

# Study on the Relationship Between Personality and Knowledge Sharing Behavior Based on Moderating Knowledge Governance Situation

Estudio sobre la relación entre la personalidad y el comportamiento de intercambio de conocimientos basado en la moderación de la situación de gobernanza del conocimiento

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## ABSTRACT

In an organization, people's knowledge sharing behavior is not only related to their personality traits but also regulated by the knowledge governance situation of their organizations. This paper demonstrates the intrinsic relationship between the big five personalities, the knowledge sharing the behaviour of the organization and the situation of knowledge governance, establishes a construct model of the big five personalities as the independent variable, the knowledge sharing behavior as the dependent variable and the knowledge governance situation as the moderator variable. The questionnaire was used to collect the scale data and the HLM model was used to test the relevant hypotheses. The results show that different personality traits have different correlations with knowledge sharing behavior, and knowledge governance situation has a moderating effect on the relationship between personality traits and knowledge sharing behavior.

**Keywords:** Personality Traits; Knowledge Governance Situation; Knowledge Sharing Behavior; HLM

## RESUMEN

En una organización, el comportamiento de intercambio de conocimiento de las personas no solo está relacionado con sus rasgos de personalidad, sino que también está regulado por la situación de gobernanza del conocimiento de sus organizaciones. Este artículo demuestra la relación intrínseca entre las cinco grandes personalidades, el conocimiento que comparte el comportamiento de la organización y la situación de la gobernanza del conocimiento, establece un modelo constructivo de las cinco grandes personalidades como la variable independiente, el comportamiento del intercambio de conocimiento como la variable dependiente y La situación de gobernanza del conocimiento como variable moderadora. El cuestionario se usó para recolectar los datos de la escala y el modelo HLM se usó para probar las hipótesis relevantes. Los resultados muestran que diferentes rasgos de personalidad tienen diferentes correlaciones con el comportamiento de intercambio de conocimiento, y la situación de gobernanza del conocimiento tiene un efecto moderador en la relación entre los rasgos de personalidad y el comportamiento de intercambio de conocimiento.

**Palabras clave:** Rasgos de personalidad; Situación de gobernanza del conocimiento; Comportamiento de intercambio de conocimientos; HLM

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## Introduction

Knowledge sharing has become one of the basic current organizational behaviors, and good sharing behavior is a key indicator for measuring the effect or level of knowledge management. As individual members of the organization vary in personalities and behaviors, the knowledge sharing of different personalities within the organization or between organizations varies accordingly. Therefore, how personal traits influence people's knowledge sharing? Besides, as there are always differences between organizations in terms of their sizes, functions and content, thus the questions are: what are the knowledge governance patterns for an organization? And how the knowledge governance patterns are influencing the behavior of knowledge sharing?

This study focuses on how the different individual personal traits are influencing the knowledge sharing behavior based on the sample of Chinese company personnel. And by introducing the knowledge governance variable at an organizational level, the study also explores the interaction between the variable and individual personal traits and how the interaction influences company personnel's knowledge sharing. [1,2,3,4]

### 1. Literature review

The research conducted by Costa (1992) shows that personnel's individual personal traits influence personal sharing or knowledge storage, while personal trait is one critical dimension of individual traits; thus, Costa presumes that individual personal traits also influence the individual's knowledge sharing behavior. [5,6,7,8,9,10]

Personality is the individual's intrinsic endowment, long promoting the consistency of individual behaviors, decided by the individual's psychology, resulted from the interaction between individual's innate characteristics and growth process, and having stableness to some extent. Currently, the Big Five Personality traits, also known as the FFM, are widely accepted, and the personal trait has become an important variable in the personnel behavior research. Moreover, as indicated in the research conducted by Gupta (2008) on the relationship between the individual personality and the individual's knowledge sharing and receiving behavior, knowledge sharing and reception vary according to different personalities in the Western cultural environment.

The Five-Factor Model of Personality is consisted of extraversion, agreeableness, conscientiousness, openness and neuroticism. Extraversion is regarded as positive, as scholars like Cabrera perceive that this personality also includes sociability, talkativeness and the tendency to seek stimulation in the company of others, while Barrick points out that people of high extraversion are usually sociable, talkative, assertive, active, confident, brave, energetic, challenge-loving and attention-seeking. People who are more agreeable show a tendency to be more helpful, compassionate and cooperative, while those with more conscientiousness show more self-discipline, acting dutifully, aiming for achievement, and are more willing to take part in activities outside their own duties and to share knowledge. Meanwhile, openness refers the openness of experience, reflecting the degree of intellectual curiosity, creativity and a preference for novelty and variety a person has, as well the extent of seeking and accepting others' opinions, and it is helpful for promoting the knowledge sharing and reception. As for neuroticism, Barrick and Mount perceive that it is a measurement for emotional stableness, as people with high neuroticism tend to experience unpleasant emotions easily, such as anxiety, depression and the lack of self-confidence, while those with low neuroticism has a stable, calm and confident personality, uninspiring and unconcerned, yet it is not clear in terms of their knowledge sharing behaviors [11,12,13,14].

When it comes to the influence of the atmosphere and condition in an organization has on personality and knowledge sharing behavior, the concept of knowledge governance is used to depict the knowledge management of the organization. Anna Grandor (1997) first brought forward the concept of knowledge governance, an organizational arrangement and system design, which facilitates the realization of knowledge sharing behaviors. As the company competition and cooperation become normal, knowledge governance reinforces its impact on the sharing behaviors. Focusing on the micro knowledge governance, Foss believes that different types of knowledge trade match the knowledge governance system, and individual behaviors and interpersonal interactions are the basic units that influence the organizational knowledge management activities and the starting point of the knowledge governance system. However, he fails to notice that the organizational knowledge governance is, in fact, interacting with personal traits.

The domestic research on knowledge governance started late and is low in amount. Wang Jianyou perceives that the governance system in knowledge activities is a choice, while the system has an impact on the activities and their results. Meanwhile, Yan Xiuchun believes that the knowledge of the knowledge-based corporations is evolutionary, so does the knowledge governance; thus, there exists a best knowledge governance pattern in the knowledge condition system. Apart from them, other scholars who study the knowledge governance of corporations from different perspectives fail to research the knowledge governance's interaction with personal traits and its influence on knowledge sharing behaviors [33,34,35,36,37].

This essay holds that, in an organization, personal traits will influence the knowledge sharing behaviors within the organization, but the scale of the influence is related to the knowledge governance pattern of the organization.

## 2. Theory and model construction

As indicated in psychological research, the FFM can depict the influence the personality types have on working behaviors, among which one behavior critical to the organization is the knowledge sharing behavior. Therefore, the personality types also have an influence on knowledge sharing behaviors. In the following sections, the influence will be discussed in detail.

### 3.1 Analysis of personality types' influence on knowledge sharing behaviors

As stated above, different personality types in the FFM have various impacts or effects on working behaviors, thus influencing the knowledge sharing behavior differently. Therefore, we make the following assumptions:

H1: In knowledge sharing, different individual personal traits have different influences and actions on the knowledge sharing behaviors. The specific analysis and demonstration are as follows:

#### (1) The analysis of the extrovert individual agents' knowledge sharing behaviors

Individuals with extraversion are behavioral agents with social interpersonal skills, the willingness to work with others and extrovert expressions of known knowledge (including experience). They gain good feelings in sharing activities, thus are more willing to contribute or share knowledge in work. Gupta explains that individuals with extraversion are usually more confident, fond of novelty and excitement, and more willing to take part in knowledge sharing. On the contrary, low extraversion causes a reserved, reflective, obedient, silent, shy and incurious personality, and a low tendency for taking part in sharing activities. This assumption is supported by Costa's research, that agents with high extraversion have high sharing behaviors, while those with low extraversion will block sharing behaviors. In company activities, the knowledge activity is the most typical and representative, and according to Devries and Ferguson's research, extrovert personality has positive effect on knowledge sharing regardless of contribution reward. Meanwhile, Ardichvili and Amayah point out that extrovert personality may see knowledge sharing behavior as a reward. Therefore, I would like to make the following hypothesis:

H11: Agents with extraversion in the organization are more willing to share knowledge with others, i.e., extraversion has a positive correlation with knowledge sharing.

#### (2) The analysis of the agreeable individuals' knowledge sharing behaviors

Agreeableness reflects the agent's degree of interpersonal orientation and compassion or hostility to others, including trust, frankness, selflessness, obedience, modesty and empathy, etc., which shows a cooperative atmosphere and form, and becomes the compositions of the knowledge activity environment in organizational knowledge activities. According to Mataler and Gupta's research, agreeableness is an important personal trait in promoting knowledge sharing activities, as in organizational business operations (business operations are, technically, knowledge activities), the knowledge sharing behaviors between agents require respect, frankness, and even altruistic interactions. Apparently, under this circumstance, agreeableness can create the proper atmosphere and benefit agents' knowledge contribution. Furthermore, the obedience and modesty of agreeableness urge, or facilitate agents to accept others' knowledge (in the case that others' knowledge is useful). Therefore, I would like to make the following hypothesis:

H12: The agreeableness of agents in the organization is beneficial for the behaviors of contribution and reception of knowledge, i.e., agreeableness has a positive correlation with knowledge sharing.

#### (3) The analysis of the conscientious individuals' knowledge sharing behaviors

Conscientiousness depicts the agent's organizational mission orientation, reflecting the agent's motivational characteristics in the organization, and it includes the following parts: capability, punctuality, endeavor, achievement, orderliness, responsibility, result-driven, self-discipline, cautiousness, etc. It is apparent that these characteristics (like capability, responsibility, punctuality and achievement) will drive the agent to contribute knowledge to other people or agents at the proper time in organizational activities, and urge the knowledge-in-demand agent to receive other agents' knowledge. As receiving and contributing knowledge are beneficial for knowledge sharing, I would like to make the following hypothesis:

H13: The conscientiousness of agents has a positive correlation with the agents' knowledge sharing behaviors.

#### (4) The analysis of the open individuals' knowledge sharing behaviors

The open personal trait refers to the agent's openness to new experience, reflecting the agent's positive pursuit and appreciation for experience, and including imagination, aesthetic sensitiveness, rich sensation, curiosity, intelligence and values. Agents with high openness are usually highly imaginative, curious, fond of variety, and good at bringing forward unusual ideas, and their personal traits are reflected as creativity and pursuit for new knowledge in knowledge activities. The research of Cabrera and Matzler also reveals that people with high experience openness are more tolerant of new ideas. Thus, in organizational knowledge activities, agents with high openness are more apt to accept useful knowledge from others within the organization, while in light of communicative symmetry, the intelligence and values of agents with openness indicate their progressiveness to contribute knowledge to others. To sum up, I would like to make the following hypothesis:

H14: The openness of agents has a positive correlation with the agents' knowledge sharing behaviors.

(5) The analysis of the neurotic individuals' knowledge sharing behaviors

Neurotic personality mainly values the agent's emotional instability, including worry, hostility, depression, impulse and vulnerability. The organizational activities, including knowledge activities, that are participated in by agents need to be backed up by emotional stability and will bring forward agents' feelings and evaluations, reflected by the degree of satisfaction. When the agent's emotion is instable, he or she usually gives negative feedback to the organizational activities, embodied by worry, hostility and impulse; thus, they are unwilling to take part in sharing activities or share knowledge with others. Therefore, I would like to make the following hypothesis:

H15: The neuroticism of agents has a negative correlation with the agents' knowledge sharing behaviors.

### **3.2 Analysis of the regulative function of knowledge governance situation in personal traits and knowledge sharing behaviors**

Effective knowledge exchange within an organization to motivate the knowledge sharing between agents is a system design or organizational mechanism. Italian scholar Anna Grandori studies knowledge governance from the cognitive perspectives of experience integration, organization regulation and social theories, while Foss researches knowledge governance from a micro level, pointing out that agent behaviors and interpersonal interactions are critical elements in influencing organizational knowledge management. Foss not only perceives that knowledge governance has influence on the motivation of agent's knowledge sharing, but also thinks that the agent's knowledge innovation, transferring and sharing are social activities, forming the situation of knowledge sharing.

In the practical process, some organizations recognize the importance of knowledge sharing in organizational development, and have designed system and created atmosphere to promote the knowledge exchanges within the organization, i.e. forming an active knowledge governance situation. Meanwhile, other organizations have not designed relevant systems and mechanism to consciously perform the organizational knowledge governance, forming an unofficial knowledge governance situation.

In an organization, the system design or organizational mechanism, felt and experienced differently by agents with different personal traits in organizational knowledge activities, forms the knowledge governance situation. Therefore, the knowledge governance situation interacts with personal traits to influence the agent's knowledge sharing behaviors; that is to say, the organizational knowledge governance situation has a regulative function in the relationship between the agent's personal traits and knowledge sharing behaviors. Therefore, I would like to make the following hypothesis:

H2: Knowledge governance situation has a regulative function in the relationship between personal traits and knowledge sharing behaviors, and the regulative function varies according to different personal traits. The specific analysis is as follows:

(1) The analysis of the interaction between knowledge governance situation and extrovert personality

Agents with high extraversion are highly sociable, relation-behavior-oriented in the organization, emotionally positive and willing to contribute to the organization. Therefore, they are sensitive to the system and mechanism of knowledge governance in the organization, as they proactively take part in the organization's activities under any circumstance. When official or unofficial systems are applied by the organization to govern the knowledge, the sharing behaviors of agents with high extraversion are reinforced. Therefore, I would like to make the following hypothesis:

H21: Knowledge governance situation has a positive interaction with extrovert personality, i.e. it has a clear regulative function between extrovert personality and knowledge sharing behaviors.

(2) The analysis of the interaction between knowledge governance situation and agreeable personality

Agreeableness is an altruistic personal trait. Agents with high agreeableness show modesty, tolerance, obedience, compassion and politeness in their words and deeds, have strong sense of personal identification and emotional dependency in the organization and tend to help and cooperate with others in organizational activities, and they are more willing to share knowledge. Organizational knowledge governance situation aims at encouraging different agents in the organization to take on knowledge sharing, so it has less influence on agents with high agreeableness in the organization, as they are always willing to share knowledge regardless of the organizational governance (encouraging system) condition. Therefore, the knowledge sharing motivation system or knowledge governance situation is more suitable for promoting and regulating the knowledge sharing behaviors of agents of low agreeableness. In a word, combining the researches of Wang and Amayah, I would like to make the following hypothesis:

H22: When there is an official or unofficial knowledge governance situation, the significance of the relationship between agreeable personality and knowledge sharing behaviors will decline, i.e. the knowledge governance situation negatively regulates the relationship between the agreeable personal trait and knowledge sharing behaviors.

(3) The analysis of the interaction between knowledge governance situation and conscientious personality

Agents with high conscientiousness, showing the personalities of hardworking, fair-minded, loyal and responsible, highly identifying with and pursuing the organizational goal, will not only accomplish their own tasks, but also help others out of their mission-oriented motivation. The official or unofficial organizational knowledge governance mechanism is sensitively perceived and highly identified with by agents with high conscientiousness, while barely recognized and interacted with by those with low conscientiousness. In other words, in the knowledge sharing between agents, as conscientiousness and knowledge governance situation have positive or reinforced interactions, the knowledge sharing behaviors are promoted. Therefore, I would like to make the following hypothesis:

H23: Organizational knowledge governance situation has a reinforced regulative function for the relationship between conscientious personal trait and knowledge sharing behaviors.

(4) The analysis of the interaction between knowledge governance situation and open personality

Agents with high openness are curious, willing to explore new opportunities and things, and craving for knowledge. When there is an official or unofficial knowledge governance mechanism (situation) and it is for promoting knowledge sharing, agents with high openness are sensitive and responsive to the organizational situation. The interaction between the agent's personality and the governance situation makes agents more willing to contribute or accept knowledge, thus the knowledge governance situation can reinforce the knowledge sharing behaviors of agents with open personal trait. Therefore, I would like to make the following hypothesis:

H24: Knowledge governance situation positively regulates the relationship between the open personal trait and knowledge sharing behaviors.

(5) The analysis of the interaction between knowledge governance situation and neurotic personality

Agents with high neuroticism are sensitive, vulnerable, worried, angry, hostile, impulsive and depressed. As in organizational sharing activities, especially in knowledge sharing, this kind of agents mainly worries about the loss they may suffer from knowledge sharing, like the loss of the position acquired using their own knowledge, and the risk of the relatively declination of their advantages and privilege as the organization is improving, agents with high neuroticism seek to avoid knowledge contribution or reception when there is no official or unofficial knowledge governance mechanism in the organization. However, when there is such a mechanism to motivate knowledge sharing, agents with high neuroticism will reduce their negative feelings, such as threat, declination of position and panic about security, when they are sharing knowledge with others, and improve their willingness to exchange knowledge. In this circumstance, the knowledge governance situations, including the operating of an award system and the support for shared knowledge from the organization, can all lower the sensitivity and resistance to knowledge sharing of the neurotic agents and strengthen their confidence in sharing behaviors. By summarizing the above analysis and combing H15, I would like to make the following hypothesis:

H25: Knowledge governance situation reduces the negative correlation between the neurotic personal trait and knowledge sharing behaviors, i.e. it negatively regulates their relationship.

### 3.3 Theory conclusion and model construction

From the above two-perspective analysis, we can theoretically conclude that:

(1) In organizational knowledge sharing activities, agents in the organization may be different in personal traits; meanwhile, agents with different personal traits behave differently in organizational knowledge sharing activities,

as some personal traits can advance the sharing while others opposing it.

(2) In organizational knowledge sharing activities, the organization applies official or unofficial knowledge sharing mechanism, forming the knowledge governance situation. Knowledge governance situation has various effects on the knowledge sharing behaviors of agents with different personal traits, interacting with dissimilar traits and influencing knowledge sharing behaviors: it positively regulates the relationships between the knowledge sharing behaviors and some personal traits, while negatively regulates those relationships with other traits.

(3) From the above analysis, I set the personal traits as the independent variable  $X$ , knowledge sharing behaviors as the dependent variable  $Y$  and knowledge governance situations as moderator variable. Here I can get the following construction model (Figure 1):

Figure 1. Construction model of the relationship between personal traits and knowledge sharing behaviors

### 3. Variable measurement and research design

From the above theoretical analysis, it is clear that the personal traits, knowledge sharing behaviors and knowledge governance situations should be able to be measured or defined operationally to become variables. Therefore, the concepts require operational definitions.

#### 4.1 Variable measurement

##### (1) Measurement of personal traits ( $X$ )

Personal traits are the Big Five personality traits. The Big-Five Factor Inventory was built by John, Donahue and Kentle in 1991, and has almost got into shape through over twenty years' application and perfection. According to the actual situations of the Chinese people, this essay puts forward eight choices for the openness variable ( $X_4$ ), and respectively five choices for each of the other four personal traits ( $X_1$ ,  $X_2$ ,  $X_3$ , and  $X_5$ ).

##### (2) Measurement of knowledge sharing behaviors ( $Y$ )

The knowledge sharing behavior is an outcome variable, resulting from personal traits and regulated by governance situations. Davenport and Prusak (1998) and Hsu (2007) have profoundly studied the organizational knowledge sharing behaviors, and formed five measuring choices through years of perfection.

##### (3) Measurement of knowledge governance situations ( $M$ )

Knowledge governance situation is a moderator variable, influencing the dependent variable  $Y$  (knowledge sharing behavior) by interacting with the independent variable  $X$ . This essay holds that Foss's classification is advisable, and by taking Lawson's research results, and Cao Yong and Xiang Yang's research into consideration, I would like to divide knowledge governance situations into two measured variables, the official governance and the unofficial governance. Either of these two measured variables is consisted of corresponding choices, with four choices for official knowledge governance ( $M_1$ ) and four for the unofficial governance ( $M_2$ ).

#### 4.2 Sample selection and variable control

##### (1) Sample selection

From the construction model in section 3, it is clear that this essay mainly focuses on the individual-level research regarding the organizational knowledge sharing behaviors and personal traits, while it also takes into consideration the issue of organizational knowledge governance situation which is on the organizational level.

Therefore, samples of this research should be selected on both individual and organizational scales: from knowledge-intensive corporations around the country and from different teams having enough knowledgeable personnel in relevant companies. 584 questionnaires are distributed via WJX.cn, among which 524 copies are responded, with 52 invalid questionnaires and 472 valid ones. Responses come from 52 organizations, each with an average population of 8 to 12, and are mainly from Shaanxi, Jiangsu, Zhejiang, Beijing, Shanghai, Guangzhou and Shenzhen, etc.

##### (2) Biodata characteristics of samples

Biodata characteristics in the 472 questionnaires include gender, age, education, job category, work experience, business ownership, company scale and industry, showing in Chart 1.

It can be observed from the eight biodata characteristics in Chart 1 that the gender distribution is almost balanced, with about 83% personnel under 40 years old and 89% with a higher education degree; moreover, the distribution and coverage of industries, positions and organizations prove the rationality of the biodata characteristics of

examinees. Besides, the research selects 54 organizations (teams) with an average population of 9 in each team, member number ranging from 5 to 22. Therefore, the biodata characteristics of the examinees can meet well the research needs.

### (3) Variable control

In general senses, knowledge sharing behaviors are connected with corporate ownership theoretically, as the ownership has an influence on knowledge governance situations. However, as knowledge governance situation acts as a moderator in this research, ownership will not be introduced as a control variable.

## 4.3 Examination on reliability and validity

### (1) Reliability analysis

SPSS 19.0 is used in this research to examine reliability. It turns out that the Cronbach's  $\alpha$  coefficients of the factors (Chart 4) are mostly between 0.80 and 0.90, with the smallest being 0.751, proving the reliability of the data.

### (2) KMO test and Bartlett's test

KMO test on variables judges whether the selected scale is suitable for factor analysis. Chart 2 shows the results of KMO test and Bartlett's test. As KMO values in Chart 2 are all over 0.8, the sample size and variables in this research are suitable for applying factor analysis.

Variable	KMO value	Bartlett's test		
		$\chi^2$	<i>df</i>	Sig.
Whole sample	0.892	10036.284	820	0.000
<i>X</i> (Personal traits)	0.883	6970.780	464	0.000
<i>M</i> (Knowledge governance situation)	0.879	3537.687	464	0.000
<i>Y</i> (Knowledge sharing behaviors)	0.810	965.723	464	0.000

### (3) Confirmatory factor analysis and reliability examination

As stated above, the scale (questionnaire) used in this essay is a mature scale based on previous research, only slightly adapted to the specific questions in terms of word order. Therefore, confirmatory factor analysis can directly be applied instead of exploratory factor analysis.

Confirmatory factor analysis examines the relationship between latent variables and manifest variables, and is consisted of three values,  $\chi^2/df$ , RMSEA and GFI. NFI and CFI are also examined here. The results are shown in Chart 3.

	$\chi^2/df$	NFI	GFI	CFI	RMSEA
<i>X</i> (personal trait 5-factor model)	2.727	0.928	0.919	0.997	0.053
<i>M</i> (knowledge governance situation 2-factor model)	2.004	0.957	0.968	0.976	0.064
<i>Y</i> (knowledge sharing behavior one-factor model)	1.655	0.957	0.953	0.982	0.037

The specific confirmatory factor analysis results are shown in Chart 4, demonstrating how good are the specific personal trait measurements' standard loadings on personal traits, and the standard loadings of measurements of moderator variable *M* and dependent variable *Y*'s on the variables themselves.

Variable	Choices	Standard loading	<i>t</i> -statistic	Cronbach's $\alpha$	CR	AVE
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$X_1$ Extroversion	$X_{11}$ I'm talkative	0.770	10.41	0.858	0.861	0.463
	$X_{12}$ I'm energetic	0.668	9.88			
	$X_{13}$ I can stir huge passion	0.687	10.02			
	$X_{14}$ I'm resolute	0.652	12.83			
	$X_{15}$ I'm outgoing and sociable	0.770	11.34			
$X_2$ Agreeableness	$X_{21}$ I'm helpful and selfless	0.678	8.37	0.785	0.792	0.506
	$X_{22}$ I'm kind and generous	0.692	10.66			
	$X_{23}$ I usually trust others	0.723	11.23			
	$X_{24}$ I'm thoughtful for others and affable	0.683	10.32			
	$X_{25}$ I like to cooperate with others	0.653	9.56			
$X_3$ Conscientiousness	$X_{31}$ I'm conscientious about work	0.685	9.23	0.870	0.902	0.418
	$X_{32}$ I'm a trustworthy worker	0.609	10.31			
	$X_{33}$ I'm perseverant enough to finish the task	0.801	11.23			
	$X_{34}$ I'm efficient	0.754	8.96			
	$X_{35}$ I make and stick to plans when working	0.712	11.34			
$X_4$ Openness	$X_{41}$ I always have creative thoughts	0.661	9.85	0.751	0.763	0.561
	$X_{42}$ I'm curious about a wide range of things	0.657	8.45			
	$X_{43}$ I'm a profound thinker	0.642	10.32			
	$X_{44}$ I have active imagination	0.701	11.23			
	$X_{45}$ I have the potential for development	0.753	9.25			
	$X_{46}$ I value artistic and aesthetic experiences	0.687	8.43			
	$X_{47}$ I like to introspect and bring forward concepts	0.665	9.62			
	$X_{48}$ I'm good at art, music or literature	0.678	7.75			
$X_5$ Neuroticism	$X_{51}$ I feel depressed	0.678	7.46	0.856	0.870	0.718
	$X_{52}$ I sometimes feel nervous	0.654	8.22			
	$X_{53}$ I worry too much	0.722	8.01			
	$X_{54}$ I'm occasionally temperamental	0.734	9.13			
	$X_{55}$ It's easy for me to get nervous	0.739	8.50			
$Y$ Knowledge sharing behaviors	$Y_1$ I often take part in knowledge sharing activities	0.784	9.78	0.836	0.851	0.521
	$Y_2$ I usually spend much time on knowledge sharing activities	0.704	10.03			
	$Y_3$ I usually take part in and interact with others when discussing a complex question	0.856	8.95			
	$Y_4$ I usually actively share my knowledge with others during my participation	0.809	7.98			
	$Y_5$ I usually take part in discussions on various topics rather than on a single object	0.756	8.67			
$M_1$ Official knowledge governance	$M_{11}$ I have many opportunities to cooperate with other departments to finish tasks	0.836	9.45	0.767	0.782	0.685
	$M_{12}$ My contribution in work can be recognized by the organization	0.712	8.78			
	$M_{13}$ My organization prefers decentralized management	0.784	9.03			
	$M_{14}$ I often work in teams to finish tasks	0.658	10.33			
$M_2$ Unofficial knowledge governance	$M_{21}$ The organization has a good communicative and sharing cultural atmosphere	0.833	9.43	0.867	0.883	0.671
	$M_{22}$ The organization has an open and innovative managing style	0.858	10.21			
	$M_{23}$ The organization treats its personnel equally	0.860	8.93			
	$M_{24}$ The management staff often create communication opportunities for us	0.845	8.79			

## 5. Hypothesis test

The hypothesis test is to test the models and corresponding hypotheses in section 3 in a statistic way to reveal the significance of relationships between variables. Therefore, descriptive statistics is needed to deal with the collected variable data and to examine the existence of hypothesized relationships between variables before the hypothesis test of the model.

### 5.1 Descriptive statistics of variables

The descriptive statistics and correlation coefficients of all variables in this essay are shown in Chart 5. As illustrated in the chart, mean values of variables in the research, except  $X_5$ , are above average level, showing the relatively vague



neurotic characteristic of the surveyed company staff. Correlation coefficients of most variables are statistically significant at the 0.01 level; meanwhile,  $X_5$  (neuroticism) does not have significant correlation with official knowledge governance and knowledge sharing. Statistics in Chart 5 has completed a correlation test of the stated hypothesis to an extent, but correlation coefficients cannot replace the corresponding mathematical model.

Chart 5 Correlation coefficients and descriptive statistics of variables										
Variable	$X_1$	$X_2$	$X_3$	$X_4$	$X_5$	$M_1$	$M_2$	$Y$	Mean	Standard deviation
$X_1$	1								3.53	0.833
$X_2$	0.490**	1							3.99	0.560
$X_3$	0.482**	0.607**	1						3.94	0.662
$X_4$	0.583**	0.470**	0.568**	1					3.53	0.633
$X_5$	-0.219**	-0.035**	-0.052*	-0.120*	1				2.99	0.684
$M_1$	0.417**	0.387**	0.422**	0.550**	0.013	1			3.72	0.590
$M_2$	0.474**	0.483**	0.440**	0.479**	-0.051*	0.606**	1		3.62	0.770
$Y$	0.451**	0.526**	0.435**	0.544**	-0.061	0.554**	0.655**	1	3.53	0.700

\*\* : Statistically significance at the 0.01 level (in both tails of the distribution)

\* : Statistically significance at the 0.05 level (in both tails)

## 5.2 Test model and 4-phase test

The designed model and research object of this essay are cross- hierarchical, so hierarchical linear modeling (HLM) will be utilized for hypothesis testing. Basic testing consists of two levels, Level-1 of individual objects and Level-2 of the organizational level, and four models including the Model 0 are built.

Model 0 tests the existence of variance between laboratories in the knowledge sharing behavior data:

$$\text{Level-1 } Y_{ij} = \beta_{0j} + \gamma_{ij}, \gamma_{ij} \sim N(0, \sigma^2)$$

$$\text{Level-2 } \beta_{0j} = \gamma_{00} + \mu_{0j}$$

Model 1 tests the main effect on individual level, i.e. the relationships between the individual Big Five personality traits and knowledge sharing behaviors:

$$\text{Level-1 } Y_{ij} = \beta_{0j} + \beta_{1j}X_1 + \beta_{2j}X_2 + \beta_{3j}X_3 + \beta_{4j}X_4 + \beta_{5j}X_5 + \gamma_{ij}$$

$$\text{Level-2 } \beta_{ij} = \gamma_{i0} + \mu_{ij} \quad i = 0, \dots, 5$$

Model 2 tests the cross-hierarchical influence of organizational-level variables on knowledge sharing behaviors, so moderator variables  $M_1$  and  $M_2$  from two dimensions are introduced in the Level-2 formula (4) and the following model is built:

$$\text{Level-1 } Y_{ij} = \beta_{0j} + \beta_{1j}X_1 + \beta_{2j}X_2 + \beta_{3j}X_3 + \beta_{4j}X_4 + \beta_{5j}X_5 + \gamma_{ij}$$

$$\text{Level-2 } \begin{cases} \beta_{0j} = \gamma_{01} + \gamma_{01}M_1 + \gamma_{02}M_2 + \mu_{0j} \\ \beta_{ij} = \gamma_{i0} + \mu_{ij} \quad i = 1, \dots, 5 \end{cases}$$

Model 3 tests the cross-hierarchical regulative effects on the organizational level. Influences or regulative effects of the organizational-level variables on individual-level variables are mainly embodied by the intercept and slope in formula (5), from which the following model is built:

$$\text{Level-1 } Y_{ij} = \beta_{0j} + \beta_{1j}X_1 + \beta_{2j}X_2 + \beta_{3j}X_3 + \beta_{4j}X_4 + \beta_{5j}X_5 + \gamma_{ij}$$

$$\text{Level-2 } \begin{cases} \beta_{0j} = \gamma_{00} + \gamma_{01}M + \mu_{0j} \\ \beta_{ij} = \gamma_{i0} + \gamma_{i1}M + \mu_{ij} \quad i = 1, \dots, 5 \end{cases}$$

From the Model 0 test, we can get the following results:  $\tau_{00} = 0.0812^{**}$ ,  $\sigma^2 = 0.432^{**}$ ;  $T = 66.712^{**}$

and  $\chi^2 = 120.465^{**}$  and from these results, we can calculate that ICC (1) = 0.149978, which means 15% population variance comes from between laboratories. Therefore, we can conclude that the organizational level has an influence on individual variance, and the influence needs further testing.

### 5.3 Hypothesis results

Test results of the above four phases and four models are shown in Chart 6.

Chart 6 Models and the hypothesis testing results of the HLM model				
Variable	Knowledge sharing behavior $Y$			
	Model 0	Model 1	Model 2	Model 3
Intercept	3.501**	3.503**	2.853**	1.593**
Level-1 regressor				
$X_1$ extroversion ( $\beta_1$ )		0.261**	0.222**	0.198**
$X_2$ agreeableness ( $\beta_2$ )		0.387**	0.342**	0.354**
$X_3$ conscientiousness ( $\beta_3$ )		0.362**	0.321**	0.308**
$X_4$ openness ( $\beta_4$ )		0.434**	0.478**	0.398**
$X_5$ neuroticism ( $\beta_5$ )		-0.131*	-0.124*	-0.103*
Level-2 regressor				
$M_1$ official knowledge governance ( $\gamma_{01}$ )			0.308**	
$M_2$ unofficial knowledge governance ( $\gamma_{02}$ )			0.431**	
Interaction terms				
$X_1 * M$ ( $\gamma_{11}$ )				0.128**
$X_2 * M$ ( $\gamma_{21}$ )				-0.214**
$X_3 * M$ ( $\gamma_{31}$ )				0.201**
$X_4 * M$ ( $\gamma_{41}$ )				0.097**
$X_5 * M$ ( $\gamma_{51}$ )				-0.250**
Variance between laboratories	0.090**	0.057**	0.038**	0.014**
Variance within laboratory	0.435	0.268		
$R^2$		0.398	0.331	
**: statistically significance at the 0.01 level (in both tails of the distribution)				
*: statistically significance at the 0.05 level (in both tails)				

From Chart 6, it is obvious that H11 to H15 within H1, i.e. the hypotheses of relationships between different personal traits and knowledge sharing behaviors, have all passed the test, so they are statistically significant at the 0.01 level. In other words, extrovert, agreeable, conscientious and open personal traits all have a positive correlation with knowledge sharing behaviors, correlation coefficients respectively being 0.261, 0.387, 0.362 and 0.434; while the neurotic personal trait has a negative correlation with knowledge sharing behaviors, correlation coefficient being -0.131.

The testing results of H21 to H25 within H2 show that these hypotheses are all statistically significant at the 0.01 level. That is to say that, the knowledge governance situation has a positive interaction with extrovert personality, and the extrovert personality has an obvious positive regulative function on knowledge sharing behaviors; the knowledge governance situation has a negative function on the relationship between the agreeable personality and knowledge sharing behaviors; organizational knowledge governance situation has a reinforced regulative function on conscientious personality and knowledge sharing behaviors; the knowledge governance situation positively regulates the relationship between the open personal trait and knowledge sharing behaviors; and the knowledge governance situation reduces the negative correlation between the neurotic personal trait and knowledge sharing behaviors.

## 4. Conclusion

Two main hypotheses and the 10 specific corresponding hypotheses brought forward in this research have been tested in samples and are proved statistically significant. According to the testing results, it is revealed that various personal traits have different relationships to different extents with knowledge sharing behaviors, knowledge governance situations regulate the relationships between personal traits and knowledge sharing behaviors, and directions and interactions of the regulations vary according to personal traits. Based on the research results, suggestions on company knowledge management practices are made:

Firstly, for companies dominated by knowledgeable employees, the core management tasks are knowledge management and knowledge sharing. Thus, for the purpose of realizing effective management, personal traits measurement in personnel recruitment should be valued, as personal traits are relatively stable individual characteristics shaped by both agents and the environment throughout the agents' personal growth and development. This research focuses on the relationships between personal traits and knowledge sharing behaviors, revealing the significant differences of relationships between diverse personalities and knowledge sharing instead of judging whether the personal traits, as objective existences, are good or bad. The results demonstrate that extrovert, agreeable, conscientious and open personal traits have a positive correlation with knowledge sharing behaviors, while the neurotic personality has a negative correlation with knowledge sharing. Therefore, candidates with higher neuroticism should be rejected when recruiting knowledge-sharing-related personnel.

Secondly, as knowledge governance situations have interactions with personal traits and can thus promote knowledge sharing among employees, companies should strive to create or perfect their knowledge governance situations. On the one hand, the building of official knowledge governance systems and situations encourages knowledge sharing behaviors, developing positive interactions between the governance situations and employees' personal traits, and enhancing employees' knowledge sharing behaviors. On the other hand, the cultural atmosphere, human-centric management, sense of participation and perception of justice in the organization also interact with individual personality development, and these organizational atmospheric mechanisms form unofficial knowledge governance situations. Therefore, unofficial knowledge governance mechanism should be valued, and corresponding governance situations should be perfected to promote the knowledge sharing behaviors among employees in the organizations.

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