procedural justice suggest that when organizational decision-making is consistent and meets the bias suppression rule, employees have positive assessments of procedural justice. In contrast, when decision-making processes apply differently to employees, procedural justice judgments of those affected are lower (Ang et al., 2003).

The last is *interactional justice*, which was introduced in the 1980s. It focuses on perceived fairness in interaction in the procedure and in related institutional systems in an organization (Lee, 2014). Some researchers emphasize that interactional justice should be divided in two perspectives, namely, *interpersonal justice* and *informational justice* (Colquitt, 2001). *Interpersonal justice* focuses on how treatment is considered fair in interpersonal relationships, especially in the execution of decisions, while *informational justice* focuses on how a decision maker provides correct and adequate information about the decision-making process and its results. In this research, we applied distributive justice, procedural justice, interpersonal justice, and informational justice as elements (or constructs) of employees' perceived fairness in organizations to understand the NIH and the NSH/OUH attitudes in an open innovation process.

The context in which an open innovation approach is presented within a company affects the level of internal resistance. Firms can adopt a more externally oriented technology strategy after an internally oriented strategy is widely considered as a failure. For this failure to be perceived, a significant downsizing of R&D staff is usually required (Chesbrough, 2006).

Also, according to behavioral research, employees' perceived fairness in an organization is an important factor affecting their attitudes and behaviors especially toward organizational changes. Folger and Konovsky (1989) found that perceptions of organizational fairness were related to organizational commitment, trust in supervision, and pay satisfaction (Moorman et al., 1993). Kuvaas (2003) found that perceived fairness of employee ownership was a significant predictor of affective commitment. Alexander and Ruderman (1987) also reported that perceptions of procedural justice were significantly related to turnover intentions and the degree of conflict or harmony in the work group. Geenberg (1990) introduced the causal relationships between perceptions of fairness and positive organizational attitudes (Moorman, et al., 1993). In sum, perceived organizational fairness can reduce the effects of negative attitudes such as NIH and NSH/OUH. Therefore, we hypothesize that:

H6: Perceived organizational fairness is positively related to employees' motivation.

H7: Perceived organizational fairness is positively related to organizational commitment.

H8: Perceived organizational fairness negatively related to NIH attitudes.

H9: Perceived organizational fairness negatively related to NSH/OUH attitudes.

IV. Research Methodology

4.1. Measures

Adopted from relevant measures of previous studies, we tailored measurement items of following constructs in the context of open innovation: perceived organiza-

tional fairness (perceived distributive fairness, perceived procedural fairness, perceived interpersonal fairness, and perceived informational fairness); motivation (intrinsic motivation and extrinsic motivation); and organizational commitment (affective commitment, continuance commitment, and normative commitment). For NIH and NSH/OUH attitudes, we developed measures by converting the definitions of constructs. In this study, we modeled perceived organizational fairness, motivation, and organizational commitment as second-order factors for improving theoretical parsimony and reducing model complexity (Edwards, 2001). All measures used, including operational definitions and related references, are summarized in <Appendix A>. All items are measured on a seven-point Likert scale, ranging from strongly disagree (1) to strongly agree (7).

4.2. Data Collection

A survey method is applied to test our proposed hypotheses. The unit of analysis is individual employee. Empirical data for this study were collected from IT professionals in Korea for one week using 'Google Docs' online-based survey platform. Survey respondents have experience in IT services or IT related projects. We used a convenient sample by adopting snowball sampling technique to collect data. Since most firms in Korea are in the very initial stage of open innovation, snowball sampling technique is appropriate to find hidden populations. A total of 72 responses were received from 9 industries. There were no missing data and outliers, so all responses were used for the final analysis. 72% of respondents were from IT industry and almost 67% work in system/software development department. The demographic characteristics of the respondents are summarized in <Table 3>.

<Table 3> Demographic Characteristics

Characteristic	Freq.	%
Gender: Male / Female	59 / 13	81.9 / 18.1
Position		
- Executive	1	1.4
- General manager	2	2.8
- Deputy general manager	8	11.1
- Manager	16	22.2
- Assistant manager	24	33.3
- Senior staff	3	4.2
- Staff/Clerk	18	25.0
Team (Task)		
- System integration	2	2.8
- System/Software development	48	66.7
- IT Planning	7	9.7
- Design	1	1.4
- Solution business	3	4.2
- Operation	2	2.8
- System Maintenance	6	8.3
- Cloud	1	1.4
- Others	2	2.8
Task related working experience (year)	N/A	Avg. 6.4
Industry		
- IT/Information system	52	72.2
- Telecom (e.g. SK, KT, LGT)	6	8.3
- Electronics	4	5.6
- Public affairs/Public corporation	4	5.6
- Distribution	2	2.8
- Broadcast/Press/Media	1	1.4
- Bank/Finance	1	1.4
- Shipbuilding/Automobile	1	1.4
- Others	1	1.4

V. Data Analysis and Results

5.1. Analysis Method

Two-stage structural equation modeling was applied to validate the proposed research model and its hypotheses, as recommended by Anderson and Gerbing (1988). In the first step, the measurement model was examined to ensure the reliability and the validity of the measures. The second step tested

the structural relationships among latent constructs in the proposed model.

5.2. Measurement Model

We used Visual PLS to test both measurement and structural models because this method is less sensitive to small sample size and has greater statistical power, compared to covariance-based analysis tools, such as LISREL and AMOS. In addition, since the research

<Table 4> Factor Structure Matrix of Loadings and Cross-Loadings

	MT	OF	NIH	NSH	OC
IM	0.925	0.495	0.186	0.067	0.547
EM	0.755	0.354	0.113	0.024	0.252
DF	0.374	0.685	-0.056	0.153	0.486
PF	0.346	0.823	-0.155	-0.119	0.287
AF	0.373	0.713	0.014	0.073	0.419
IF	0.475	0.873	-0.266	0.021	0.378
NI1	0.102	-0.275	0.920	0.030	0.020
NI2	0.211	-0.094	0.935	0.199	0.226
NI3	0.202	0.038	0.784	0.063	0.165
NS1	0.146	0.085	0.124	0.732	0.211
NS2	0.038	0.013	0.076	0.862	0.231
NS3	-0.010	0.046	0.096	0.861	0.225
AC	0.582	0.531	0.122	0.206	0.924
NC	0.224	0.323	0.138	0.283	0.792

Note: MT=motivation; OF=perceived organizational fairness; NIH=NIH attitudes; NSH=NSH/OUH attitudes; OC=organizational commitment; IM=intrinsic motivation; EM=extrinsic motivation; DF=perceived distributive fairness; PF=perceived procedural fairness; AF=perceived interpersonal fairness; IF=perceived informational fairness; NI=NIH attitudes; NS=NSH/OUH attitudes; AC=affective commitment; NC=normative commitment

<Table 5> Reliability and AVE

Construct	CR	AVE	Cronbach Alpha
MT	0.830	0.712	0.619
OF	0.858	0.604	0.777
NIH	0.913	0.779	0.861
NSH	0.860	0.674	0.759
OC	0.850	0.740	0.664

Note: CR=composite reliability; AVE=average variance extracted; MT=motivation; OF=perceived organizational fairness; NIH=NIH attitudes; NSH=NSH/OUH attitudes; OC=organizational commitment

<Table 6> Correlation of Latent Variables

	MT	OF	NIH	NSH	OC
MT	0.844				
OF	0.514	0.777			
NIH	0.185	-0.154	0.883		
NSH	0.060	0.053	0.116	0.821	
OC	0.508	0.516	0.147	0.270	0.860

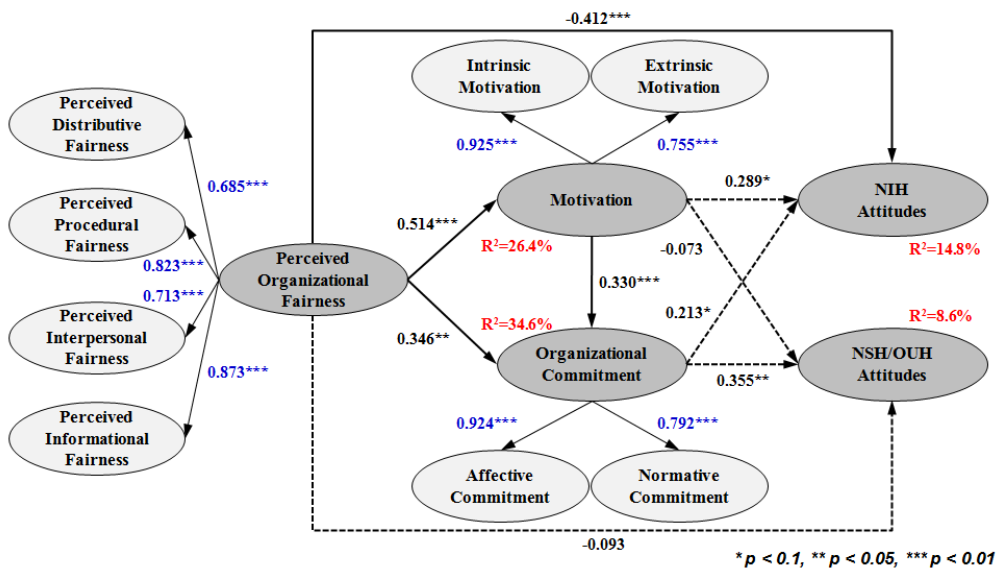
Note: MT=motivation; OF=perceived organizational fairness; NIH=NIH attitudes; NSH=NSH/OUH attitudes; OC=organizational commitment. The shaded numbers on the diagonal are the square roots of the AVE

model of the study included three second-order factors (i.e., perceived organizational fairness, motivation, and organizational commitment), Partial Least Squares (PLS) method is flexible for hierarchical structural model testing. Confirmatory Factor Analysis (CFA) was applied to assess construct validity with Visual PLS.

To validate the measurement model, three types of validity were assessed, namely, content validity, convergent validity, and discriminant validity of the instrument. The instrument's content validity was first established to ensure that the measurement items were consistent with measures in literature. Convergent validity was then assessed by looking at the Composite Reliability (CR) and the Average Variance Extracted (AVE) from the measures (Hair et al., 2009). Convergent validity of the scales was verified using three criteria suggested by Fornell and Larcker (1981): 1) all indicator loadings should be significant and should exceed 0.7; 2) construct reliabilities (i.e., CR of the constructs) should exceed 0.7; and 3) AVE of each construct should exceed the variance because

of the measurement error for that construct (i.e., AVE should exceed 0.5). As shown in <Table 4>, all loadings are above the 0.7 threshold. During the measurement model testing, NI4 and NI5 (i.e., items for NIH attitudes) were removed because of high cross-loadings. Also, CC (i.e., continuance commitment for organizational commitment) was removed because of low loading values. As shown in <Table 5>, the CR of each construct ranges between 0.830 and 0.913, while AVE ranges between 0.604 and 0.779. Hence, all three conditions for convergent validity are met.

Finally, discriminant validity of the instrument was assessed by comparing the square root of AVE of the construct and the correlation shared between the construct and the other constructs in the model (Fornell and Larcker, 1981). <Table 6> lists the correlations among the latent variables with the square root of the AVE on the diagonal. Results show that the square root of AVE for each construct is greater than the correlations between each construct and



<Figure 2> Analysis Result

all the other constructs. Multicollinearity for all variables was examined using the Variance Inflation Factor (VIF). According to Myers (1990), when the VIF is greater than 10, the model built is considered to have a multicollinearity problem. Our results show acceptable values of VIF, which are all under 3.0. Hence, results of the inter-construct correlations confirm that each construct shares a larger variance with its own measures than with other measures. These results suggest that the measurement models fit to the data well and merit further analysis.

5.3. Structural Model

The structural model reflecting the causal relationships among the constructs was tested using data collected from the validated measures. <Figure 2> displays the results of the proposed model. Based on the results of the data analysis, we found that IT professionals' perceived organizational fairness is the key factor which can reduce NIH attitudes (i.e., negative attitudes toward technology- and knowledge- (or idea-) sourcing from the outside).

As shown in <Figure 2>, the effect of motivation on organizational commitment is significant, which supports H3. The effects of perceived organizational fairness on motivation and organizational commitment are statistically significant, providing support for H6 and H7, respectively. Perceived organizational fairness explains 26.4% of variance in motivation, and perceived organizational fairness and motivation together explain 34.6% of variance in organizational commitment. We find that perceived organizational fairness is significantly related to NIH attitudes. Thus, the result supports H8.

Although the effect of motivation on NIH attitudes is statistically significant, the result shows positive effect; thus H1 is not supported. This result can be

interpreted as internally and externally motivated employees have self-confidence about their task related knowledge; thus, they do not willing to take technology- and knowledge- (or idea-) from the outside.

Motivation was not significantly related to NSH/OUH attitudes, indicating the lack of support for H2. We can interpret this result as the same way as that of H1. That is, highly motivated employees with higher self-confidence may not need to worry about the loss of their value as an IT professional from the exploitation of their knowledge at outside the firm. In addition, although the effects of organizational commitment on NIH attitudes and NSH/OUH attitudes are statistically significant, they show positive effects, contradicting H4 and H5, respectively. These results can be thought that employees who are highly committed (or attached) to their firm do not trust external sources (H4) and do not willing to exploit their knowledge at outside the firm (H5). That is, if employees are too much attached to their firm, they may show protective attitudes towards outside oriented sources. Reinholt et al. (2011) and Hansen et al. (2005) argue that an overemphasis on within-team relations and communication can be seen as manifestations of the NIH and NSH/OUH attitudes. Perceived organizational fairness has no effect on NSH/OUH attitudes, so H9 is not supported. If employees perceive that they are treated fairly in their organization, they may not need to worry about the exploitation of their knowledge at outside the firm. Three factors including opposite direction effects (i.e., perceived organizational fairness, motivation, and organizational commitment) explain 14.8% of variation of NIH attitudes. Although organizational commitment had a positive effect on NSH/OUH, it explains 8.6% of variation in NSH/OUH attitudes. <Table 7> summarizes the results of hypothesis tests.

<Table 7> Summary of Results

Hypotheses	Results
<i>H1: Employees' motivation is negatively related to NIH attitudes</i>	Not Supported
<i>H2: Employees' motivation is negatively related to NSH/OUH attitudes</i>	Not Supported
<i>H3: Employees' motivation is positively related to organizational commitment</i>	Supported
<i>H4: Organizational commitment is negatively related to NIH attitudes</i>	Not Supported
<i>H5: Organizational commitment is negatively related to NSH/OUH attitudes</i>	Not Supported
<i>H6: Perceived organizational fairness is positively related to employees' motivation</i>	Supported
<i>H7: Perceived organizational fairness is positively related to organizational commitment</i>	Supported
<i>H8: Perceived organizational fairness negatively related to NIH attitudes</i>	Supported
<i>H9: Perceived organizational fairness negatively related to NSH/OUH attitudes</i>	Not Supported

VI. Discussion and Conclusion

The results show that individual employees' perceptions of organizational fairness directly reduce NIH attitudes. However, their perceptions of organizational fairness indirectly increase NIH attitudes through motivation and organizational commitment. As discussed in the previous section, these results can be thought that internally and externally motivated employees have higher self-confidence about their task related knowledge. Therefore, they do not willing to take technology and knowledge (or idea) from the outside. Furthermore, if employees are too much attached to their firm, they may show protective attitudes towards outside oriented sources. To diminish these influences on NIH attitudes, management may consider specific types of training programs. As de Araújo Burcharth et al. (2014) proposed, training for innovation and creativity for IT professional would be effective against NIH attitudes in open innovation processes.

Since the second-order motivation construct does not support the proposed hypotheses, we conducted additional analysis using a revised model with two separated first-order motivations (i.e., intrinsic moti-

vation and extrinsic motivation) to further examine if there is any difference. <Figure 3> displays the results of the additional analysis. The results show that the overall impacts of motivation on NIH attitudes and NSH/OUH attitudes are almost the same as those of the original model: perceived organizational fairness directly affects NIH attitudes; and perceived organizational fairness does not affect NIH attitudes.

In addition, since the second-order perceived organizational fairness construct is negatively related to NIH attitudes, we conducted another additional analysis to check individual effects of first-order perceived fairness constructs (i.e., distributive fairness, procedural fairness, interpersonal fairness, and informational fairness) on NIH and NSH/OUH attitudes. As summarized in <Figure 4>, the results show that perceived informational fairness is the key factor that negatively influences NIH attitudes. If IT professionals perceive that they have enough information, they are more generous toward technology- and knowledge- (or idea-) sourcing from the outside. The results also show that perceived procedural fairness of IT professionals in organizations is another key factor which can reduce NSH/OUH

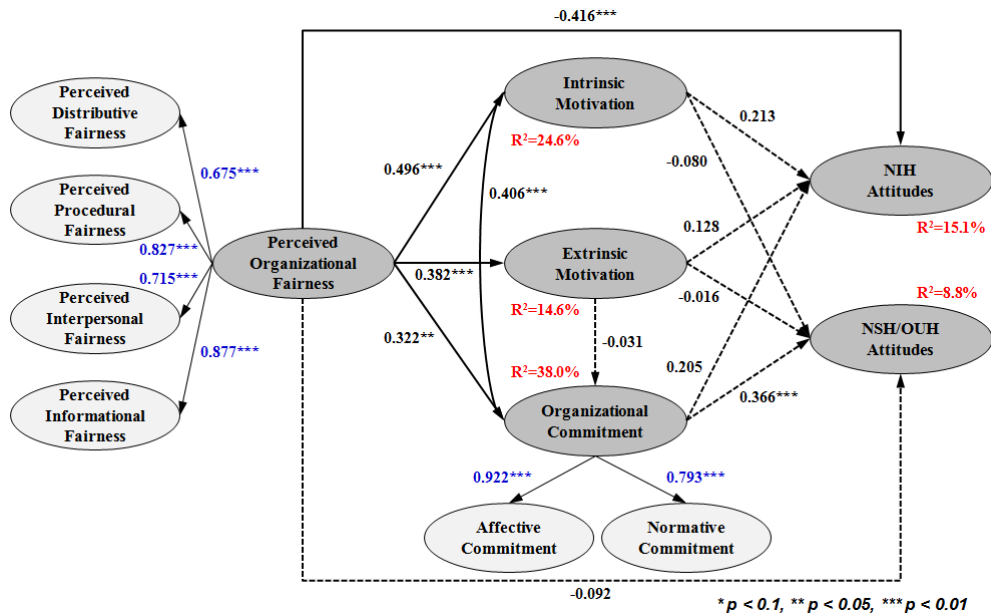
attitudes (i.e., negative attitudes toward technology and knowledge or idea exploitation). If IT professionals perceive that they have enough rights appropriate procedures in their work, they are more generous toward technology- and knowledge- (or idea-) exploitation.

Based on the results and analysis interpretation, for the success of open innovation, executives who make decisions concerning open innovation should first consider IT professionals' perceived fairness in an organization. Especially, executives have to provide enough information and follow appropriate processes or procedures for IT professionals to be able to do their jobs properly.

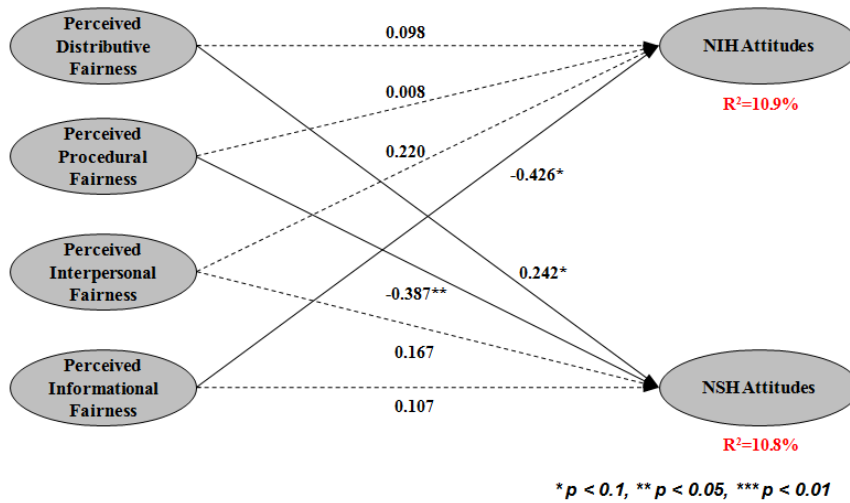
This study makes the following contributions to both IT research and practice. For IT research, this study suggests possible ways for successful open innovation by understanding the factors that influence NIH and OUH syndromes. Also, in this study, we conceptualize several second-order constructs base on

previous relevant theories and develop measures of the constructs. This effort extends our conceptual understanding and operationalization of the constructs to the IT research field in general and to open innovation domain in particular. Especially, in the situation that many studies deal with four types of organizational fairness (i.e., distributive, procedural, interpersonal, and informational fairness) and their impacts on employees' attitudes and behaviors (Colquitt et al., 2001; Kernan and Hanges, 2002; Roch and Shanock, 2006), more diverse perspectives about the consequences of organizational fairness are needed.

For practical contributions, this study provides valuable insights to managers of IT organizations. The results of the study not only help them understand which factors play an important role for successful open innovation by reducing the negative effects of NIH and the NSH/OUH attitudes, but also assist them to develop their own innovation strategy. Since we found that perceived organizational fairness has



<Figure 3> Additional Analysis Result (Separated Intrinsic and Extrinsic Motivation Model)



<Figure 4> Additional Analysis Result (Separated Perceived Organizational Fairness Model)

a direct effect on NIH attitudes, it may be better for managers to focus mainly on organization fairness, rather than motivation and commitment, to have more successful open innovation.

We acknowledge a few limitations as well. First, in this study, motivation refers to intrinsic and extrinsic motivations to work with IT professionals rather than to work with external parties. That is, we do not consider the situation that IT professionals work with external parties. We think that it is a possible reason why H1 and H2 are not supported

in this study. Therefore, for better understanding of the roles of motivations, future research is necessary to consider the case that IT professionals work with external parties in open innovation processes. In addition, the study used only 72 responses; more than 70% of them are from IT industry; and the results show only about 10% explanation power on NIH and NSH/OUH attitudes. For more precise analysis with statistical power and stronger interpretation of the results, future research needs to collect more data from various industries.

<References>

- [1] Adams, J. S. (1963). Towards an Understanding of Inequity. *The Journal of Abnormal and Social Psychology*, 67(5), 422.
- [2] Ahlstrom, D. (2010). Innovation and Growth: How Business Contributes to Society. *The Academy of Management Perspectives*, 24(3), 11-24.
- [3] Alexander, S., and Ruderman, M. (1987). The Role of Procedural and Distributive Justice in Organizational Behavior. *Social Justice Research*, 1(2), 177-198.
- [4] Amabile, T. M. (1997). Motivating Creativity in Organizations: On Doing What You Love and Loving What You Do. *California Management Review*, 40(1), 39-58.
- [5] Amabile, T. M., Hill, K. G., Hennessey, B. A., and Tighe, E. M. (1994). The Work Preference Inventory:

- Assessing Intrinsic and Extrinsic Motivational Orientations. *Journal of Personality and Social Psychology*, 66(5), 950.
- [6] Amesse, F., and Cohendet, P. (2001). Technology Transfer Revisited from the Perspective of the Knowledge-Based Economy. *Research Policy*, 30(9), 1459-1478.
- [7] Anderson, J. C., and Gerbing, D. W. (1988). Structural Equation Modeling in Practice: A Review and Recommended Two-Step Approach. *Psychological Bulletin*, 103(3), 411.
- [8] Ang, S., Van Dyne, L., and Begley, T. M. (2003). The Employment Relationships of Foreign Workers versus Local Employees: A Field Study of Organizational Justice, Job Satisfaction, Performance, and OCB. *Journal of Organizational Behavior*, 24(5), 561-583.
- [9] Angle, H. L. (1989). Psychology and Organizational Innovation. In A. H. van de Ven, Angle, H.L., Poole, M.S. (Ed.), *Research on the Management of Innovation: The Minnesota Studies* (pp. 135-170): Oxford.
- [10] Bang, Y., and Lee, D.-J. (2013). Effects of Transaction Characteristics on Distributive Justice and Purchase Intention in the Social Commerce. *Asia Pacific Journal of Information Systems*, 23(2), 1-20.
- [11] Beamish, P. W., and Lupton, N. C. (2009). Managing Joint Ventures. *The Academy of Management Perspectives*, 23(2), 75-94.
- [12] Cassiman, B., and Veugelers, R. (2006). In Search of Complementarity in Innovation Strategy: Internal R&D and External Knowledge Acquisition. *Management Science*, 52(1), 68.
- [13] Chesbrough, H. W. (2003a). The Era of Open Innovation. *MIT Sloan Management Review*, 44(3), 35-41.
- [14] Chesbrough, H. W. (2003b). *Open Innovation: The New Imperative for Creating and Profiting from Technology*: Harvard Business Press.
- [15] Chesbrough, H. W. (2006). *Open Business Models: How to Thrive in the New Innovation Landscape*: Harvard Business School Press.
- [16] Chesbrough, H. W., Vanhaverbeke, W., and West, J. (2006). *Open Innovation: Researching a New Paradigm*: Oxford University Press, USA.
- [17] Cohen-Charash, Y., and Spector, P. E. (2001). The Role of Justice in Organizations: A Meta Analysis. *Organizational Behavior and Human Decision Processes*, 86(2), 278-321.
- [18] Colquitt, J. A. (2001). On the Dimensionality of Organizational Justice: A Construct Validation of a Measure. *Journal of Applied Psychology*, 86(3), 386-400.
- [19] Colquitt, J. A., Conlon, D. E., Wesson, M. J., and Porter, C. (2001). Justice at the Millennium: A Meta-Analytic Review of 25 Years of Organizational Justice Research. *Journal of Applied Psychology*, 86(3), 425-445.
- [20] Cropanzano, R., and Schminke, M. (2001). Using Social Justice to Build Effective work Groups. In M. Turner (Ed.), *Groups at work: Advances in theory and research* (pp. 143-171). NJ: Erlbaum: Hillsdale.
- [21] de Araújo Burcharth, A. L., Knudsen, M. P., and Søndergaard, H. A. (2014). Neither Invented nor Shared Here: The Impact and Management of Attitudes for the Adoption of Open Innovation Practices. *Technovation*, 34(3), 149-161.
- [22] Dyer, J. H., and Singh, H. (1998). The Relational View: Cooperative Strategy and Sources of Interorganizational Competitive Advantage. *The Academy of Management Review*, 23(4), 660-679.
- [23] Edwards, J. R. (2001). Multidimensional Constructs in Organizational Behavior Research: An Integrative Analytical Framework. *Organizational Research Methods*, 4(2), 144-192.
- [24] Eisenberg, J. (1999). How Individualism Collectivism Moderates the Effects of Rewards on Creativity and Innovation: A Comparative Review of Practices in Japan and the US. *Creativity and Innovation Management*, 8(4), 251-261.
- [25] Fishbein, M., and Ajzen, I. (1975). *Belief, Attitude, Intention and Behavior: An Introduction to Theory and Research*.
- [26] Folger, R., and Konovsky, M. A. (1989). Effects of

- Procedural and Distributive Justice on Reactions to Pay Raise Decisions. *Academy of Management Journal*, 32(1), 115-130.
- [27] Fornell, C., and Larcker, D. F. (1981). Evaluating Structural Equation Models with Unobservable Variables and Measurement Error. *Journal of Marketing Research*, 18(1), 39-50.
- [28] Gassmann, O. (2006). Opening up the Innovation Process: Towards an Agenda. *R&D Management*, 36(3), 223-228.
- [29] Grant, R. M., and Baden-Fuller, C. (2004). A Knowledge Accessing Theory of Strategic Alliances. *Journal of Management Studies*, 41(1), 61-84.
- [30] Greenberg, J. (1987). A Taxonomy of Organizational Justice Theories. *The Academy of Management Review*, 12(1), 9-22.
- [31] Greenberg, J. (1990). Organizational Justice: Yesterday, Today, and Tomorrow. *Journal of Management*, 16(2), 399.
- [32] Grindley, P. C., and Teece, D. J. (1997). Managing Intellectual Capital: Licensing and Cross-licensing in Semiconductors and Electronics. *California Management Review*, 39(2), 8-41.
- [33] Hair, J. F., Black, W. C., Babin, B. J., and Anderson, R. E. (2009). *Multivariate Data Analysis* (7th ed.). Upper Saddle River, NJ: Prentice Hall.
- [34] Hansen, M. T., Mors, M. L., and Lovås, B. (2005). Knowledge Sharing in Organizations: Multiple Networks, Multiple Phases. *Academy of Management Journal*, 48(5), 776-793.
- [35] Herzog, P. (2011). *Open and Closed Innovation* (2nd ed.): Gabler.
- [36] Huizingh, E. K. (2011). Open Innovation: State of the Art and Future Perspectives. *Technovation*, 31(1), 2-9.
- [37] Huston, L., and Sakkab, N. (2006). Connect and Develop: Inside Procter & Gamble's New Model for Innovation. *Harvard Business Review*, 84(3), 58-66.
- [38] Kanfer, R. (1991). Motivation Theory and Industrial and Organizational Psychology. In M. D. Dunnett & L. M. Hough (Eds.), *Handbook of Industrial and Organizational Psychology* (Vol. 1, pp. 75-170). Palo Alto, CA: Consulting Psychologists Press.
- [39] Katz, R., and Allen, T. J. (1982). Investigating the Not Invented Here (NIH) Syndrome: A Look at the Performance, Tenure, and Communication Patterns of 50 R&D Project Groups. *R&D Management*, 12(1), 7-20.
- [40] Kernan, M. C., and Hanges, P. J. (2002). Survivor Reactions to Reorganization: Antecedents and Consequences of Procedural, Interpersonal, and Informational Justice. *Journal of Applied Psychology*, 87(5), 916.
- [41] Kim, J., Yang, S., Lim, S., and Lee, I. (2010). An Empirical Study on Motivation Factors and Reward Structure for User's Creative Contents Generation: Focusing on the Mediating effect of Commitment. *Asia Pacific Journal of Information Systems*, 20(1), 141-170.
- [42] Kuvaas, B. (2003). Employee Ownership and Affective Organizational Commitment: Employees' Perceptions of Fairness and Their Preference for Company Shares Over Cash. *Scandinavian Journal of Management*, 19(2), 193-212.
- [43] Landau, D., and Drori, I. (2008). Narratives as Sensemaking Accounts: The Case of an R&D Laboratory. *Journal of Organizational Change Management*, 21(6), 701-720.
- [44] Laursen, K., and Salter, A. (2006). Open for Innovation: The Role of Openness in Explaining Innovation Performance among UK Manufacturing Firms. *Strategic Management Journal*, 27(2), 131-150.
- [45] Lee, K., Allen, N. J., Meyer, J. P., and Rhee, K. Y. (2001). The Three Component Model of Organisational Commitment: An Application to South Korea. *Applied Psychology*, 50(4), 596-614.
- [46] Lee, U.-K. (2014). The Effects of Psychological Contract Violation on OS User's Betrayal Behaviors: Window XP Technical Support Ending Case. *Asia Pacific Journal of Information Systems*, 24(3), 325-344.
- [47] Lichtenthaler, U. (2008). Open Innovation in Practice: An Analysis of Strategic Approaches to

- Technology Transactions. *IEEE Transactions on Engineering Management*, 55(1), 148-157.
- [48] Lichtenthaler, U., and Ernst, H. (2006). Attitudes to Externally Organising Knowledge Management Tasks: A Review, Reconsideration and Extension of the NIH Syndrome. *R&D Management*, 36(4), 367-386.
- [49] Lichtenthaler, U., Ernst, H., and Hoegl, M. (2010). Not-Sold-Here: How Attitudes Influence External Knowledge Exploitation. *Organization Science*, 21(5), 1054-1071.
- [50] Lucas, H. C., and Goh, J. M. (2009). Disruptive Technology: How Kodak Missed the Digital Photography Revolution. *The Journal of Strategic Information Systems*, 18(1), 46-55.
- [51] March, J. G. (1991). Exploration and Exploitation in Organizational Learning. *Organization Science*, 2(1), 71-87.
- [52] Meyer, J. P., and Allen, N. J. (1991). A Three-Component Conceptualization of Organizational Commitment. *Human Resource Management Review*, 1(1), 61-89.
- [53] Meyer, J. P., Allen, N. J., and Smith, C. A. (1993). Commitment to Organizations and Occupations: Extension and Test of a Three-Component Conceptualization. *Journal of Applied Psychology*, 78(4), 538-551.
- [54] Moorman, R. H., Niehoff, B. P., and Organ, D. W. (1993). Treating Employees Fairly and Organizational Citizenship Behavior: Sorting the Effects of Job Satisfaction, Organizational Commitment, and Procedural Justice. *Employee Responsibilities and Rights Journal*, 6(3), 209-225.
- [55] Myers, R. H. (1990). *Classical and Modern Regression with Application* (2nd ed.). Boston: PWS-KENT.
- [56] Niehoff, B. P., and Moorman, R. H. (1993). Justice as a Mediator of the Relationship between Methods of Monitoring and Organizational Citizenship Behavior. *Academy of Management Journal*, 36(3), 527-556.
- [57] O'Neill, B. S., and Adya, M. (2007). Knowledge Sharing and the Psychological Contract: Managing Knowledge Workers across Different Stages of Employment. *Journal of Managerial Psychology*, 22(4), 411-436.
- [58] Reinholt, M., Pedersen, T., and Foss, N. J. (2011). Why a Central Network Position isn't Enough: The Role of Motivation and Ability for Knowledge Sharing in Employee Networks. *Academy of Management Journal*, 54(6), 1277-1297.
- [59] Roch, S. G., and Shanock, L. R. (2006). Organizational Justice in an Exchange Framework: Clarifying Organizational Justice Distinctions. *Journal of Management*, 32(2), 299.
- [60] Ryan, R. M., and Deci, E. L. (2000). Intrinsic and Extrinsic Motivations: Classic Definitions and New Directions. *Contemporary Educational Psychology*, 25(1), 54-67.
- [61] Teece, D. J. (1986). Profiting from Technological Innovation: Implications for Integration, Collaboration, Licensing and Public Policy. *Research Policy*, 15(6), 285-305.
- [62] Van de Vrande, V., de Jong, J. P. J., Vanhaverbeke, W., and de Rochemont, M. (2009). Open Innovation in SMEs: Trends, Motives and Management Challenges. *Technovation*, 29(6-7), 423-437.
- [63] Van De Vrande, V., Lemmens, C., and Vanhaverbeke, W. (2006). Choosing Governance Modes for External Technology Sourcing. *R&D Management*, 36(3), 347-363.
- [64] Von Hippel, E., and Von Hippel, E. A. (1988). *The Sources of Innovation* (Vol. 80). New York: Oxford University Press.
- [65] West, J., and Gallagher, S. (2006). Challenges of Open Innovation: The Paradox of Firm Investment in Open Source Software. *R&D Management*, 36(3), 319-331.

<Appendix> Measurement Items

Construct	Sub-Constructs	Items	Key References
Perceived Organizational Fairness	Perceived Distributive Fairness	<ol style="list-style-type: none"> 1. When considering the responsibility of doing a task, I consider performance compensation to have been executed fairly. 2. When considering my experience and career, I consider performance compensation to have been executed fairly. 3. When considering a task, which I accomplished successfully, I consider performance compensation to have been executed fairly. 4. When considering the degree of effort I placed on a particular task, I consider performance compensation to have been executed fairly. 	Colquitt, 2001
	Perceived Procedural Fairness	<ol style="list-style-type: none"> 1. When I do a job, I can make consistent decisions because of standardization in decision-making procedures. 2. When I do a job, I can collect accurate data that are needed in decision making. 3. When I do a job, I receive useful feedback on decision making and on the execution of my work. 4. When I do a job, I take the opportunity to give an opinion or make an objection. 	Colquitt, 2001
	Perceived Interpersonal Fairness	<ol style="list-style-type: none"> 1. When I do a job, my opinion is respected by my boss and by my junior and senior co-workers. 2. When I do a job, my boss and my junior and senior co-workers show consideration and interest. 3. When I do a job, I am treated by my boss and by my junior and senior co-workers kindly and considerately. 4. When I do a job, I am treated by my boss and by my junior and senior co-workers sincerely. 	Colquitt, 2001
	Perceived Informational Fairness	<ol style="list-style-type: none"> 1. When I do a job, I receive a timely feedback. 2. When I do a job, I receive the appropriate information. 3. When I do a job, I receive the necessary information sufficiently. 	Colquitt, 2001
Motivation	Intrinsic Motivation	<ol style="list-style-type: none"> 1. I feel happy and satisfied with my work. 2. I am motivated through my work. 3. I participate in my work positively. 	Herzog, 2011
	Extrinsic Motivation	<ol style="list-style-type: none"> 1. When I get an opportunity to build my career or receive my salary, I become motivated. 2. When I receive recognition for my performance, I feel motivated. 3. When the company supports me for my abilities or expertise, I feel motivated. 	Herzog, 2011

<Appendix> Measurement Items (Cont.)

Construct	Sub-Constructs	Items	Key References
Organizational Commitment	Affective Commitment	<ol style="list-style-type: none"> 1. I sincerely consider the problem of company as my own. 2. I feel a strong sense of belongingness with the company. 3. I feel an emotional attachment to the company. 4. In this company, I feel like a member of a family. 	Lee et al., 2001; Meyer and Allen, 1991; Meyer et al., 1993
	Continuance Commitment	<ol style="list-style-type: none"> 1. If I quit the company, I would suffer more losses than gains. 2. If I quit the company, I would lose many things, which is why I should not quit. 3. If I quit the company, I would be in trouble and lose so much. 4. If I leave the company, there would be few alternatives for me. 	Lee et al., 2001; Meyer and Allen, 1991; Meyer et al., 1993
	Normative Commitment	<ol style="list-style-type: none"> 1. If I leave the company, I would feel guilty. 2. I deem it my duty to remain in the company. 3. Even if quitting the company is profitable for me, I think that it is not good. 4. Even if I get a better offer from other companies, I think that leaving the company is not good. 	Lee et al., 2001; Meyer and Allen, 1991; Meyer et al., 1993
NIH Attitudes	-	<ol style="list-style-type: none"> 1. I prefer developing myself, such as my knowledge and expertise, rather than depend on experts or other companies. 2. I prefer developing myself, such as my knowledge and expertise, which I need in dealing with other companies. 3. Even if expertise or technology is not offered by another company, I can execute the task successfully. 4. I do not feel comfortable soliciting expertise or technology from another company in doing my job. 5. I feel that soliciting expertise or technology from another company affects my competitiveness. 	Herzog, 2011; Lichtenthaler and Ernst, 2006
NSH (OUH) Attitudes	-	<ol style="list-style-type: none"> 1. If a task-related technology or idea is licensed or associated with outside vendors, I lose control over my own technology or idea. 2. A task-related technology or idea must be used in my own company only. 3. A task-related technology or idea must be licensed exclusively. 4. Market expansion/sale of my task-related competitive technology or ideas should be sold through channels within our company rather than having the same licensed or made part of a partnership. 	Herzog, 2011; Lichtenthaler and Ernst, 2006

◆ About the Authors ◆



Juyeon Ham

Juyeon Ham is a Ph.D. student of MIS in the Business School of Korea University in Seoul, Korea. She holds MS degree in Information Systems from the Graduate School of Information of Yonsei University. Her research interests are open innovation, the role of information technology in open innovation, open data provision and use, and knowledge management.



Dan J. Kim

Dan J. Kim is a Professor of Information Technology and Decision Sciences at University of North Texas (UNT). He earned his Ph.D. in MIS from State University of New York (SUNY) at Buffalo. His research interests are in multidisciplinary areas such as information security (InfoSec) and privacy, information assurance, and trust in electronic commerce. His research work has been published or in forthcoming more than 120 papers in refereed journals, peer-reviewed book chapters, and conference proceedings including Information Systems Research, Journal of Management Information Systems, Communications of ACM, Communications of AIS, Decision Support Systems, and so on. He was ranked at 22nd worldwide in terms of research productivity from year 2008 to 2010 based on top three leading IS journals: ISR, MISQ and JMIS.



Byounggu Choi

Byounggu Choi is an Associate Professor at the College of Business Administration of the Kookmin University in Seoul, Korea. He was formerly on the faculty of the School of Information Technologies at the University of Sydney. He held his MS and PhD degrees in Management Information Systems from the Korea Advanced Institute of Science and Technology (KAIST). His research interests are knowledge management, innovation, social media, and business value of IT. His papers have been published in the Journal of MIS, Journal of the AIS, IEEE Transactions on Engineering Management, Information & Management, and others. He has presented several papers at the ICIS, HICSS, and PACIS Conferences, and serves as an editorial board member of Journal of the AIS and Information & Management.



Jae-Nam Lee

Jae-Nam Lee is a Professor of MIS in the Business School of Korea University in Seoul, Korea. He was formerly on the faculty of the Department of Information Systems at the City University of Hong Kong. He holds MS and Ph.D. degrees in MIS from the Graduate School of Management of the Korea Advanced Institute of Science and Technology (KAIST). His research interests are IT outsourcing, knowledge management, information security management, and IT deployment and impacts on organizational performance. His published research articles appear in MIS Quarterly, Information Systems Research, Journal of MIS, Journal of the AIS, Decision Support Systems, Communications of the ACM, Information & Management, and others.

Submitted: November 26, 2014; 1st Revision: May 1, 2015; Accepted: May 13, 2015
