Seoul Journal of Business
Volume 23, Number 2 (December 2017)

Internal Labor Markets and Firm Innovation*

SUNGCHOON KANG**
Seoul National University
Seoul, Korea

JEONG-YEON LEE***
Seoul National University
Seoul, Korea

ABSTRACT

This study examines the relations between internal labor markets and organizational innovation. From the knowledge-based view, we hypothesize that ILMs will be positively associated with organizational innovation by encouraging employees to share and integrate their knowledge. We also attempt to uncover potential moderating effects of environmental dynamism by focusing on its influence on knowledge stock and flow under ILMs. The empirical results from a sample of 205 firms show that ILMs have an overall positive influence on organizational innovation. However, the positive effect is more pronounced as environmental dynamism increases.

Keywords: Internal labor markets (ILMs), Organizational innovation, Resource-based view, Knowledge management, Environmental dynamism

---

* This study was supported by the Institute of Management Research and the Institute of Industrial Relations at Seoul National University.

** Sungchoon Kang is Professor/Associate Dean at Seoul National University Business School.

*** Jeong-Yeon Lee is an Associate Professor at Seoul National University. Inquiries about the manuscript should be forwarded to his email at jaytalks@snu.ac.kr or mailed to his address, Building 59, office 709, 1 Gwanak-ro, Gwanak-gu, Seoul, 08826, Korea.

INTRODUCTION

The sustainable success of organizations depends on their ability to pursue innovation while maintaining efficiency (O Reilly and Tushman 2004). Given the importance of innovation, human resource management scholars have attempted to conceptually identify the effects of HRM systems on organizational innovation (Wright, Snell, and Dunford 2001). In the area of strategy, resource-based theorists argue that human assets given their tacitness and complexity can be a major competitive advantage and a source of organizational innovation (Barney, 1991; Wernerfelt 1984).

Because of the strong emphasis on human assets and importance placed on managing human capital in strategy and strategic human capital literature, it is somewhat surprising to see the paucity of research that empirically investigates innovation as an outcome of human resource strategies/practice. Contingency factors, such as types of human assets and environmental factors might be as important as human resource strategies (Datta, Guthrie, and Wright 2005). Yet, scholastic attention to such factors has also been futile. Given the deficiency of research, the primary purpose of our study is to see if firms' practice of internal labors markets (ILMs) is reliably associated with organizational innovation. ILMs are typically characterized by internal staffing, extensive firm-specific training, seniority-based entitlements, and long-term employment. Although the increasing 'market-based' employment arrangements, such as hiring from the outside, downsizing, and outsourcing (Cappelli 1995), recently posed challenges against a firm's ability to maintain ILMs, the strategic implications of ILMs in their role of creating organizational innovation has not been extensively discussed.

While considerable research has been devoted to the emergence of ILMs (e.g., Doeringer & Piore 1971; Edwards 1979; Jacoby 1979; Williamson 1975) and the characteristics of ILMs (e.g. Althauser and Kalleberg, 1981; Kerr 1950, 1954; Lazear and Oyer 2004; Malcomson 1984; Osterman 1984b, 1987), to our knowledge, few studies have directly tested the effects of ILMs on organizational innovation (except Imai & Itami 1984; Quinn & Rivoli 1991). We attempt to fill this research void by testing the main effects of ILMs on firm innovation and the moderating effects of environmental dynamism as a condition under which the effects of ILMs on

innovation may differ.

We tested these hypotheses regarding the ILMs organizational innovation relations using a sample of Korean firms that have experienced dramatic change in their employment systems over the last decade (Kang and Yanadori 2011). This research will offer new insight into ILMs to scholars as well as managers by empirically substantiating the contributions of ILMs to organizational innovation. We begin by clarifying the constructs of ILMs and then hypothesize the main effects of ILMs and the moderating effects of environmental dynamism. Next, we describe the employed methodology for testing our hypotheses and report the empirical results. We conclude by discussing the implications and limitations of our findings, and propose possible directions for future research.

THEORETICAL BACKGROUND

Internal Labor Markets (ILMs)

The ILM is a set of administrative rules and procedures within the focal firm to make decisions about pricing, allocating and training of labor (Baron & Kreps 1999; Doeringer & Piore 1971; Dunlop 1966). These institutional rules make a distinction between internal and external markets even if the two markets are interconnected in the ports of entry and exist (Kerr, 1950, 1954). The emergence of ILMs may be attributed to a variety of factors, such as the increase of productivity through the investment in human capital (e.g., Becker 1962), competitive advantage of transaction cost (e.g., Williamson 1975), market failure in skill specificity (e.g., Doeringer & Piore 1971), capitalists' control over labor force (e.g., Edwards 1979), and workers' motives to balkanize existing labor structures (e.g., Jacoby 1984).

While there is no clear consensus yet on which practices constitute ILMs among scholars, Doeringer & Piore (1971) provided a comprehensive theoretical framework for understanding the emergence and elements of ILMs. Accordingly, firms need their own skill specificity for sustainable competitive advantage, but markets cannot fully provide labors with tailored knowledge and skills at the right time and the proper price. These untradeable firm-specific knowledge and skills encourage firms to invest in employees'

training for higher productivity and motivating employees to develop their knowledge and skills. Moreover, since firm-specific knowledge and skills are difficult to obtain from formal education at general institutions, on-the-job training (OJT) provides an important mechanism for delivering skilled senior employees' valuable tacit knowledge to novices. Because sharing employees' own knowledge and skills with other employees (mainly subordinates) can threaten their current positions, incentives should also be provided to facilitate the transfer of tacit knowledge through OJT. The incentives include job ladders, long-term employment, and seniority-based promotion system (Baron & Kreps 1999). As the investment in skill specificity increases, it promotes employers to stabilize employment and discourages employees to leave the organization. These mutual benefits engender the rigidity of firms' administrative rules. Organization custom, which means an unwritten set of rules based largely upon past practices or experiences, is the key mechanism to institutionalize these rules and procedures (Doeringer & Piore 1971; Dunlop 1966; Kerr 1950). This custom facilitates homogeneity and solidarity in the work group and, in turn, the stability of the group strengthens existing internal structure and customary laws.

In sum, ILMs can be defined as a set of interrelated practices such as the job ladder (or line of progression), seniority entitlement (or seniority-based promotion and pay system), extensive firm-specific training, long-term employment relations, and bureaucratic control, as represented in hierarchical structures and institutionalized (formal or informal) rules or procedures. The ILM is different from the so-called 'high-performance work system' (HPWS). In general, the HPWS includes comprehensive selection procedures, results-based evaluation and incentive systems, internal promotion, extensive training, employment security, and active employee participation (Combs, Liu, Hall, and Ketchen, 2006). Although the HPWS includes such elements of ILMs as internal promotion, employment security, and firm-specific training, the HPWS emphasizes employee participation and autonomy rather than bureaucratic control. Additionally, the HPWS determines pay and promotion based on performance rather than seniority and places more value on selective recruitment to hire the 'right' people. We acknowledge the recent developments in researching the role of HPWS on organizational innovation (Collins and Smith, 2006; Patel, Messersmith, and Lepak, 2013), However, due to the difference

between ILMs and HPWS and given its early stage of research on HPWS's role on innovation, although we refer to HPWS literature, we decided not to draw too much inference from HPWS literature.

Knowledge Management and Organizational Innovation

To examine how ILMs can facilitate or hinder organizational innovation, we first need to understand the innovation process in the firm. Organizational innovation, in general, proceeds through a process of (1) creating new knowledge, (2) disseminating and sharing the knowledge throughout the firm, and (3) integrating the knowledge embodied at individuals or groups into new products and services (Nonaka & Takeuchi 1995, 2007).

New knowledge in the organization is often created while employees apply their experience and accumulated knowledge in performing his or her job (Nonaka & Takeuchi, 1995). Individual experiences trigger intuiting activities, and their cognitive maps guide interpreting activities (Crossan et al. 1999; Nonaka & Takeuchi 2007). Individuals may discern new opportunities or new combinations of existing knowledge through intuitive and the interpretative processes (Kanter 1988). An individual's ability to recognize new opportunities is related to the level of knowledge or expertise he or she has accumulated (Shane 2000). For example, Cohen and Levinthal (1990) emphasize that the possession of relevant knowledge enables the sorts of associations and linkages that may have never been considered. Similarly, the creativity literature suggests that individual creativity is a function of domain-relevant skills (or expertise), creativity-relevant skills (or creative-thinking skills), and intrinsic task motivation (or inner passion) (Amabile, 1988, 1998). The domain-relevant skills are pertinent to expert intuition based on a past algorism of performing tasks, and creativity-relevant skills are related to entrepreneurial intuition with novel connections out of the established patterns of causality (Crossan et al. 1999).

While the invention or conception of innovative ideas is based on individual creativity, the embodiment of new ideas into organizational knowledge (e.g., routines) and products requires collective achievements (Nonaka & Toyama 2003; Van de Ven 1986). More specifically, when an individual's idiosyncratic knowledge is shared, it is often modified by absorbing other people's knowledge

(Nonaka, Toyama, & Hirata 2008). Individual knowledge can be augmented and complemented by being combined with the knowledge of others, thus facilitating the creation of new knowledge at the group level (Nonaka & Toyama 2003; Subramaniam & Youndt 2005). Employee reactions to the shared knowledge may also help the organization to evaluate social legitimacy as well as the economic efficiency of individual knowledge. Accordingly, knowledge sharing is an important mechanism to transform individual knowledge into collective knowledge embodied at the group or the organization itself. Organizations provide better institutional mechanisms to share individual knowledge than markets (Kogut & Zander 1992; Leana & Van Buren III 1999; Nahapiet & Ghoshal 1998). In particular, when individuals communicate and interact with each other within the organizational context for a long period of time, they are more likely to share in-depth knowledge by establishing ongoing relationships, build mutual trust, and develop common language (Kogut & Zander 1992; Nonaka & Takeuchi 1995).

As individual knowledge is shared and its boundary is extended to higher levels, more people are involved in creating organizational knowledge. In this stage, diverse perspectives need to be compromised and redundant ideas should be integrated into the reservoir of organizational knowledge (Nahapiet & Ghoshal 1998; Nonaka 1994; Zollo & Winter 2002). Previously institutionalized knowledge at the firm may provide a coordination system for efficient information processing and legitimization of new knowledge (Nonaka 1994). In other words, organizational knowledge embodied at the firm level may facilitate organizational innovation by providing a cognitive framework for individual intuition and interpretation (Crossan et al. 1999). However, institutionalized knowledge as an efficient coordination mechanism may also repress individual creativity (Amabile 1998) or lose fit with changing environments (Crossan et al., 1999). The knowledge embedded in the organizational system, structure, and routine tend to have strong inertia for reliability and accountability, especially when it has provided the firm with core competence for current success (Hannan & Freeman 1984). Thus, a firm's innovation capabilities hinge on how it can resolve the inherent tension between organizational knowledge and individual creativity, and build up a virtuous circulation of knowledge creation-sharing-integration.

HYPOTHESES

ILMs and Organizational Innovation

Given that excessive institutionalized knowledge can inhibit the creation of new knowledge, one can argue that ILMs may hinder organizational innovation due to their bureaucratic elements. That is, excessive conformity to customary laws may discourage individuals to suggest new ideas and make unprecedented attempts (Amabile, 1988, 1998; Kanter, 1988). Long-term employment relations and firm-specific training under ILMs may engender homogeneity within the firm through the attraction-selection-attrition process (Schneider, 1987) and thus, make employees share a similar cognitive frame (sense-making), use common language (Weick, 1995), and think similarly. As a result, employees under ILMs may seek the simple re-combinations of existing patterns by searching locally, not to think out of the box (Amabile, 1988). In addition, ILMs may keep organizations from getting outside talents and information about current technology developments. From a knowledge creation viewpoint, therefore, ILMs are expected to negatively influence organizational innovation, which is consistent with the generally accepted notion about its downside.

We argue that the benefits of an ILM as an institutionalized tool to minimize opportunism and engender trust in knowledge sharing and integration will outweigh the aforementioned costs of ILMs. Organizational innovation tends to progress by a process of creating new knowledge, disseminating and sharing that knowledge throughout the firm, and integrating the knowledge embodied in individuals or groups into new products and services (Crossan et al. 1999; Nonaka, 1994). This process indicates that, although new knowledge in the organization often originates in individual creativity and innovative behaviors, individual knowledge will not be applied to create a new process or products/services without collective collaboration and commitment (Grant 1996; Kogut and Zander 1992). Accordingly, Subramaniam and Youndt (2005) emphasized that fragmented human capital would not guarantee the innovative capabilities of a firm without a proper environment for activating individuals' tacit knowledge sharing and integration.

Knowledge sharing and integration as the driving forces of

organizational innovation inherently bear risks because reciprocity between the giver and the recipient cannot be guaranteed and because the exclusive benefits of individual knowledge may depreciate as that knowledge is shared with others (Doeringer and Piore 1971). Thus, institutional mechanisms appropriate for knowledge sharing and integration should focus on minimizing concerns regarding opportunism and maximizing trust among employees (Lazear and Moore 1984). ILMs may provide an effective institutional mechanism that encourages employees to share and integrate their knowledge. More specifically, a job ladder, seniority-based promotion and rewards, and lifetime employment alleviate the fears of layoff or pay cuts inherent in tacit knowledge sharing (Leana and Van Buren 1999). As organizational members interact with one another over a long period of time, they build generalized as well as dyadic trust with one another (Kang, Morris, and Snell 2007). Consequently, ILMs decrease employees' motives for opportunistic behaviors and increase incentives for reciprocity. For example, Kang and Snell (2009) suggest that ILMs facilitate cooperative relationships and reinforce shared norms of reciprocity for efficient knowledge exchange and sharing among its members. Similarly, Moss, Salzman, and Tilly (2000) demonstrated that firms that had deconstructed ILMs to achieve flexibility were reconstructing them to prevent a loss of employees' undocumented knowledge and to facilitate knowledge sharing among employees.

In addition to knowledge sharing, ILMs may help integrate and institutionalize individual- or group-level knowledge into organizational knowledge. As the fields or contexts of knowledge sharing spread into groups and organizations, hierarchical structures and the customary laws of ILMs function as a decision-making system for efficient information processing and the legitimacy of knowledge (Baron and Kreps 1999; Doeringer and Piore 1971). Furthermore, the extensive firm-specific training and long-term employment relations of ILMs encourage employees to share cognitive maps, interpretation schema, and a common language (Weick and Roberts 1993). Thus, ILMs may lead to a gradual convergence of diverse individual knowledge to more integrated knowledge by information refinement and knowledge justification processes (Nonaka 1994). Consequently, conflicting perspectives are compromised, and redundant information becomes integrated into the reservoir of common organizational knowledge (Nonaka,

1994; Zollo and Winter 2002). These benefits of ILMs in sharing and integrating knowledge within the firm suggest that ILMs will positively influence organizational innovation. Thus, we hypothesize the following.

> **H1:** ILMs will be positively associated with organizational innovation.

ILMs and Organizational Innovation in Dynamic Environments

While a firm can purse innovation by transferring and exploiting underutilized yet potentially valuable knowledge within organizational boundaries, its innovative capacity may sharply decrease as the gap between its accumulated knowledge and the technological frontier grows larger (Argote and Ingram 2000). Dynamic environments consistently push the technological frontier upwards and widen the knowledge gap (Kortum 1997). This situation indicates that continuous knowledge integration becomes even more critical to organizational innovation in dynamic environments.

More specifically, dynamic environments, which refer to a high degree of instability of the environment, render current products and services rapidly obsolete (Jansen, van den Bosch, and Volberda 2006). Environmental dynamism creates a condition where new technologies and ideas on the rise should be successfully integrated into a new product and service. Under this context, a stock of firm-specific knowledge that is established through the operation of ILMs over a long horizon becomes quite useful, strengthening the influence of ILMs (i.e., stifling individual creativity) on organization innovation. Dynamic environments generate higher needs and greater pressure for organizational members to resolve any conflicts or tensions that threaten social integration. Under this context, ILMs increase member—those who share common organizational goals—tolerance and acceptance of heterogeneity and differences, rendering them more able to respond to strong environmental pressures that threaten organizational survival (Cannella, Park, and Lee 2008; Jansen et al. 2006). The benefits of ILMs as effective institutional mechanisms that strengthen within-group communication and interpersonal cohesion remain apparent. Thus, the positive association between ILMs and organizational innovation will be

reinforced in dynamic environments.

On the other hand, in relatively stable and predictable environments, given the lack of pressure to integrate knowledge inside the firm against external pressure, the aforementioned positive influence of ILM will be weakened. In this context, there is even a possibility that ILM with its bureaucratic and conventional elements may prevail and therefore hinder organizational innovation. The need to obtain knowledge flow from outside and integrate knowledge inside that provide new ideas or fresh perspectives are not critical to organizational innovation in relatively stable environments (Cady and Valentine 1999; Zajac, Golden, and Shortell 1991). Under this situation, either positive aspects of ILMs may disappear, or negative aspects of ILMs such as fostering conventional thinking and sticking with bureaucratic routines, hindering organizational innovation.

Therefore, we hypothesize the following:

> **H2:** Environmental dynamism will positively moderate the relation between ILMs and organizational innovation. The positive relation between ILMs and organizational innovation will be stronger in firms with dynamic environments than those with stable environments.

METHOD

Data and Sample

We obtained the data for this study from the Human Capital Corporate Panel's (HCCP) 2007 survey; data were collected by the Korean Research Institute for Vocational Education and Training (KRIVET). With a stratified sample from the Korea Information Service (KIS) corporate database, KRIVET distributed the survey to 1,899 firms that had more than 100 employees and were listed in KOSDAQ (Korean Securities Dealers Automated Quotations). The HCCP measures HRM practices through a survey administered to HRM managers, general managers, or owners. All survey measures referred to the 2006 calendar year. The final HCCP data were constructed from surveys returned by 467 firms. The HCCP data were matched with innovation performance data (i.e., Korean patent data) archived by the Korean Intellectual Property Office

(KIPO), which reports the number of patents registered yearly to each firm in Korea. For our analysis, we used the patent data for 2007, a one-year difference from the HCCP data. We identified 256 firms with available patent counts in 8 industries (chemicals, metal manufacturing and processing, computer and electronics, machinery, automobile and transportation equipment) in which in which patent application has been actively made for protecting property rights. The HCCP data were also matched to financial statement data from the Korea Investor Service's database (KIS-VALUE), the Korean equivalent of COMPUSTAT. After eliminating firms with incomplete survey and archival data, we had 233 firms for our final sample. We conducted tests to examine the possibility of bias between the selected and excluded samples, and the results showed no significant differences in terms of firm age, innovation performance, ILMs, and environmental dynamism.

Measures

Organizational Innovation. We used Korean patent data to measure firm innovation. Although patent applications are only an imperfect measure of firm innovation, innovative capacity is a prerequisite for successful patenting; thus, patents are widely used as an indicator of organizational innovation (Crepon and Duguet 1997). We constructed our measure of organizational innovation with yearly patent counts registered to the firms in 2007.

Internal Labor Markets (ILMs). We defined ILMs as a set of interrelated practices such as internal staffing, seniority entitlement (or seniority-based promotion), extensive firm-specific training, long-term employment relations. We matched these ILM characteristics with survey items in the HCCP data. The survey items measuring ILMs include two items of internal staffing (the proportion of entry-level hires and the proportion of hires selected through annual open recruitment), one item of seniority-based promotion (the average length of organizational tenure needed for promotion from entry- to executive-level, as this indicates an organizational requirement of tenure or recommended number of years to reach the top position), one item of firm-specific training investment (the average training and development costs per entry-level worker), and one item of life-time employment (the proportion of regular workers with at least 10

years' firm tenure).

The proportion of hires selected through annual open recruitment is in line with the idea of 'port of entry' in ILMs where external recruiting is mainly open at the bottom of hiearchy. In ILMs, internal staffing is prevalent except at the bottom of the hiearchy. Average length of tenure required for promotion represents the organizational HR practice where seniority and getting substantial firm-specific knowledge at a specific position is an important requirement for promotion. Required length of tenure matters as tenure represents the amount of firm-specific skills and knowledge that ILMs value.

Following the previous literature of strategic human resource management, we standardized the five items and added the *z*-scores to form the ILMs index. Despite their potential shortcoming of the index value (that is, not satisfy the item-sampling principle), many HR researchers have addressed that it can be an acceptable measure to reflect the effects of a HR bundle in that it varies with in both the number and extensiveness of practices utilized (e.g., Batt 2002; Guthrie 2001; MacDuffie 1995). In addition, while an additive index does not capture all of the synergies among individual practices, it has been popularly used because it is considered a conservative approach to the effects of a HR bundle (Delery 1998). Conceptually this is similar ILM can be regarded as a formative rather than a reflective indicator (Podsakoff et al., 2003; MacKenzie, Podsakoff, and Jarvis, 2005). Both theoretically and methodologically, these ILM attributes form the construct rather than an underlying construct "causing" the indicators (Law, Wong, and Mobley, 1998).

Environmental Dynamism. Environmental dynamism was measured by the amount of change in each industry to derive industry-level objective information. Following prior studies (Dess and Beard 1984; Keats and Hitt 1988; Simerly and Li 2000), we regressed the values of the revenues in each industry over five years against time and then used the standard error of the regression coefficient to a time dummy variable divided by sales (mean) for a measure of environmental dynamism.

Control variables. We controlled for two firm characteristics (firm size and firm age) that may be related to firm innovation. *Firm size* was measured by the number of employees, and *firm age* was computed by the difference between the firm's founding year and

2006. Both were logged because of the skewness of the distribution. We controlled for workforce age diversity because when analyzing the age dependence of innovation at the aggregate level such as teams or firms, mean age and age diversity should be considered simultaneously (Frosch 2011). We measured workforce age diversity as the diversity index (called the Blau (1977) index), which was computed as $1 - \sum p_i^2$, in which p_i is the percentage of employees in the ith category. The index can vary between 0 and 1, with values close to 1 indicating higher diversity and values of 0 indicating lower diversity. We also controlled *workforce age*. The HCCP data classified employees into four age groups (under 29, 30-39, 40-49, and over 50). Prior studies on age effects at an aggregate level have used either mean age or shares of different age groups as age indicators (Frosch 2011). The hypotheses are primarily tested using the mean age of total employees (which was calculated with the median of each age group). Finally, some scholars have been critical of the use of patent data as a measure of firm innovation because the proclivity to patent varies across industries (Levin, Klevorick, Nelson, and Winter 1987). To address this issue, we included the average number of patents registered (*industry mean patents*) by each industry in 2006 in which the mean value excludes the firm of interest as a control. Additionally, we included a firm's R&D intensity, which previous research has controlled for because R&D factors are closely related to a firm's innovation performance. Our results were not significantly changed by including the control variable of R&D intensity. Because the variable included a great deal of missing data, we did not include R&D intensity in our final model.

RESULT

Table 1 presents the descriptive statistics and zero-order correlations among the study variables. In the correlations among variables, ILMs were positively related to firm age (r = .24, p <0.001), indicating that older firms are more likely to maintain ILMs. ILMs were also positively correlated to workforce mean age (r = .48, p <0.001) and workforce age diversity (r = .32, p <0.001). To test the relations between ILMs and organizational innovation, we used a negative binomial regression because patent data are widely

Table 1. Descriptive Statistics and Correlations[a]

Variables	Mean	s.d.	1	2	3	4	5	6	7
1. Organizational innovation	70.27	567.54							
2. Internal labor markets	-.01	.58	.06						
3. Environmental dynamism	.15	.30	.01	-.08					
4. Workforce mean age	36.85	3.46	-.04	.48 ***	-.07				
5. Firm size[b]	30.66	1.98	.18 **	-.27 ***	.01	-.35 ***			
6. Firm age[b]	3.12	.66	.06	.24 ***	-.06	.26 ***	-.14 *		
7. Workforce age diversity	.61	.09	-.03	.32 ***	-.11 †	.53 ***	-.07	.26 ***	
8. Industry mean patents	85.24	127.83	.11 †	-.08	.25 ***	.04	-.08	-.06	-.11 †

[a] n=205; [b] logarithm; † $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 2. Negative binomial regression results

Variables	Model 1		Model 2		Model 3	
Intercept	3.68 †	(2.00)	7.30 **	(2.27)	6.88 **	(2.30)
Firm size [b]	1.17 ***	(.10)	1.02 ***	(.11)	1.05 ***	(.11)
Firm age [b]	.00	(.28)	-.17	(.28)	-.18	(.25)
Workforce age diversity	-2.97	(2.30)	-5.30 *	(2.37)	-5.65 *	(2.34)
Industry mean patent	.00	(.00)	.01	(.00)	.01	(.00)
Environmental dynamism (ED)	-.02	(.04)	-.06 †	(.04)	-.04	(.04)
Workforce mean age (WMA)	-.11 *	(.05)	-.14 *	(.06)	-.13 *	(.06)
Internal labor markets (ILMs)			1.13 ***	(.30)	.95 **	(.36)
ILMs x ED					.24 **	(.07)
Degrees of freedom	7.00		8.00		9.00	
Log-likelihood	-616.63		-609.66		-602.47	
Log-likelihood ratio test [c]			14.40 ***		13.93 ***	

a. n=233
b. logarithm
c. The likelihood ratio test assesses the improvement of fit over the preceding model in the table
† $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

dispersed count data; thus, a linear regression model can produce biased and unreliable estimates.

Although the Poisson distribution could be used for estimating the probability of a count to minimize these issues (Agresti 2007), it is also inappropriate when the *equisdispersion* (the equality of the mean and variance) assumption of the Poisson distribution does not meet because of a greater variance of count variables rather than the mean (overdispersion). Prior studies that compared the Poisson distribution with a negative binomial distribution showed that the

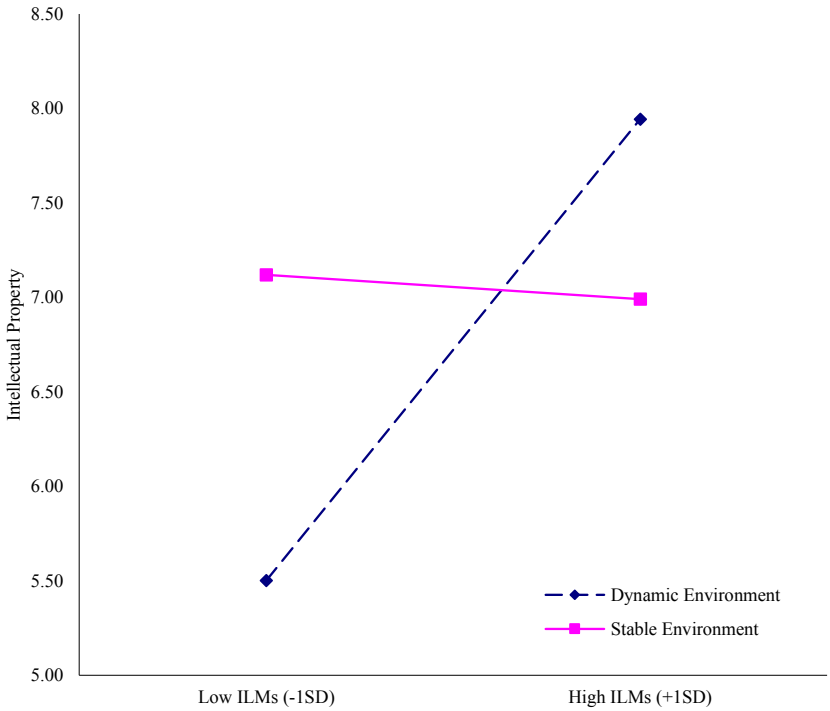

Figure 1. A two-way interaction of ILMs and environmental dynamism

binomial distribution model significantly reduces deviance to produce reliable estimates for overdispersed count data (Hilbe 2007). Because patent counts were an overdispersed count variable, we used a negative binomial distribution model. table 2 shows the results of the negative binomial regressions. As shown in table 2, only control variables were entered in Model 1, and then ILMs as a key independent variable were entered in Model 2. ILMs were positively related to firm innovation (b = 1.13, p <0.001). This result supports our Hypothesis 1 that ILMs contribute to firm innovation by efficient knowledge-sharing and integrating processes. Model 3 tests the interactive effect of ILMs and environmental dynamism on firm innovation (Hypothesis 2). The interaction variables were mean-centered to reduce multicollinearity. Model 3 shows that the interaction term is significant (b = .24, p < 0.01). As shown in figure 1, we plotted the interactive effects of ILMs and environmental dynamism on organizational innovation using values of ±1 standard deviation to rep-

resent high and low values of the variables. The results show that a dynamic environment strengthened the positive relation between ILMs and firm innovation as predicted by Hypothesis 2. Examining the interactive effect of ILMs and environmental dynamism on organizational innovation, additional simple slope tests revealed positive relations between ILMs and organizational innovation at high low level of environmental dynamism was significant (b = 2.00, p <0.01).

However, the relationship between ILMs and organizational innovation was not significant at low level of environmental dynamism (b = -.10, *n.s.*).

DISCUSSION

This study empirically examined the ILM–organizational innovation relation that prior research has largely neglected. We first defined ILMs as a set of employment practices that focus on internal staffing, seniority entitlement, extensive training, and long-term employment relations. We examined a positive aspect of ILMs in creating organizational innovation and then how environmental dynamism strengthens the ILMs-innovation relation. Based on the knowledge-based view, which postulates that organizational innovation is achieved by a process of creating, sharing, and integrating new knowledge, we hypothesized that ILMs would be positively associated with organizational innovation by encouraging employee creation of new knowledge. However, we also hypothesized that this positive effect will be pronounced since sharing and integrating knowledge becomes more critical under dynamic environment. The empirical results supported our hypothesis by showing that ILMs have overall positive influences on organizational innovation.

The results also show that the positive effects of ILMs were likely to be strengthened as environmental dynamism increased. These results suggest that under dynamic environments the positive aspect of ILMs in integrating knowledge may offset the harmful aspect of ILMs that emphasizes routines and conventions. In dynamic environments firm's ability to utilize firm-specific knowledge stock to integrate knowledge may be more helpful to maintain organizational innovation than in static environment. ILMs help firms accumulate firm-specific knowledge and integrate scattered knowledge residing

within the firm. And in dynamic environments, ILMs help firms achieving innovation by increasing knowledge flow to expand, acquire, and absorb new knowledge.

Contributions and Implications

One of the important contributions of this study is to reevaluate the strategic value of ILMs in the pursuit of organizational innovation. Although ILM research has its own tradition and has mostly focused on why ILM emerges in the first place, its strategic value has not been highlighted. Our study reveals that the benefits of the ILM as an innovation driver lies in its role of encouraging the acquisition and transfer of firm-specific knowledge, intense employee commitment to the organization, and generalized employee trust in management and colleagues (Baron and Kreps 1999). Given that the invention or conception of innovative ideas resides in individuals but requires collaboration and implementation beyond a few individuals' generation of ideas (Nonaka and Toyama 2003), our research suggests that ILMs may provide an effective institutional mechanism for sharing knowledge throughout the firm and transforming individual- or group-level knowledge into organizational innovation.

These findings provide important implications for researchers as well as managers. For organizational scholars, this study directs more attention to the relation between ILMs and organizational innovation. The current findings are compelling because they demonstrate the enabling role of ILMs in organizational innovation, although more studies should follow this incipient study to more rigorously substantiate the ILM–organizational innovation relation. In particular, our findings on the interaction of ILMs and environmental dynamism is consistent with the argument that the advantages of the enabling logic of formalization and bureaucracy may be bolstered by the demands of the task environment and notably by the intensification of competitive pressure (Womack, Jones, and Roos 1991).

This research also provides valuable implications for firms that pursue continuous innovation. Many firms have destroyed ILMs either for short-lived cost reduction or simply to follow management fads. Without careful consideration of intra-firm goals and constraints, however, the myopic deconstruction of ILMs can destroy a valuable source of knowledge, cause a "brain drain," and

disrupt the organizational knowledge structure, thereby incurring considerable costs to restore the knowledge formation process for innovation (Moss et al. 2000).

The results of this study make a valuable contribution to the HRM literature by establishing the mechanisms by which HRM enables organizational innovation, which is a vital yet relatively unexamined facet of firm performance (Wright, et al. 2001). Because innovation is central to a firm's competitive advantage, the HRM-innovation link has become an increasingly important research issue for the HRM researchers who attempt to identify the roles of HRM as the source of competitive advantages. This study presents a specific HRM system (i.e., ILMs) that supports firm innovation.

Another unique contribution of this study in the HRM area is related to the fit of the HRM system with internal and external organizational factors. The results of this study highlight environmental dynamism as an external factor that reduces the positive effects of ILMs on organizational innovation. The study also highlights workforce age as an internal factor that expands the strengths or amplifies the weaknesses of ILMs in different environmental conditions. This finding indicates that internal and external contextual factors should be considered to discern the effects of ILMs on organizational innovation. By considering these contexts in which organizations are embedded, managers may predict and understand when their firms obtain more or fewer benefits from ILMs.

Limitations and Future Research

This research has several potential limitations. First, we believe that Korean firms provide an appropriate research setting for testing the relation between ILMs and organizational innovation because most Korean firms are under economic and social pressures to depart from ILMs to compete with global firms, especially after the financial crisis of 1997. In fact, Korean firms have traditionally established ILM-based employment relations such as internal staffing, seniority-based promotion, and lifetime employment. Recently, however, Korean firms have widely emphasized meritocracy and individualism to pursue continuous innovation and global competitiveness (Kang and Yanadori 2011). Despite the advantage of our empirical setting, however, our findings must be

replicated in different social contexts because there are substantial variations in the organizing patterns of ILMs in different countries (Osterman 1994).

Next, future research must examine how this relation changes dynamically over time with a longitudinal research design. A longitudinal investigation would unravel the complex dynamics of ILMs and organizational innovation. In addition, qualitative as well as quantitative research design with longitudinal data can untangle the mechanism of how ILMs contribute to knowledge creation and integration and ultimately organizational innovation. With detailed and context-dependent information, qualitative research can show how ILMs are deconstructed, transformed, or reconstructed in a process that allows firms to achieve unique goals and to overcome various constraints (Moss et al. 2000; Osterman 1987).

Conclusion

Over twenty years ago, Osterman (1987) argued that the choice of employment subsystems is a function of a firm's central goals such as cost effectiveness, maximizing predictability and flexibility, and internal and external constraints such as physical and social technologies, workforce nature, and government rules. Current dynamic environments ask firms to pursue such sustainable innovations as achieving organizational goals and overcoming constraints. Although there is an unproven general notion that ILMs tend to hinder organizational innovation, the current research demonstrates a positive effect of ILMs on organizational innovation. This research also highlights that the effects of ILMs on organizational innovation depend upon the environmental dynamism. We expect that this research will motivate scholars and managers to pay more attention to and to reevaluate the value of ILMs.

REFERENCES

Agresti, A. (2007), *An Introduction to Categorical Data Analysis*. New York: Wiley-Blackwell.

Althauser, R. P. and A. Kalleberg (1981), "Firms, occupations, and the structure of labor markets: A conceptual analysis" in *Sociological*

Perspectives on Labor Markets, Berg I. (ed). New York Academic Press: 119-149.

Argote, L. and P. Ingram (2000), "Knowledge transfer: A basis for competitive advantage in firms," *Organizational Behavior and Human Decision Processes,* 82, 150-169.

Backe-Gellner, U., M. Schneider, and S. Veen (2011), "Effect of workforce age on quantitative and qualitative performance: Conceptual framework and case study evidence," *Organization Studies,* 32, 1103-1121.

Barney, J. B. (1991), "Firm resources and sustained competitive advantage," *Journal of Management,* 17, 99-120.

Baron, J. N. and D. Kreps. (1999), *Strategic Human Resources: Frameworks for General Managers*. New York: John Wiley and Sons.

Batt, R. (2002), "Managing customer services: human resource practices, quit rates, and sales growth," *Academy of Management Journal,* 45, 587–97.

Becker, G. S. (1962), "Investment in human capital: a theoretical analysis," *Journal of Political Economy,* 70(5), 9-49.

Binnewies, C., S. Ohly, and C. Niessen. (2008), "Age and creativity at work: The interplay between job resources, age and idea creativity," *Journal of Managerial Psychology,* 23, 438-457

Blau, P. M. (1977), *Inequality and Heterogeneity*. Glen-coe, IL: Free Press.

Cady, S. H., and J. Valentine (1999), "Team innovation and perceptions of consideration: What difference does diversity make?" *Small Group Research,* 30, 730-750.

Cappelli, P. (1995), "Rethinking employment," *British Journal of Industrial Relations* 33, 563-602.

Cannella, A. A., J. Park, and H. Lee. (2008), "Top management team functional background diversity and firm performance: Examining the roles of team member colocation and environmental uncertainty," *Academy of Management Journal,* 51, 768-784.

Chadwick, C., and A. Dabu (2009), "Human resources, human resource management, and the competitive advantage of firms: toward a more comprehensive model of causal linkages," *Organization Science,* 20(1), 253-272.

Coff, R. W. (1997), "Human assets and management dilemmas: Coping with hazards on the road to resource-based theory," *Academy of Management Review,* 22(2), 374-402.

Coff, R. W. (1999), "When competitive advantage doesn't lead to performance: The resource-based view and stakeholder bargaining power," *Organization Science,* 10(2), 119-133.

Collins and Smith (2006). Knowledge exchange and combination: The role of human resource practices in the performance of high-technology firms. *Academy of Management Journal*, 49, 544-560.

Crepon, B., and E. Duguet (1997), "Estimating the innovation function from patent numbers: GMM on count panel data," *Journal of Applied Econometrics,* 12, 243-263.

Crossan, M. M., H. Lane, and R. White (1999), "An organizational learning framework: From intuition to institution," *Academy of Management Review,* 24, 522-537.

Datta, D., J. Guthrie, and P. Wright (2005), "Human resource management and labor productivity: Does industry matter?" *Academy of Management Journal,* 48, 135–145.

Delery, J. E. (1998), "Issues of fit in strategic human resource management: Implications for research," *Human Resource Management Review*, 8, 289–309.

Dess, G. G. and D. Beard (1984), "Dimensions of organizational task environments," *Administrative Science Quarterly,* 29, 52-73.

Doeringer, P. B. and M. Piore (1971), *Internal Labor Market and Manpower Analysis*. Lexington, MA: Heath.

Dulebohn, J. H. and S. Werling (2007), "Compensation research past, present, and future," *Human Resource Management Review,* 17(2), 191-207.

Edwards, R. (1979), *Contested Terrain*. New York: Basic Books.

Frosch, K. H. (2011), "Workforce age and innovation: A literature survey," *International Journal of Management Reviews,* 13, 414–430.

Frosch, K. H. and T. Tivig (2007), "Age, human capital and the geography of innovation," *Thünen-Series of Applied Economic Theory*, No. 71.

Gerhart, B. and S. Rynes (2003), *Compensation: Theory, Evidence, and Strategic Implications*. Thousand Oaks, CA: Sage Publications.

Gilson, L. L., J. Mathieu, C. Shalley, and T. Ruddy (2005), "Creativity and standardization: complementary or conflicting drivers of team effectiveness?" *Academy of Management Journal,* 48, 521-531.

Grant, R. M. (1996), "Toward a knowledge-based theory of the firm," *Strategic Management Journal* 17S, 109–122.

Guthrie, J. P. (2001), "High involvement work practices, turnover and productivity: evidence from New Zealand," *Academy of Management Journal,* 44, 180–90.

Hannan, M. T. and J. Freeman (1984), "Structural inertia and organizational change," *American Sociological Review,* 49, 149-164.

Hilbe, J. (2007), *Negative Binomial Estimation*. Cambridge, UK: University Press.

Jacoby, S. (1979), "The origins of internal labor markets in Japan," *Industrial Relations,* 18, 184-196.

Jansen, J. J. P., F. van den Bosch, and H. Volberda (2006), "Exploratory innovation, exploitative innovation, and performance: Effects of organizational antecedents and environmental moderators,"

Management Science, 52, 1661-1674.

Kang, S.-C., S. Morris, and S. Snell (2007), "Relational archetypes, organizational learning, and value creation: Extending the human resource architecture," *Academy of Management Review,* 32, 236-256.

Kang, S.-C. and S. Snell (2009), "Intellectual capital architectures and ambidextrous learning: A framework for human resource management," *Journal of Management Studies* 46, 65-92.

Kang, S.-C. and Y. Yanadori (2011), "Adoption and coverage of performance-related pay during institutional change: An integration of institutional and agency theories," *Journal of Management Studies,* 48, 1837-1865.

Keats, B. W. and M. Hitt (1988), "A causal model of linkages among environmental dimensions, macro organizational characteristics, and performance," Academy of *Management Journal,* 31, 570-598.

Kogut, B. and U. Zander (1992), "Knowledge of the firm, combinative capabilities and the replication of technology," *Organization Science,* 3, 387–397.

Kortum, S. S. (1997), "Research, patenting, and technological change," *Econometrica* 65, 1389-1419.

Law, K. S., C. Wong, and W. H. Mobley (1998), "Toward a taxonomy of multidimensional constructs." *Academy of Management Journal*, 23, 741-755.

Lazear, E. P. and R. Moore (1984), "Incentives, productivity, and labor contracts," *The Quarterly Journal of Economics,* 99, 275-296.

Leana, C. R. and H. Van Buren (1999), "Organizational social capital and employment practices," *Academy of Management Review,* 24, 538-555.

Lee, J. (2015), "Internal labor market under external market pressure," *Industrial and Labor Relations Review*, 68 (2), 338-371.

Lee, J., D. Bachrach, and D. Rousseau (2015), "Internal labor markets, firm-specific human capital, and heterogeneity antecedents of employee idiosyncratic deal requests," *Organization Science*, 26 (3), 794-810.

Li, J., W. Chu, C. Lam, and S. Liao (2011), "Age diversity and firm performance in an emerging economy: Implications for cross-cultural human resource management," *Human Resource Management,* 5, 247-270.

MacDuffie, J. P. (1995), "Human resource bundles and manufacturing performance: organizational logic and flexible production systems in the world auto industry," *Industrial and Labor Relations Review,* 48, 197–221.

MacKenzie, S. B., P. M. Podsakoff, and C. B. Jarvis (2005), "The problem of measurement model misspecification in behavioral and organizational research and some recommended solutions." *Journal of Applied Psychology*, 90, 710--730.

Meyer, A. (1982), "Adapting to environmental jolts," *Administrative Science*

Quarterly, 27, 515-537.

Moss, P., H. Salzman, and C. Tilly (2000), "Limits to market-mediated employment: From deconstruction to reconstruction of internal labor markets," in *Nonstandard Work: The Nature and Challenges of Changing Employment Arrangements,* Carre FJ, Ferber M, Golden L (eds). Champaign, IL: Industrial Relations Research Association, 95-121.

Niessen, C., C. Swarowsky, and M. Leiz (2010), "Age and adaptation to changes in the workplace," *Journal of Managerial Psychology,* 25, 356-383.

Ng, T. W. H and D. Feldman (2008), "The relationship of age to ten dimensions of job performance," *Journal of Applied Psychology,* 93, 392-423.

Ng, T. W. H and D. Feldman (2012), "Evaluating six common stereotypes about older workers with meta-analytical data," *Personnel Psychology,* 65, 821–858.

Nonaka, I. (1994), "A dynamic theory of organizational knowledge creation," *Organization Science,* 5, 14-37.

Nonaka, I and R. Toyama (2003), "The knowledge-creating theory revisited: knowledge creation as a synthesizing process," *Knowledge Management Research and Practice,* 1, 2-10.

O'Reilly, C. A. and M. Tushman (2004), "The ambidextrous organization," *Harvard Business Review,* 82(4), 74-83.

Osterman, P. (1987), "Choice of employment systems in internal labor markets," *Industrial Relations,* 26, 46-67.

Osterman, P. (1994), "Internal labor markets: theory and change," in *Labor Economics and Industrial Relations: Markets and Institutions*, Kerr C, Staudohar PD (eds). Cambridge, MA: Harvard University Press, 303-339.

Patel, Messersmith, and Lepak (2013). Walkingthe tightrole, An assessment of the relationship between high-performance work system and organizational ambidexterity. *Academy of Management Journal*, 56, 1420-1442.

Pfeffer, J. and Y. Cohen (1984), "Determinants of internal labor markets in organizations," *Administrative Science Quarterly,* 29, 550-572.

Podsakoff, P. M., S. MacKenzie, N. Podsakoff, J. Lee (2003). "The mismeasure of man(agement) and its implications for leadership research." *Leadership Quarterly*, 14, 615-656.

Rosenfeld, R. A. (1992), "Job mobility and career processes," *Annual Review of Sociology* 18, 39-61.

Sheets, R. G., and Y. Ting (1988), "Determinants of employee-termination benefits in organizations," *Administrative Science Quarterly,* 33, 607-624.

Shore, L. M., B. Chung, M. Dean, K. Ehrhart, D. Jung, A. Randel, and G. Singh. (2009), "Diversity and inclusiveness: Where are we now and where are we going?" *Human Resource Management Review,* 19, 117-133.

Simerly, R. L. and M. Li (2000), "Environmental dynamism, capital structure and performance: A theoretical integration and an empirical test," *Strategic Management Journal,* 21, 31-49.

Spilerman, S. and T. Lunde (1991), "Features of educational attainment and job promotion prospects," *American Journal of Sociology,* 97, 689-720.

Sturman, M. C. (2003), "Searching for the Inverted U-Shaped relationship between time and performance: Meta-analyses of the experience/performance, tenure/performance, and age/performance relationships," *Journal of Management,* 29, 609-640.

Subramaniam, M. and M. Youndt (2005), "The influence of intellectual capital on the types of innovative capabilities," *Academy of Management Journal,* 48, 450-463.

Teece, D. J., G. Pisano, and A. Shuen (1997), "Dynamic capabilities and strategic management," *Strategic Management Journal,* 18, 509–533.

Weick, K. E. and K. Roberts (1993), "Collective mind in organizations: Heedful interrelating on flight decks," *Administrative Science Quarterly,* 38, 357-381.

Wernerfelt, B. (1984), "A resource-based view of the firm," *Strategic Management Journal,* 5, 171-180.

Williamson, O. E. (1975), *Markets and Hierarchies: Analysis and Antitrust Implications: A Study in the Economics of Internal Organization.* New York: Free Press.

Wright, P. M., S. Snell, and B. Dunford (2001), "Human resources and the resource based view of the firm," *Journal of Management,* 27, 701-721.

Zajac, E. J., B. Golden, and S. Shortell (1991), "New organizational forms for enhancing innovation: The case of internal corporate joint ventures," *Management Science,* 37, 170-184.

Zollo, M. and S. Winter (2002), "Deliberate learning and the evolution of dynamic capabilities," *Organization Science,* 13, 339-351.

Received Aug 28, 2017
Revised Dec 14, 2017
Accepted Dec 15, 2017