




“Psychological contract, organizational commitment, and knowledge innovation: A perspective of open innovation”

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PSYCHOLOGICAL CONTRACT, ORGANIZATIONAL COMMITMENT, AND KNOWLEDGE INNOVATION: A PERSPECTIVE OF OPEN INNOVATION

Abstract

This paper explores the influence of employee perception of psychological contracts on knowledge innovation from the perspective of open innovation. The purpose is to explore internal factors affecting knowledge innovation through the construction of the SEM model and provide enterprise managers with scientific and effective management methods. The survey sample includes 312 technical and scientific research employees from 16 high-tech enterprises in China. This study adopts a quantitative research method and conducts a questionnaire survey through the subjective sampling method of improbability sampling. Through empirical analysis, the results show that a psychological contract has a significant positive effect on knowledge innovation. Among them, the relational psychological contract is more influential than the transactional one. The influence of the relational psychological contract on organizational commitment is extremely significant; the influence is more than 50%. It reflects the importance that employees attach to the employment relationship. However, the transactional psychological contract has no significant effect on organizational commitment, and organizational commitment plays a partial mediating role. Therefore, enterprises should focus on building mutual trust and friendly employment relationships and implement targeted management strategies and incentives for employees to enhance their ability of knowledge innovation.

Keywords

employees, management, psychological contract,
relationship, transactions, affective, commitment,
impact, innovation

JEL Classification

O15, O36

INTRODUCTION

Under the influence of economic globalization, technological change, resource sharing, and internationalization of strategic demands, the innovation model of modern enterprises has also undergone great changes. Compared with the traditional closed innovation model, open innovation creates an innovation model. The biggest characteristic of open innovation is that knowledge innovation is not only generated inside the enterprise but also can bring equally important innovation to the enterprise from the outside (Chesbrough, 2003). Open knowledge innovation refers to a social process of coordination and interaction between individuals and organizations with different backgrounds, resources, perceptions, and insights. In this process, the importance of individual members in the organization is emphasized, and individuals are considered important driving forces in the process of creating organizational knowledge (Gassmann et al., 2010). The essence of innovation is a complex system in which individuals interact with the external environment (Amabile, 1983). Ramamoorth et al. (2005) found that the creativity of team members is related to the perception of the psychological contract. In the relationship between

enterprises and employees, in addition to the provisions of the written contract, there are also various implicit, informal and unstated mutual understanding and expectations, namely the “psychological contract”, which also has a significant impact on employee performance, job satisfaction and emotional investment in the enterprise. Individual perception of “insecurity” is a result of employees’ innovation willingness drop, and it is closely related to the imbalance in the “psychological contract”. Good psychological contract can effectively reduce both sides of insecurity, and it is advantageous for the organization in a more flexible way: put the lies in the individual tacit knowledge of activation, and make it fully shared and flow freely within the organization. Its dynamism is to satisfy the psychological needs of employees at higher levels and promote knowledge innovation. Therefore, it is vital to find a close relationship between the psychological contract and knowledge innovation and using the theory of the psychological contract improve employment relationships between enterprises and employees. The use of the psychological contract provides theoretical guidance to further motivate employees’ knowledge innovation to achieve the sustainable development of enterprise, and improve enterprise core competitiveness.

In addition, organizational commitment expresses a psychological state of an employee towards the organization, which can effectively predict work behavior, job performance, and loyalty of employees (Mowday, 1979). Organizational commitment refers to the employee attachment to the organization, involvement in work, and expression of self-responsibility. Cambra et al. (2011) found that organizational belonging promotes knowledge innovation.

Therefore, from the perspective of open innovation, this study explores the relationship between employees’ perception of the psychological contract and the promotion of employees’ knowledge innovation and explores the influence path of employees’ perception of the psychological contract on knowledge innovation by constructing the SEM model. To further explain its internal mechanism, this study takes “organizational commitment” as the mediating variable to explore whether organizational commitment can directly or indirectly affect employee knowledge innovation. It provides a theoretical basis and practical guidance for modern enterprises to promote employee knowledge innovation.

1. LITERATURE REVIEW

1.1. Psychological contract and knowledge innovation

Psychological contract refers to the contract generated by employees’ understanding of organizational responsibilities and obligations as well as the commitment perceived from the expression or implication of organizational agents. It includes two aspects: transactional psychological contract (employees’ perception of economic, material, and developmental responsibilities and obligations provided by the organization) and relational psychological contract (employees’ perception of long-term stable relationship with the organization) (Rousseau, 1998).

Knowledge innovation refers to the process in which an organization combines the inherent knowledge with the acquired new knowledge through four stages of socialization, externali-

zation, combination, and internalization to enhance enterprise value (Bo & Tian, 2019). SECI theory expounds the complete process of knowledge innovation, including knowledge production, knowledge transfer, and knowledge re-creation, and points out the influence of individuals on knowledge innovation (Nonaka, 1994). From the point of view of the knowledge innovation process, it includes the formation of individual cognition and concept as well as the generation of conception. Implemented on the practice innovation conception finally forms the new knowledge innovation. By strengthening individual perception, individuals can be promoted to participate in innovation activities at any stage and at any time (Scott & Bruce, 1994).

Flood et al. (2001) found the psychological contract between the knowledge worker and the employer will determine whether the source of innovation and creativity is unleashed. Employees’ perception of psychological contract directly affects their willingness

to innovate. The perception of psychological contract implies employees' expectations and understanding of the organization, which will ultimately be reflected in their willingness to invest in their work. For example, if employees believe that the organization has fulfilled its commitments, they will be more willing to share, diffuse, and re-innovate knowledge. Ramamoorth et al. (2005) put forward that the creativity of team members is significantly correlated with the psychological contract; the mechanism of psychological contract influencing knowledge innovation is that psychological contract can promote individuals' strong willingness to share and spread knowledge, thus promoting knowledge innovation. Kiazad et al. (2014) further confirmed the relationship between psychological contract and innovation. Employees' perception of psychological contract and their own resources affect individual innovation motivation. The perception of the psychological contract in transactions can maintain a relatively balanced and stable exchange relationship between enterprises and knowledge workers. Developing the perception of the psychological contract can stimulate employees' extra-role behaviors, and standardizing the perception of the psychological contract can promote the improvement of employees' innovation self-efficacy. The basic idea to realize the dynamic management of the psychological contract is to realize the full, effective and timely transmission of the mutual needs and expectations between the organization and the employees, to keep the dynamic balance of the psychological contract, and then drive the employees' extra-role behaviors (such as knowledge sharing and innovation). Dai and Wang (2016) also found that a balanced psychological contract was positively correlated with employees' willingness to share tacit knowledge. Therefore, when the perceived level of psychological contract is high, the higher the employee's trust in the organization is, the better the organizational innovation atmosphere is likely to be perceived by the employee, such as innovation autonomy, team cooperation, organizational motivation, etc., thus promoting knowledge innovation (Önhon, 2019).

1.2. Psychological contract and organizational commitment

Organizational commitment is a psychological state that reflects the relationship between employees and the organization and implies the decision of em-

ployees to stay in the organization or not (Meyer et al., 1993). It includes three dimensions: emotional commitment, which reflects the emotional attachment, identification and investment of employees to the organization; normative commitment, which reflects the commitment of employees to stay in the enterprise based on self-moral constraints, social responsibilities and obligations; continuous commitment, which is a commitment that employees retain in the organization based on self-interest trade-offs (Meyer et al., 1993). The degree of psychological contract fulfillment has an important effect on organizational commitment.

There are two sides to the study of the psychological contract in academic circles, namely perception and violation of the psychological contract. Freese and Schalk (1996) found that the higher employees' perceived level of "organizational responsibility", the higher their commitment to the organization. However, Kickul and Lester (2001) found that psychological contract breach reduces organizational commitment, especially affective commitment. Turnley and Feldman (1999b) found a negative correlation between psychological contract breach and organizational commitment. Wong et al. (2002) used Chinese employees as research objects to verify the impact of psychological contract on organizational commitment. The transactional psychological contract has a significant negative correlation with organizational commitment and has the greatest impact on continuous commitment. The relational psychological contract has a significant positive correlation with organizational commitment and has the greatest impact on affective commitment, and the impact of the relational psychological contract is more significant than that of the transactional psychological contract. Therefore, the perception of psychological contract is the internal root of organizational commitment (Rousseau et al., 2018). The perception of psychological contract influences the decision of employees to stay in the organization and changes the degree of emotional dependence and investment on the organization.

1.3. Organizational commitment and knowledge innovation

A large number of academic studies have proved that organizational belonging, organizational identity, and emotional attachment have a positive

impact on employees' creativity. Eisenberg et al. (1990) studied 422 steel technicians and research staff and found that the higher the employee's emotional commitment, the higher the employee's innovation tendency. Nazir et al. (2018) showed that affective commitment helps to promote employee knowledge sharing and knowledge innovation. Therefore, organizational commitment can promote employees' perception of organizational innovation atmosphere, which is conducive to employees' knowledge sharing and promote knowledge innovation. Battistelli et al. (2019) supported this point of view. Through a questionnaire survey of 756 employees in military organizations, it was found that organizational commitment of employees has a positive impact on employees' innovation performance. Organizational commitment can enhance employee loyalty and promote knowledge and skill learning. This in turn improves innovation performance. Bo and Tian (2019) also confirmed that organizational learning and shared vision have a significant promoting effect on knowledge innovation. Therefore, organizational commitment promotes knowledge exchange and diffusion among employees, drives innovation willingness of employees, and promotes knowledge innovation.

1.4. Mediating role of organizational commitment

The generation of knowledge innovation is influenced by internal and external factors of individuals, among which organizational and individual factors are the most critical. Employees' sense of belonging and identity to the organization can effectively stimulate employees' organizational citizenship behavior and dedication (Cambra-Fierro et al., 2011). When the level of psychological contract perception is high (that is when the degree of fulfillment of "the responsibility of the organization to the employees" perceived by the employee is high), the employee will identify with, believe in, attach to and serve the organization from the bottom of his heart, consequently he will be willing to innovate for the organization (Freese & Schalk, 1996). Organizational commitment enhances employees' strong sense of mission and responsibility to the organization, which closely links psychological contract perception with employees' innovation motivation (Bo & Tian, 2019). Through the literature review and the demonstra-

tion of the relationship between various variables, it can be found that organizational commitment plays a mediating role between the psychological contract and knowledge innovation.

2. AIMS AND HYPOTHESES

The purpose of this study is to explore the effects of psychological contract and organizational commitment on knowledge innovation, explain the effects of different types of psychological contract and organizational commitment on knowledge innovation, and put forward the following hypotheses:

Ha: Psychological contract has a positive effect on knowledge innovation.

Ha1: Psychological contract has a positive effect on knowledge innovation.

Ha2: Relational psychological contract has a positive effect on knowledge innovation.

Hb: Psychological contract has a positive effect on organizational commitment.

Hb1: Transaction dimension has a positive effect on affective commitment.

Hb2: Transaction dimension has a positive effect on continuous commitment.

Hb3: Transaction dimension has a positive effect on normative commitment.

Hb4: Relationship dimension has a positive effect on affective commitment.

Hb5: Relationship dimension has a positive effect on continuous commitment.

Hb6: Relationship dimensions have a positive effect on normative commitment.

Hc: Organizational commitment has a positive impact on knowledge innovation.

Hc1: Affective commitment has a positive effect on knowledge innovation.

Hc2: Continuous commitment has a positive effect on knowledge innovation.

Hc3: Normative commitment has a positive effect on knowledge innovation.

Hd: Organizational commitment plays a mediating role in the relationship between psychological contract and knowledge innovation.

Hd1: Affective commitment plays a mediating role in the impact of transaction dimension on knowledge innovation.

Hd2: Affective commitment plays a mediating role in the influence of the relational dimension on knowledge innovation.

Hd3: Continuous commitment plays a mediating role in the impact of transaction dimension on knowledge innovation.

Hd4: Continuous commitment plays a mediating role in the influence of the relational dimension on knowledge innovation.

Hd5: Normative commitment plays a mediating role in the impact of transaction dimension on knowledge innovation.

Hd6: Normative commitment plays a mediating role in the influence of the relational dimension on knowledge innovation.

This study uses deductive reasoning to develop theoretical positions, then empirically support or reject the hypotheses. Therefore, the test hypotheses proposed in this study can be divided into two categories. The first ones are the confirmatory hypotheses, which have been studied by scholars and verified or partially verified in a specific context. The correlation between the psychological contract and organizational commitment has been proved by predecessors. Therefore, *Ha* and *Hb* are confirmatory hypotheses. The other type is exploratory hypotheses, which have been proposed by some scholars but have not been empirically studied. As a mediating variable, organizational commitment has not been empirically analyzed on the impact of psychological contract perception on knowledge innovation. Hence, *Hc* and *Hd* are exploratory hypotheses. Referring to Turnley and Feldman (1999a) proposed a dynamic model of the psychological contract; it indicates that the psychological contract would affect employees' behavior, among which organizational practices and individual traits played a mediating role (Allen & Meyer, 1990). This conceptual model is shown in Figure 1.

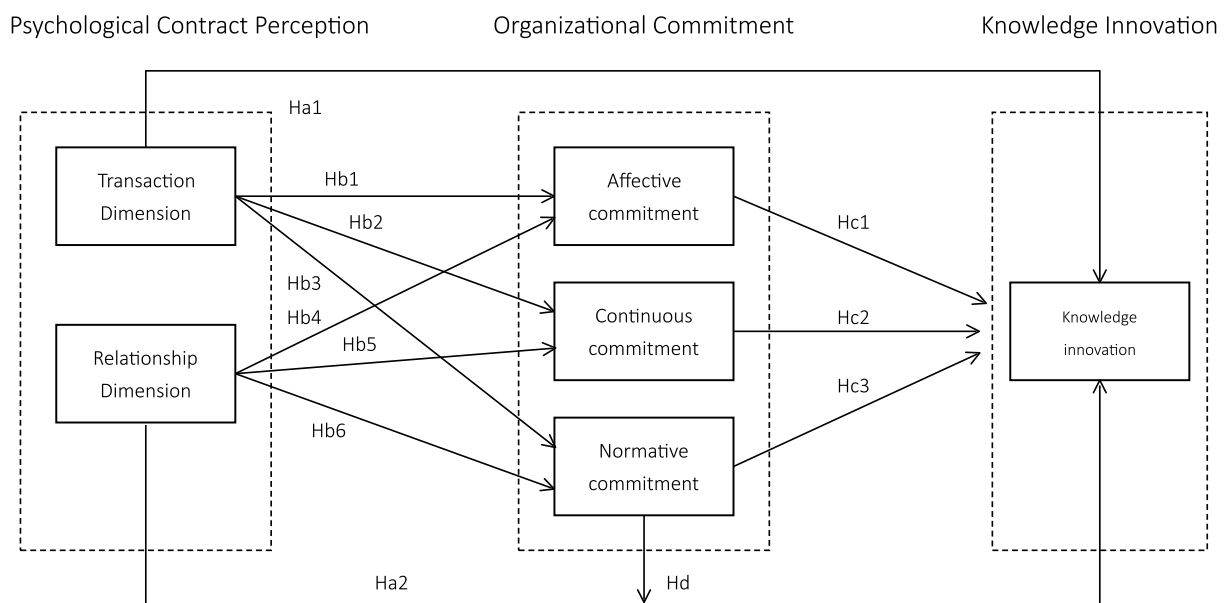


Figure 1. The conceptual framework

3. METHODOLOGY

This study adopts the literature method, questionnaire survey method, and statistical analysis method, mainly using SPSS21.0 and AMOS21.0. In this study, SPSS was used for internal consistency analysis to test the reliability of the questionnaire. AMOS was used to conduct confirmatory factor analysis to verify the validity of the questionnaire and to construct the SEM model to test the relationship between variables and the mediating effect of organizational commitment.

In this study, 312 R&D and technical personnel of 16 high-tech enterprises were selected as the research objects. The survey scope was mainly distributed in Central China, North China, South China, and other regions. The questionnaire survey was carried out in three ways using the non-probability sampling method: 1. The questionnaire was distributed on the spot, and the survey was carried out on the spot in the enterprise training class; 2. Classmates, friends, and relatives were invited to carry out investigations in their units; 3. Online survey was conducted through the network link questionnaire. 400 questionnaires were sent out, 380 questionnaires were collected and 312 valid answers were received, with an overall effective rate of 78%.

The items in the questionnaire were evaluated by using a five-scale Likert scale (from 1 = strongly disagree to 5 = strongly agree). 28 items were used to measure 3 potential variables in this study (Table 2). Then, based on a large range of predictive tests, through the corrected item-total correlation (CITC) and reliability analysis, KMO and Bartlett's test and exploratory factor analysis, formative measurement scale of psychological contract perception, organizational commitment, and knowledge innovation was formed.

A. Perception of psychological contract

Reference to Rousseau's scale, the perception scale of psychological contract can be divided into two dimensions: the transaction dimension (TR) has 5 items, the relationship dimension (RE) has 4 items (Rousseau et al., 2018). There are 9 items in total. The higher the score, the better the employee perceives the performance of the psychological con-

tract. Through reliability analysis, Cronbach's alpha of the scale is greater than 0.8, indicating high reliability of the scale (Table 3).

B. Organizational commitment

According to Allen's scale, the organizational commitment scale has three dimensions: affective commitment (AF), continuous commitment (CO), and normative commitment (NA) (Allen & Meyer, 1999), there are 12 items in total. The higher the score, the more committed the employee is to the organization. Cronbach's alpha exceeds 0.8, indicating high reliability (Table 3).

C. Knowledge innovation

According to Wang's scale, it was revised (Wang & Wang, 2012). Knowledge innovation (KI) is determined as 7 items. After prediction, it is confirmed that the scale has good reliability and validity. The higher the score is, the more knowledge innovation is, and the higher reliability of the scale shows that Cronbach's alpha exceeds 0.8 (Table 3).

4. RESULTS

In this study, SPSS was used to sort out the data and analyze the samples. Firstly, descriptive statistical analysis was conducted on the samples. Then, reliability and validity analysis was conducted on the questionnaire. Next, AMOS was used to construct SEM to test the relationship between variables and verify the hypotheses. Finally, the reasons affecting the relationship between the variables were revealed, results were analyzed a scientific solution was found.

Among 312 valid samples, 51.6% were male and 48.4% female; in age, 27.2% were 25 years old or below, 36.5% were 26-35 years old, 28.5% were 35-45 years old, 7.7% were 45 years old or above; in educational background, 23.4% were high school or below. In terms of work experience, 18.7% have been working for 3 years or less, 26.3% have been working for 4-8 years, 14.4% have been working for 9-15 years, and 10.6% have been working for 16 years or more. In terms of enterprise nature, state-owned enterprises account for 23.7%, and private enterprises account for 35.3%. Foreign invest-

Table 1. Demographics

Indicators	Category	Frequency	Percent
Gender	Male	161	51.6
	Female	151	48.4
Age	Less than 25 years	85	27.2
	26-35 years	114	36.5
	36-44 years	89	28.5
	Over 45 years	24	7.7
Level of education	High school	43	13.8
	University	146	46.8
	Graduate student	123	39.4
Work experience	Less than 3	152	48.7
	4-8 years	82	26.3
	9-15 years	45	14.4
	Over 16 years	33	10.6
Nature of enterprise	State-owned enterprises	74	23.7
	Private	110	35.3
	Foreign investment/joint venture	98	31.4
	The other	30	9.6

ment/joint venture accounts for 31.4%, and other accounts for 9.6%, indicating the diversity and representativeness of the samples.

SPSS21.0 was used to conduct descriptive statistical analysis on the six variables in this paper. As shown in Table 2, $N = 312$, the lowest and highest values were between 1 and 5, all the mean values were higher than 3, and the standard deviations were all greater than 0.7, indicating that the sample size of this study was sufficient, the samples are widely distributed and the sampling method is scientific and reasonable.

As seen from Table 3, the Cronbach's alpha coefficient of all potential variables is greater than 0.8. This indicates that the internal consistency of each questionnaire item is very high and each questionnaire item can measure each latent variable well. Therefore, a questionnaire can be used as a research tool in this study. The corrected item-total correlation (CITC) is between 0.6 and 0.8, indicating that each item in the questionnaire is reasonably set. Values of Cronbach's alpha if Item Deleted were all

above 0.8, which indicates that the reliability of the questionnaire was not improved after the deletion of one variable, the reliability of the questionnaire was good and the measurement questions of each latent variable had good reliability.

A. Confirmatory factor analysis

As shown in Table 4, KMO is 0.908, Bartlett's test is 5186.030, and $P < 0.001$, so it is suitable for factor analysis. In this study, principal component analysis was used to extract factors with eigenvalues greater than 1. Six common factors were extracted, and the cumulative sum of squares of rotation was 68.94%, greater than 60%. After rotation by the orthogonal rotation method, 28 question options can be classified into 6 types of factors, and a load of each item is higher than 0.5, which implies that the extracted 6 factors contain comprehensive information, and there is no high load of both double factors. The observed variables are aggregated into each dimension following the theoretical preset. Based on this analysis, the scale in this paper has good construct validity.

Table 2. Descriptive statistical analysis

Variable	N	Minimum	Maximum	Mean	Std. Deviation
TR	312	1	5	3.84	0.87
RE	312	1.25	5	3.76	0.91
AF	312	1	5	3.69	0.79
CO	312	1	5	3.38	1.02
NA	312	1.25	5	3.05	0.76
KI	312	1	5	3.78	0.83

Table 3. Reliability analysis

Variable	Corrected item-total correlation	Cronbach's alpha if Item Deleted	Cronbach's alpha
TR1	0.751	0.873	0.897
TR2	0.692	0.886	
TR3	0.710	0.882	
TR4	0.745	0.875	
TR5	0.837	0.854	
RE1	0.681	0.813	0.850
RE2	0.681	0.813	
RE3	0.680	0.813	
RE4	0.715	0.799	
AF1	0.733	0.819	0.864
AF2	0.645	0.854	
AF3	0.707	0.830	
AF4	0.772	0.802	
CO1	0.743	0.802	0.858
CO2	0.646	0.841	
CO3	0.668	0.833	
CO4	0.756	0.796	
NA1	0.741	0.844	0.879
NA2	0.738	0.845	
NA3	0.666	0.872	
NA4	0.810	0.815	
KI1	0.652	0.874	0.887
KI2	0.680	0.870	
KI3	0.669	0.872	
KI4	0.647	0.874	
KI5	0.694	0.869	
KI6	0.702	0.868	
KI7	0.705	0.867	

Table 4. Validity analysis

Variable	Component					
	1	2	3	4	5	6
TR1		0.818				
TR2		0.801				
TR3		0.779				
TR4		0.811				
TR5		0.876				
RE1					0.716	
RE2					0.753	
RE3					0.746	
RE4					0.745	
AF1				0.800		
AF2				0.767		
AF3				0.777		
AF4				0.816		
CO1						0.734
CO2						0.785
CO3						0.703
CO4						0.765
NA1			0.788			
NA2			0.816			
NA3			0.742			
NA4			0.850			
KI1	0.665					
KI2	0.703					
KI3	0.678					
KI4	0.602					
KI5	0.762					
KI6	0.667					
KI7	0.709					
Total	10.014	2.885	1.984	1.681	1.412	1.327
Cumulative %	14.718	27.737	38.651	49.239	59.17	68.94
KMO				0.908		
Bartlett's Test				5186.30	($P < 0.001$)	

Table 5. Confirmatory factor analysis

The path			Estimate	S.E.	C.R.	P	CR	AVE
TR5	←	TR	0.909					
TR4	←	TR	0.766	0.056	16.941	***	0.899	0.641
TR3	←	TR	0.778	0.047	17.415	***		
TR2	←	TR	0.733	0.052	15.763	***		
TR1	←	TR	0.806	0.049	18.486	***		
AF4	←	AF	0.869					
AF3	←	AF	0.755	0.054	15.066	***	0.866	0.619
AF2	←	AF	0.685	0.055	13.201	***		
AF1	←	AF	0.825	0.056	16.92	***		
CO4	←	CO	0.902					
CO3	←	CO	0.699	0.051	14.276	***	0.881	0.651
CO2	←	CO	0.818	0.047	18.18	***		
CO1	←	CO	0.794	0.051	17.37	***		
RE4	←	RE	0.799					
RE3	←	RE	0.753	0.069	13.564	***	0.850	0.587
RE2	←	RE	0.749	0.072	13.479	***		
RE1	←	RE	0.763	0.07	13.777	***		
NA4	←	NA	0.844					
NA3	←	NA	0.726	0.063	14.02	***	0.859	0.606
NA2	←	NA	0.684	0.059	12.977	***		
NA1	←	NA	0.846	0.063	17.04	***		
KI7	←	KI	0.753					
KI6	←	KI	0.75	0.071	13.273	***	0.887	0.529
KI5	←	KI	0.729	0.075	12.867	***		
KI4	←	KI	0.708	0.075	12.468	***		
KI3	←	KI	0.721	0.07	12.718	***		
KI2	←	KI	0.727	0.073	12.83	***		
KI1	←	KI	0.701	0.074	12.332	***		

Table 6. Discriminant validity analysis

Variable	TR	RE	AF	CO	NA	KI
TR	0.800					
RE	330 ** *1	0.766				
AF	186 **	408 **	0.787			
CO	354 **	512 **	437 **	0.778		
NA	238 **	460 **	352 **	366 **	0.806	
KI	363 **	584 **	491 **	585 **	509 **	0.727

Note: *** means $p < 0.001$; ** means $p < 0.05$; and * means $p < 0.1$.

B. Exploratory factor analysis

Table 5, Table 6, and Figure 2 show that the standardized factor loaded of each item is greater than 0.5, manifesting that each item can well explain its dimension. The combined reliability CR is greater than 0.7, indicating that all the test terms in each latent variable can consistently explain the latent variable. The Average Variance Extracted (AVE) of each dimension is greater than 0.5, and the square root of AVE is greater than the correlation coefficient of each dimension, indicating that the scale has good convergent validity and discriminant validity.

Table 7 shows $\chi^2/df = 1.796$, indicating good model fitting. GFI = 0.885, AGFI = 0.860, and NFI = 0.888, indicating high model fitness. TLI = 0.940, CFI = 0.946, and RMSEA = 0.051, indicating that the data fit the model completely. In summary, it shows that all indicators of the exploratory factor analysis in this study have reached the standard, and the overall fitting degree of the model is good. The established model can effectively measure the relevant latent variables.

According to the conceptual framework (Figure 1), the structural equation model was established

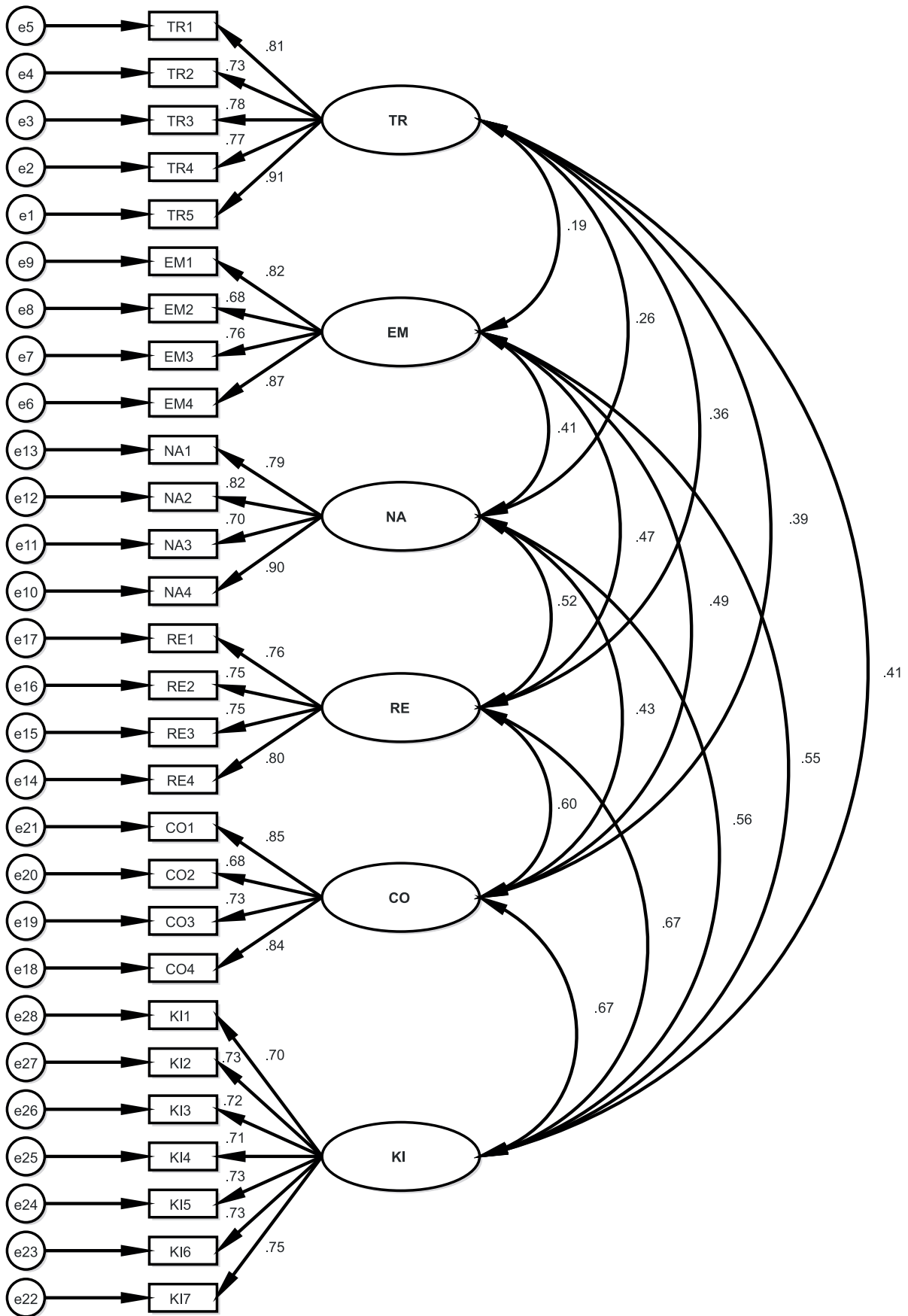


Figure 2. Confirmatory factor analysis model

Table 7. Model fit index

Index	χ^2/df	RMR	GFI	AGFI	NFI	TLI	CFI	RMSEA
Statistical value	1.796	0.042	0.885	0.86	0.888	0.940	0.946	0.051
Reference value	<3	<0.05	>0.8	>0.8	>0.8	>0.9	>0.9	<0.08
Up to standard	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

by AMOS21.0 with transaction dimension (TR) and relationship dimension (RE) as independent variables; affective commitment (AF), continuous commitment (CO), and normative commitment (NA) as mediating variables; and knowledge innovation (KI) as dependent variable (Figure 3).

As shown in Table 8, if the P value is less than 0.05, the hypothesis is valid; but if it is more than 0.05, the hypothesis is not supported. Psychological contract has a significant positive impact on knowledge innovation, and *Ha1* and *Ha2* are verified ($\beta = 0.110, p = 0.027 < 0.05; \beta = 0.286, p < 0.001$). However, transactional psychological contract has no significant effect on affective commitment and normative commitment. Therefore, *Hb1* and *Hb3* are not supported ($\beta = 0.015, p = 0.804 > 0.05$). *Hb2, Hb4, Hb5, and Hb6* are supported. Organizational commitment has a significant

positive effect on knowledge innovation. *Hc1-Hc3* are confirmed ($\beta = 0.184, p < 0.001; \beta = 0.285, p < 0.001; \beta = 0.189, p < 0.001$). By observing the path coefficient of each path, the path coefficient from transaction dimension to knowledge innovation is 0.110, while the path coefficient from relationship dimension to knowledge innovation is 0.286. Therefore, the relationship dimension has a greater impact on knowledge innovation than the transaction dimension. It is worth emphasizing that both relational dimension and organizational commitment coefficient are more than 0.5, indicating that relational dimension has a great influence on organizational commitment. In addition, the path coefficient from continuous commitment to knowledge innovation is 0.285, which is significantly higher than affective commitment ($\beta = 0.189$) and specification commitment ($\beta = 0.184$).

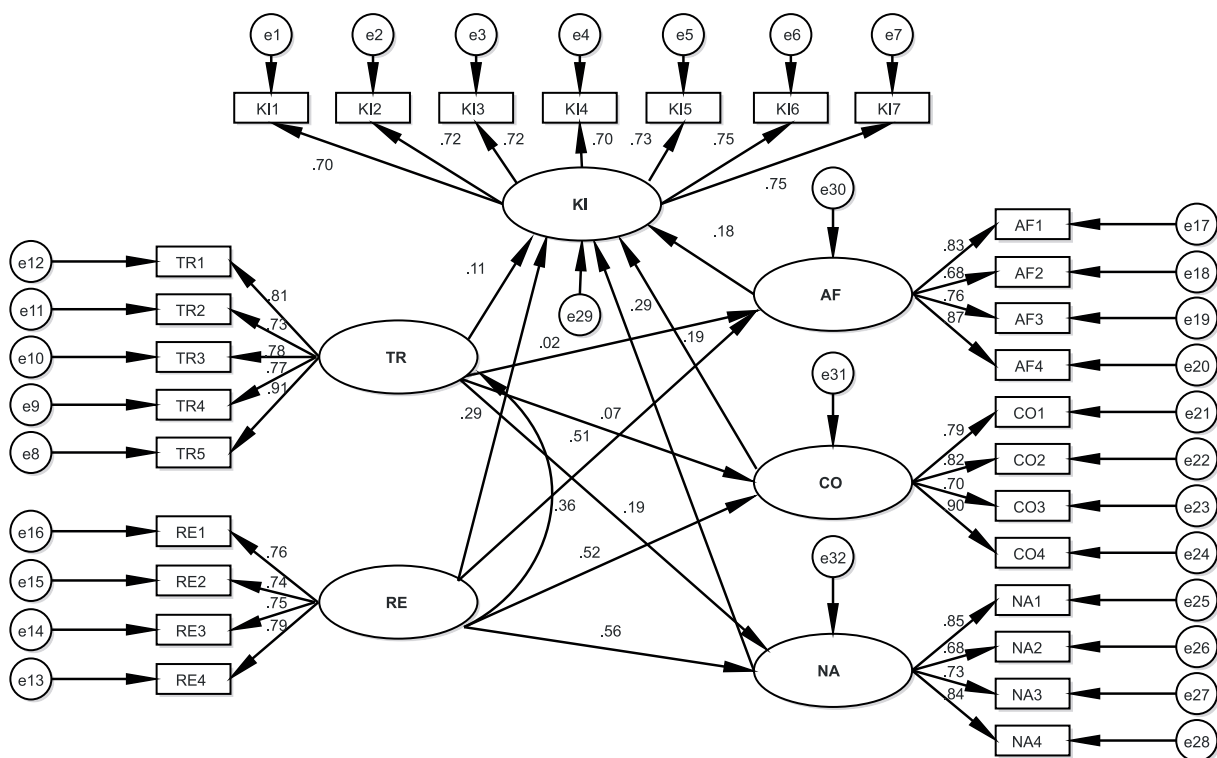


Figure 3. Structural model of the study

Table 8. Path coefficient analysis of the structural equation

The path			Estimate	S.E.	C.R.	P	Results
AF	←	TR	0.015	0.061	0.249	0.804	Not Supported
NA	←	TR	0.072	0.055	1.197	0.231	Not Supported
CO	←	TR	0.192	0.054	3.340	***1	Supported
AF	←	RE	0.508	0.094	7.243	***	Supported
NA	←	RE	0.518	0.087	7.465	***	Supported
CO	←	RE	0.561	0.085	8.485	***	Supported
KI	←	TR	0.110	0.033	2.209	0.027	Supported
KI	←	RE	0.286	0.076	3.396	***	Supported
KI	←	NA	0.189	0.041	3.312	***	Supported
KI	←	AF	0.184	0.038	3.295	***	Supported
KI	←	CO	0.285	0.047	4.223	***	Supported

Note: *** means $p < 0.001$; ** means $p < 0.05$; and * means $p < 0.1$.

Table 9. Mediating effect analysis

The path	Estimate	Lower	Upper	P	Results
RE-AF-KI	0.094	0.038	0.156	0.001	Supported
TR-AF-KI	0.003	0.018	0.029	0.798	Not Supported
RE-CO-KI	0.160	0.087	0.240	0.000	Supported
TR-CO-KI	0.055	0.021	0.097	0.001	Supported
RE-NA-KI	0.098	0.034	0.164	0.004	Supported
TR-NA-KI	0.014	0.009	0.046	0.239	Not Supported

The Bootstrap method was used to test the mediating effect, and 5,000 samples were repeated to calculate the 95% confidence interval. As can be seen from Table 9, there were 6 mediating paths, the upper and lower intervals of the mediating paths did not contain 0, and the P value was less than the significance level of 0.05. Therefore, the hypothesis was established and the mediating effect was established. The upper and lower intervals of the mediating path contain 0, and the P value is greater than the significance level of 0.05, so the hypothesis is not supported and the mediating effect does not exist.

As can be seen from the results in Table 9, there are 6 mediating paths, of which four hypotheses are supported (RE-AF-KI, RE-CO-KI; TR-CO-KI; RE-NA-KI) and two hypotheses are not supported (TR-AF-KI; TR-NA-KI). Therefore, affective commitment and normative commitment have no mediating effect on the relationship between psychological contract and knowledge innovation, *Hd1*, *Hd3-Hd5* are supported. *Hd2* and *Hd6* are not supported. By observing the mediation path coefficient, the mediating effect of continuous commitment on the relationship between the relational dimension and knowledge innovation is the

largest ($\beta = 0.160$, $p < 0.001$), which is significantly larger than the other paths coefficient.

5. DISCUSSION

The results show that transactional and relational psychological contracts both have significant positive effects on knowledge innovation. Among them, the relational psychological contract is more influential than the transactional one. This indicates that, compared with employees' expectations of remuneration, benefits, etc., employees expect the company to commit to the stability of the relationship between the employer and the employee. This conclusion also reflects that technical personnel and scientific research workers' pay more attention to the long-term development of the enterprise, and good interpersonal communication, relationship trust, sharing, and cooperative enterprise culture can better stimulate the knowledge innovation of skilled and knowledge-based employees.

However, the results of this study found that transactional psychological contract had a significant positive effect on continuous commitment,

but had no significant effect on affective and normative commitment. This result partly supports Allen and Meyer (1990). If employees attach more importance to the transactional psychological contract, they will pay more attention to short-term economic gains, so they have no intention to stay in the organization in the long term and have no emotional attachment to the organization. This kind of employee pays more attention to the balance between pay and income, less emotional attachment to the enterprise, so employee loyalty is low. For this kind of employee, the enterprise commitment and encouragement of material implementation effectively stimulate innovation ability.

In addition, this study also found that the relational psychological contract has a significant influence on organizational commitment, with the influence reaching more than 50%. The results

show that a good employment relationship can promote employee identity, emotional attachment, and sense of belonging to the organization, and can effectively improve employee loyalty.

Exploratory analysis was used to examine the mediating effect of organizational commitment. The results show that organizational commitment plays a partial mediating role, and affective commitment and normative commitment have no significant mediating effect on the relationship between the transactional psychological contract and knowledge innovation. This conclusion shows that if employees have higher expectations for material things such as compensation and benefits, they are more inclined to short-term transactions and have a higher turnover rate. Therefore, such employees do not have much emotional attachment to the organization and a sense of responsibility to the enterprise, and their loyalty is low.

CONCLUSION

The purpose of this study is to explore the internal influence mechanism and path of psychological contract on knowledge innovation by constructing the SEM model, promote enterprises to pay attention on employee relationship management and provide theoretical reference and practical guidance for enterprise management practice.

The empirical results show that employee' perception of the psychological contract has a significant positive effect on knowledge innovation. Among them, the relational psychological contract is more significant. Organizational commitment has some significant positive effects on knowledge innovation. Organizational commitment plays a partial mediating role in the relationship between psychological contract and knowledge innovation.

Based on the results, this study puts forward the following three suggestions for enterprises. First – design an incentive system that meets the “deep-seated needs” to promote the innovative behaviors of employees with different types of psychological contract perception. Second – a more reasonable and perfect compensation system of salary and benefits should be established to reduce employees' short-term behaviors and avoid the risk of loss of core knowledge due to resignation. Third – create a corporate culture atmosphere of trust and sharing, build a harmonious relationship to form a corporate culture system of harmony and unity between individual values and corporate values, enhance employees' sense of belonging and responsibility to the organization, promote the integration of personal values and corporate values, and guide employees to make voluntary contributions to the enterprise.

AUTHOR CONTRIBUTIONS

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