

The Mediating Effects of Psychological Contracts on the Relationship Between Human Resource Systems and Role Behaviors: A Multilevel Analysis

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Abstract

Purpose The purpose of this study was to examine the mediating effect of the psychological contracts on the relationship between human resource (HR) systems and role behavior.

Design/Methodology/Approach Multilevel analyses were conducted on data gathered from 146 knowledge workers and 28 immediate managers in 25 Taiwanese high-tech firms.

Findings Relational psychological contracts mediated the relationship between commitment-based HR systems and in-role behaviors, as well as organizational citizenship behaviors. Transactional psychological contracts did not significantly mediate these relationships. In addition, the results also indicated that commitment-based HR systems related positively to relational psychological contracts and negatively to transactional psychological contracts.

Practical Implications Commitment-based HR systems could elicit a wide range of knowledge workers' behaviors that are beneficial to the goals of the firms. Furthermore, our findings also provide insight into, how HR systems

potentially elicit employees' role behaviors. Organizations could elicit employees' in-role behaviors by providing financial and other non-financial, but tangible, inducements and facilitate employees' extra-role behaviors by providing positive experiences, such as respect, commitment, and support.

Originality/Value The study is one of the primary studies to empirically examine the mediating effect of psychological contracts on HR systems and employee behaviors.

Keywords HR systems · Psychological contracts · Role behaviors · Organizational citizenship behaviors

Introduction

Human Resource (HR) systems create and support employment relationships (Lepak and Snell 1999). One way to operationalize an employment relationship is to assess an employee's psychological contract or "individual beliefs, shaped by the organization, regarding the terms of an exchange agreement between individuals and their organizations" (Rousseau 1995, p. 9). Thus, psychological contracts can be treated as employees' beliefs stemming from the HR system (Wright and Boswell 2002).

Furthermore, psychological contracts represent employees' beliefs about mutual employment obligations (Rousseau 1989; Rousseau and McLean Parks 1993). Employees tend to perform what they believe, that is, according to their psychological contracts. Thus, psychological contracts are positively related to employees' role behaviors, turnover intentions, commitment, and trust (e.g., Johnson and O'Leary-Kelly 2003; Lo and Aryee 2003; Robinson 1996; Robinson et al. 1994; Robinson and Morrison 1995; Robinson and Rousseau 1994; Turnley et al.

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2003). In other words, psychological contracts are not only formulated by HR systems but also influence employee behaviors. Consequently, psychological contracts can be viewed as the linking mechanism between HR systems and employee behaviors (Wright and Boswell 2002).

In the past decade, most psychological contract research has focused on identifying the components of psychological contracts and the effects of the fulfillment or the violation of psychological contracts by employers. For example, Robinson et al. (1994) found that the components of psychological contracts included expectations of high pay, pay based on the current level of performance, training, long-term job security, and career development. Based on these findings, Robinson and Morrison (1995) further proposed that employees are less likely to engage in civic virtue behavior when these expectations were violated. In summary, researchers have confirmed that violated psychological contracts negatively influence employees' role behaviors while fulfilled psychological contracts have positive influences (e.g., Coyle-Shapiro and Conway 2005; Kickul and Lester 2001; Lemire and Rouillard 2005; Lo and Aryee 2003; Turnley et al. 2003). However, no studies have empirically examined psychological contracts as a linking mechanism between HR systems and employee behaviors.

Accordingly, the goal of this study is to empirically examine psychological contracts as a mediator of the relationship between HR systems and role behaviors. Our results will provide insights regarding the reason for HR systems having an effect on employees' role behaviors. Based on these insights, HR practitioners will gain a better understanding of how to facilitate employees' role behaviors (e.g., by offering them specific inducements). Subsequently, we provide a brief review of psychological contract research, discuss relationships between HR systems and psychological contracts, and propose psychological contracts as mediators of the HR system–employee behavior relationship. HR systems are considered as an organizational level variable, whereas psychological contracts and role behaviors are both considered as individual level variables. Thus, relationships between HR systems and these variables are considered cross-level relationships and will be tested accordingly.

Psychological Contracts

Initially, a psychological contract was defined as an implicit, unwritten agreement between parties to respect each other's norms (Argyris 1960) and mainly used as a framework that referred to the implicitness of the exchange relationship between an employee and his/her employer (Millward and Brewerton 1999). It did not acquire construct status until the seminal work of Rousseau in the

1990s. According to Rousseau (1989, 1995), a psychological contract is an individual's belief regarding the terms and conditions of a reciprocal exchange agreement between employees and employers. Furthermore, psychological contracts include different kinds of mental models or schemas, which employees hold concerning reciprocal obligations in the workplace (Rousseau 1989).

In accordance with MacNeil's (1985) typology of promissory contracts, Rousseau (1990) also categorized psychological contracts into two types: transactional and relational. Based on Rousseau and McLean Parks' (1993) framework, transactional and relational psychological contracts differ on the following five characteristics: focus, time frame, stability, scope, and tangibility. Specifically, transactional contracts focus on economic terms, have a specific duration, are static, narrow in scope, and are easily observable. Relational contracts simultaneously focus on both economic and socio-emotional terms, have an indefinite duration, are dynamic, pervasive in scope, and are subjectively understood.

In summary, transactional psychological contracts refer to employment arrangements with short-term exchanges of specified performance terms and relational psychological contracts refer to arrangements with long-term exchanges of non-specified performance terms. Empirical evidence supports not only the existence of these two different types of psychological contracts, but also the movement between them. For example, Robinson et al. (1994) found that as contracts become less relational, employees perceived their employment arrangements to be more transactional in nature.

HR Systems and Psychological Contracts

According to Arthur (1992, 1994), HR systems can be classified as "control" or "commitment" systems. Control HR systems rely on enforcing employee compliance with specified rules and procedures and outcome-based rewards to achieve the goals of efficiency improvement and direct labor cost reduction. In contrast, commitment-based HR systems aim to increase effectiveness and productivity by developing committed employees who can identify with the goals of the organization, and who will work hard to accomplish those goals. Even though researchers have proposed different clusters of HR systems (e.g., Huselid and Becker 1996; Lee and Chee 1996), commitment-based HR systems probably remain the most extensively applied.

Commitment-based HR systems have broadly defined jobs, more extensive and general skills training, as well as higher salaries and more extensive benefits (Arthur 1994). When an organization offers these inducements, employees will perceive the organization's commitment to stable, long-term employment as well as support for the well-

being and interests of themselves and their families. These perceptions will shape employees' relational psychological contracts which are simultaneously focused on economic and socio-emotional terms in their open-ended exchange relationships with the employer (Rousseau 2000). Thus, commitment-based HR systems are expected to have a positive influence on relational psychological contracts.

Hypothesis 1 Commitment-based HR systems will positively relate to relational psychological contracts.

In contrast, when an organization applies a low commitment-based HR system, such as narrowly defined jobs, limited training efforts, relatively limited benefits, and lower wages, employees will perceive that the organization has committed to offer them little to no training or career development. These perceptions will shape employees' transactional psychological contracts, which primarily focus upon the economic aspects of their short-term reciprocal exchange agreement with the organization (Rousseau 2000). Accordingly, we hypothesize that commitment-based HR systems will negatively relate to transactional psychological contracts.

Hypothesis 2 Commitment-based HR systems will negatively relate to transactional psychological contracts.

The Mediating Effects of Psychological Contracts on the Relationship Between HR Systems and Role Behaviors

Organizations and their employees can be considered as the parties in the social exchange relationships (Eisenberger et al. 1986). Based on the organization's actions, such as HR systems, employees will generate their own perceptions, which in turn will determine their role behaviors in reciprocation to their organizations (Settoon et al. 1996; Wayne et al. 1997). In other words, employees' perceptions regarding the exchange agreement between themselves and their organizations mediate the relationships between HR systems and employees' role behaviors. Consequently, psychological contracts are expected to mediate the relationships between commitment-based HR systems and role behaviors.

Role behavior refers to the recurring actions of an individual appropriately inter-correlated with the repetitive activities of others, to yield a predictable outcome (Katz and Kahn 1978). There are two types of role behaviors: in-role and extra-role behavior. In-role behaviors are those behaviors required or expected within the purview of performing the duties and responsibilities of an assigned work role (Van Dyne et al. 1995). Since they are required for the work role, employers adopt formal reward systems which

provide financial and other non-financial, but tangible inducements in exchange for employees' in-role behaviors.

The exchange of financial and tangible inducements is a key feature of economic exchange (Blau 1964) and, thus, the exchange relationships between commitment-based HR systems and employees' in-role behaviors could be treated as a kind of economic exchange. In other words, commitment-based HR systems elicit employees' in-role behaviors by shaping perceptions regarding the economic terms of the exchange agreement between themselves and their organizations. Since both relational and transactional psychological contracts focus on economic terms of exchange relationships (Rousseau and McLean Parks 1993), employees with transactional or relational psychological contracts will perform in-role behaviors in order to exchange those higher salaries and more extensive benefits in commitment-based HR systems. Accordingly, we hypothesize that both relational and transactional psychological contracts will mediate the relationships between commitment-based HR systems and in-role behaviors.

Hypothesis 3 Both relational and transactional psychological contracts will mediate the relationships between commitment-based HR systems and in-role behaviors.

In contrast, extra-role behaviors, such as organizational citizenship behaviors (OCB), are those behaviors that benefit the organization and go beyond existing role expectations (Van Dyne et al. 1995). OCBs are not required for the work role, and employers do not formally reward them. For this reason, employees perform OCBs to reciprocate only when they have had positive experiences, such as involvement, commitment, and support, with the organization (Organ 1990; Robinson and Morrison 1995). Since commitment-based HR systems are labeled "commitment maximizers" (Arthur 1992, 1994), they are likely to facilitate employees' OCBs by offering those positive experiences.

The reciprocation of these positive experiences is a kind of social exchange (Cropanzano and Mitchell 2005). In other words, to elicit employees' OCBs, socio-emotional terms need to be in the exchange agreement between employees and their organizations. Since transactional psychological contracts do not focus on socio-emotional terms of exchange relationship (Rousseau and McLean Parks 1993), they are not expected to mediate the HR system–OCBs relationship. Accordingly, we hypothesize that relational psychological contracts mediate the relationship between commitment-based HR systems and OCBs.

Hypothesis 4 Relational psychological contracts will mediate the relationship between commitment-based HR systems and OCBs.

Methods

Sample and Procedure

The solid strength of Taiwanese high-tech industries is a critical factor in the global economy (Einhorn 2005). Knowledge workers,¹ such as R&D professionals and engineers, have been viewed as a core human resource for high-tech firms, and these firms would like to adopt commitment-based HR systems in managing their knowledge workers (Lepak and Snell 2002).

Since the HR system is a global unit-level variable at the organizational level, a single expert who has unique access to relevant information may serve as a data source (Klein and Kozlowski 2000; Koslowski and Klein 2000). According to Tekleab and Taylor (2003), immediate managers are considered to have a better understanding concerning the contract contents for specific employees and are treated as the agent representing the organization. They are suitable for completing the commitment-based HR system scales. In addition, immediate managers are also the direct supervisors of knowledge workers; thus they are also the source of the evaluation of knowledge workers' role behaviors. Consequently, in our research design, immediate managers were asked to complete an organizational commitment-based HR system and five knowledge workers' role behavior scales, whereas knowledge workers were only asked to respond to a psychological contract scale.

Since personal contacts significantly facilitate company access in Chinese societies (Easterby-Smith and Malina 1999), we accessed high-tech companies through personal contacts and a snowballing technique. All of these companies are publicly held companies or have employees numbering over one hundred. We distributed 75 survey packages to 60 high-tech firms. Each survey package contained an immediate manager questionnaire and five knowledge worker questionnaires. A cover letter for immediate managers attached to each survey package explained the objective of the survey, assured respondents of the confidentiality of their responses, and asked them to randomly select five subordinates to complete the knowledge worker questionnaires. Thirty-two survey packages were returned for a response rate of 42.67%. Specifically, we received questionnaires from 32 immediate managers and 146 knowledge workers from 25 high-tech firms. After deleting incomplete questionnaires and records with unmatched supervisor-worker dyads, we had data from 28 immediate managers and 127 knowledge workers from 25

high-tech firms,² representing effective response rates of 47 and 42 percent.

Eighty-seven percent of immediate managers were male. The average age was 40 years old, and respondents had on average 11 years ($SD = 7.67$) of experience in a high-tech field. Twenty-six percent of them had PhD degrees, 52% had master's degrees, 9% had bachelor's degrees, and 13% had vocational school diplomas. Compared to immediate managers, 68 percent of knowledge workers were male. The average age of the knowledge worker was 33 years old, with 80 months of work experience. Sixty-four percent of them were engineers, and 29% were R&D professionals. Ten percent had PhD degrees, 42% had master's degrees, 34% had bachelor's degrees, and 14% had vocational school diplomas.

Measures

Commitment-based HR System

Lepak and Snell's (2002) twenty-item scale was adopted to measure the extent to which an organization's HR system nurtured employee involvement and maximized the organization's return on its HR investment. The original scale was in English. It was translated into Chinese and then back-translated into English (Brislin 1980) by two Chinese bilingual academics. We then gave the English and Chinese versions of the questionnaires to yet another Chinese academic (a professor of HRM) to check whether the Chinese version was accurate. The response scale ranged from 1 (strongly disagree) to 5 (strongly agree). A sample item for this scale is: "These employees perform jobs that empower them to make decisions."

Psychological Contracts

The Psychological Contract Inventory (PCI) was originally developed by Rousseau (2000) to measure employees' beliefs regarding the terms and conditions of the exchange agreements between themselves and their organizations. Hui et al. (2004) translated the PCI into Chinese and suggested that the PCI is 'generalizable' to China. Since Taiwan shares an identical culture and spoken language with China, we adopted the PCI as translated by Hui et al. to measure Taiwanese knowledge workers' psychological contracts.

Each relational and transactional psychological contract scale has ten items. A sample item for the relational psychological contracts is: "To what extent, do you perceive that the company has provided stable benefits to

¹ Knowledge worker is one who works primarily with information or one who develops and uses knowledge in the workplace (Drucker 1999).

² Results did not differ substantially when data were limited to 25 immediate managers (one per firm).

employees’ families?”, and for transactional psychological contracts is: “To what extent, do you agree that your job is a short-term employment?” The subordinates were asked to rate their psychological contracts on a six-point Likert type scale with scale anchors ranging from 1 “not at all” to 6 “to a great extent”.

Role Behavior

In-role behavior was measured with Williams and Anderson’s (1991) scale, and OCBs were measured with Farh et al. (1997) Chinese OCB scale. Following reliability examination, five items were retained for the in-role behavior scale and six items were retained for the OCBs scale. Sample items for our scale are: “Performs tasks that are expected of him/her” (in-role behavior) and “Willing to help colleagues solve work-related problems” (OCB). Both scales ranged from 1 (strongly disagree) to 5 (strongly agree).

Results

Table 1 contains descriptive statistics and reliabilities for the variables in this study. Since commitment-based HR systems, psychological contracts, and role behaviors are considered to be on different levels of analysis, we employed Hierarchical Linear Modeling (HLM) (Raudenbush and Bryk 2002) for our analyses. In addition, we also followed Hofmann and Stetzer’s (1996) recommended procedures for testing mediation in a multilevel framework.

Hypotheses 1 and 2 predicted that commitment-based HR systems would significantly relate to relational and transactional psychological contracts. In order to support these hypotheses, there had to be significant between-group variance in employees’ psychological contracts. Thus, using HLM, we estimated a null model to test the significant level of relational ($\tau_{00} = 0.14, p < 0.01$) and transactional ($\tau_{00} = 0.06, p < 0.01$) psychological contracts, respectively. The

ICC1 was 0.35 for relational psychological contracts and 0.23 for transactional psychological contracts. Both of them were greater than 0.12 (James 1982), indicating that appropriate variance in knowledge worker psychological contracts exists between-groups.

Hypothesis 1 predicted that relational psychological contracts would be positively associated with commitment-based HR systems. Model 7 in Table 2, the intercept-as-outcome model, shows that a commitment-based HR system had significantly positive relationships with relational psychological contracts ($\gamma_{01} = 0.47, p < 0.05, R^2 = 0.32$). Therefore, Hypothesis 1 was supported. Hypothesis 2 assumed that commitment-based HR systems would be negatively related to transactional psychological contracts. As shown in Model 8 of Table 2, commitment-based HR systems had significantly negative relationships with transactional psychological contracts ($\gamma_{01} = -0.23, p < 0.05, R^2 = 0.03$), so Hypothesis 2 was also supported.

Following Hofmann and Stetzer’s (1996) procedures, three preconditions had to be met before we could test the mediation effect of psychological contracts. First, commitment-based HR systems must be significantly related to in-role behaviors ($\tau_{00} = 0.07, p < 0.01, ICC1 = 0.46; \gamma_{01} = 0.43, p < 0.01, R^2 = 0.40$). Second, commitment-based HR systems must be significantly related to psychological contracts (Hypothesis 1 and 2). Third, psychological contracts must be significantly related to in-role behaviors (relational: $\gamma_{10} = 0.22, p < 0.01$; transactional: $\gamma_{20} = 0.01, p > 0.10; R^2 = 0.22$). Since all three of the preconditions were supported, we could start to examine Hypothesis 3.

Table 2 also shows the effects of commitment-based HR systems and psychological contracts on role behaviors. Models 1–3 show the results of a set of tests with in-role behavior as the dependent variable. Comparing Model 1 to Model 3, we found that the effect of commitment-based HR systems on in-role behaviors dropped from 0.43 ($p < 0.01$) to 0.35 ($p < 0.01$), indicating that psychological contracts partially mediated the relationship between

Table 1 Descriptive statistics and correlations^a

	Mean	SD	1	2	3	4	5
1. Commitment-based HR system	3.54	0.48	(0.88)				
2. Relational psychological contract	3.28	0.56	0.32**	(0.90)			
3. Transactional psychological contract	2.82	0.49	-0.25*	-0.55**	(0.70)		
4. In-role behavior	3.73	0.42	0.46**	0.44**	-0.21*	(0.83)	
5. Extra-role behavior	3.66	0.44	0.47**	0.36**	-0.16	0.50**	(0.83)

N = 127; reliability coefficients for the scales are in parentheses along the diagonal

* $p < 0.05$; ** $p < 0.01$

^a Although the correlations between HR system and all other variables were computed by using *N* = 127, HR system scores were assigned down to individual knowledge workers. Thus, the effective *N* for HR system is 28

Table 2 Results of cross-level analysis of effects of commitment-based HR systems and psychological contracts on role behaviors

Variable		Role behavior ^a						Psychological contract ^b	
		IRB			OCB			Relational	Transactional
		Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Intercept	γ_{00}	3.69**	3.71**	3.69**	3.63**	3.63**	2.84**	3.25**	2.83**
Commitment-based HR system	γ_{01}	0.43**		0.35**	0.48**		0.36**	0.47*	-0.23*
Relational psychological contract	γ_{10}		0.22**	0.19*		0.19*	0.18*		
Transactional psychological contract	γ_{20}		0.01	0.02		0.08	0.09		
	σ^2	0.08	0.06	0.06	0.16	0.11	0.11	0.26	0.20
	τ_{00}	0.02**	0.04**	0.03**	0.01	0.06**	0.02*	0.10**	0.06**

IRB in-role behavior, OCB organizational citizenship behavior

* $p < 0.05$; ** $p < 0.01$

^a Level-1: role behavior = $\beta_0 + \beta_1 \times (\text{relational psychological contract}) + \beta_2 \times (\text{transactional psychological contract}) + r$; Level-2: $\beta_0 = \gamma_{00} + \gamma_{01} \times (\text{commitment-based HR system}) + U_{00}$; $\beta_k = \gamma_{k0} + U_{k0}$ for $k = 1, 2$

^b Level-1: psychological contract = $\beta_0 + r$; Level-2: $\beta_0 = \gamma_{00} + \gamma_{01} \times (\text{commitment-based HR system}) + U_{00}$

commitment-based HR systems and in-role behaviors. Specifically, because transactional psychological contracts were not significant in Model 3, the effect of organizational commitment-based HR systems on knowledge workers' in-role behaviors could result from their relational psychological contracts. Thus, Hypothesis 3 is partially supported.

In order to examine Hypothesis 4, we first needed to confirm that both commitment-based HR systems ($\tau_{00} = 0.06, p < 0.01, ICC1 = 0.28; \gamma_{01} = 0.48, p < 0.01, R^2 = 0.85$) and psychological contracts (relational: $\gamma_{10} = 0.19, p < 0.05$; transactional: $\gamma_{20} = 0.08, p > 0.05; R^2 = 0.33$) have significant influences on OCBs. Since both of the preconditions were supported and commitment-based HR systems were also significantly related to psychological contracts, we could start to examine Hypothesis 4. Comparing Model 4 with Model 6 in Table 2, we found that the effect of commitment-based HR systems on OCBs dropped from 0.48 ($p < 0.01$) to 0.37 ($p < 0.01$), indicating that psychological contracts partially mediated the relationships between commitment-based HR systems and OCBs. In addition, according to the coefficients in Model 6, only relational psychological contracts were significantly associated with OCBs. Consequently, organizational commitment-based HR systems might also result from knowledge workers' relational psychological contracts influencing their OCBs, thus supporting Hypothesis 4.

Discussion

Our study contributes to both the human resource management and psychological contract literature in a number of ways. Research results indicated that commitment-based HR systems would be significantly and positively

associated with their in-role behaviors and OCBs, adding to our understanding of the relationship between HR systems and role behaviors. The results further indicated that relational psychological contracts mediate the relationship between commitment-based HR systems and role behaviors. In other words, when a firm adopts a commitment-based HR system concerning its knowledge workers, the knowledge workers might perceive that they have open-ended employment arrangements based upon mutual trust, thereby, are willing to perform higher level in-role behaviors and OCBs. This finding not only empirically supports Wright and Boswell's (2002) contention that psychological contracts can be best viewed as the linking mechanism between HR systems and employee behaviors, but also provides a possible explanation as to how a commitment-based HR system influences knowledge workers' role behaviors.

Our results also indicated that commitment-based HR systems could positively influence knowledge workers' relational psychological contracts and, in contrast, negatively influence their transactional psychological contracts. This finding contributes to our understanding of the influences of commitment-based HR systems on employees' beliefs concerning their own employment. Finally, we found that only relational psychological contracts were positively associated with in-role and extra-role behaviors. This finding not only contributes to our understanding of the impact of these contract forms on organizationally relevant outcomes, but is also beneficial for developing a deeper theoretical understanding of the nature of the psychological contracts (Hui et al. 2004).

The results did not support our hypothesis that transactional psychological contracts mediated the relationship between commitment-based HR systems and in-role behaviors. This was due to the absence of the significant

relationship between transactional psychological contracts and in-role behaviors. Since relational psychological contracts were highly correlated to transactional psychological contracts and the correlation between the relational psychological contracts and in-role behaviors was higher than the correlation between transactional psychological contracts and in-role behaviors, we doubt that the relationship between transactional psychological contracts and in-role behaviors might be suppressed by relational psychological contracts (Schwab 2005). In addition, the stronger correlation between commitment-based HR systems and in-role behaviors than the one between transactional psychological contracts and in-role behaviors might be another reason for the unsupported mediation effect of transactional psychological contracts.

Furthermore, the failure of finding the significant mediating effect of transactional psychological contracts in the relationship between commitment-based HR systems and in-role behaviors revealed the necessary reconsideration of the linkage among commitment-based HR systems, transactional psychological contracts, and in-role behaviors. More specifically, organizations need different types of HR systems to form knowledge workers' transactional psychological contracts and then to influence their in-role behaviors. For example, based on the value and uniqueness of human capital, Lepak and Snell's (1999, 2002) HR architecture divided employees into four different types, namely, knowledge-based employment, job-based employment, contract work, and alliance/partnership. In order to effectively and efficiently manage these employees, Lepak and Snell further proposed four corresponding HR configurations: commitment-based, productivity-based, compliance-based, and collaborative-based. Since our findings indicated that relational psychological contracts could link the relationship between commitment-based HR configurations and knowledge worker's role behaviors, transactional psychological contracts might link other types of employment relationships and HR configurations. Correspondingly, we suggest that future research explore the linking mechanism of other types of psychological contracts under the different types of employment modes and HR systems.

Our cross-sectional research design limits the extent to which cause-effect relations can be inferred from our findings. For example, it is intuitively plausible that organizations that adopt a commitment-based HR system might enhance their knowledge workers' OCBs. However, the cross-sectional design implies that we measured the commitment-based HR system after the OCBs period resulting in prediction of past OCBs. Future research that employs a longitudinal research design would be better suited to addressing the causal and mediated effects examined in this study. Lastly, obtaining data from a single industry raises

questions about the generalizability of our findings. Accordingly, we suggest that future research should obtain data from different industries in order to enhance external validity.

From a practical perspective, our findings suggest that commitment-based HR systems elicit a wide range of knowledge workers' behaviors that are beneficial to the goals of the firms. More specifically, employers could adopt more extensive and general skills training, as well as higher salaries and more extensive benefits (Arthur 1994) or sponsor career development; and mentoring programs (Lepak and Snell 1999) to encourage employees to perform in-role and extra-role behaviors. Since knowledge workers are treated as a core component of a firm's competitive advantages (Lepak and Snell 1999), employers could achieve competitive advantages by adopting these practices when managing their knowledge workers.

Our findings also provide insight into, how HR systems potentially elicit employees' role behaviors. That is, employees tend to have different focuses when performing in-role and extra-role behaviors. Employees who focus on economic terms tend to exhibit more in-role behaviors; on the other hand, those who focus more on socio-emotional terms tend to perform more extra-role behaviors. Accordingly, employers could elicit employees' in-role behaviors by providing financial and other non-financial, but tangible, inducements and facilitate employees' extra-role behaviors by providing positive experiences, such as respect, commitment, and support. Furthermore, we also suggest that employers who want to achieve a competitive advantage by enhancing knowledge workers' in-role behaviors could restructure their compensation structure. In contrast, for those employers who want to achieve competitive advantage by improving knowledge workers' extra-role behaviors, they could sponsor career development and mentoring programs in order to nurture and maximize knowledge workers' positive experiences.

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