A Study on the Influencing Factors of the Intention to Share Tacit Knowledge in the University Research Team

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Abstract—The aim of our study was to explore the influencing factors of the intention to share tacit knowledge in the university research team. On the basis of related literature review, combing with the Theory of Planned Behavior, we proposed a research model about the intention to share tacit knowledge in the university research team. After the completion of questionnaire, we surveyed of 202 researchers from the university research teams of Chinese mainland, and examined the research model by using Structural Equation Modeling (SEM), and then revised theoretical model. We found that, in the university research team, personal feature (need satisfaction, sense of honor and altruism), internal mechanism (interpersonal trust, team cohesion and authorized leadership), and support framework (resources adequacy and self-efficacy) significantly contributed to the intention to share tacit knowledge, however, heterogeneity significantly had a negative effect on the intention to share tacit knowledge. Finally, we provided some useful strategies and suggestions for university managers and team leaders to enhance the intention to share tacit knowledge of university research team.

Index Terms—university research team; tacit knowledge; knowledge sharing; tacit knowledge sharing; intention to share tacit knowledge

I. INTRODUCTION

Scientific research is the basic function of university. As an important indicator of the level of scientific research, innovative scientific achievements are often the results of depth, peripherization and chiasm of discipline construction in the university. To get innovative scientific achievements, university researchers must break discipline limitations down and achieve amalgamation and innovation of various disciplines. As the main force of scientific research work in the university, university research team is playing an increasing role. Therefore, how to improve the research capability of university research team has become the concerned focus of university’s managers and researchers.

In the whole process of team management, tacit knowledge sharing plays a crucial role in the university research team [1]. The reason is that, innovative ideas first exist in the brain in the form of tacit knowledge which is the source of research innovation (Polany, 1958; Eucker, 2007). Recent studies about research practice in the university showed, due to the pattern, characteristic of tacit knowledge and the exclusiveness of knowledge owners, some team members often are reluctant to share their tacit knowledge with others. This inhibits innovative capability of university research team. So, what are the crucial influencing factors of the intention to share tacit knowledge in the university research team? Currently, studies about this aspect are seldom, and even these researches have some limitations: (1) most of previous studies focus on the qualitative analysis and discussion about the influencing factors of knowledge exchanging and sharing in the university research team, whereas empirical study about this aspect is rare; (2) most of previous researches pay more attention to the explicit knowledge sharing, and do not make a sufficient study on the intention to share tacit knowledge.

Because the university research team is made up of individuals, therefore, from the perspective of individual tacit knowledge sharing, we can easily study the influencing factors of intention to share tacit knowledge in the university research team. Consequently, on the basis of related literature review, with the help of the theory of planned behavior which was applied extensively in the individual behavior fields, we proposed a theoretical model about the intention to share tacit knowledge in the university research team. After examining and revising the model, we finally provided some suggestions about improving the intention to share tacit knowledge for universities.

II. THE RESEARCH MODEL AND HYPOTHESES

A. The research model

Tacit knowledge sharing in the university research team is a behavior of team member. About the general decision making process of individual behavior, Fishbein and Ajzen first proposed the Theory of Reasoned Action...
Figure 1. The model of planned behavior theory

Figure 2. The conceptual model of intention to share tacit knowledge in the university research team

Figure 3. Research model and hypotheses

B. Research hypotheses

Based on the above research model, we proposed the following research hypotheses.

Wilson (1975) believed that people’s altruism has a crucial significance on human’s survival and continuation. Owing to possessing positive and public-spirited nature, some are pleased to share knowledge with others and don’t require return (Davenport, Prusak, 1998). Constant (1994) hold that selfish people have a passive influence on information sharing, while altruist play a positive role in knowledge sharing. This lead to our first hypothesis:

H1: Altruism has a direct and positive effect on the intention to share tacit knowledge.

Davenport et al. (1998) thought that, one’s time, energy, and knowledge are finite, people do not want to share knowledge with others unless it is profitable. Similarly, members who contribute tacit knowledge to others hope that they can get material or spiritual compensation in the university research team, such as others’ recognition and respect, self-realization, and so on. Therefore, satisfying team members’ needs as far as possible would promote members’ intention to share tacit knowledge. This lead to our second hypothesis:

H2: Need satisfaction has a direct and positive effect on the intention to share tacit knowledge.

Davenport et al. (1998) believed that spreading knowledge would make knowledge owners build a “wisdom” image, so, they are willing to share precious knowledge which they own with others. Team members try their best to pursue sense of honor, consequently, they would get high reputation, and they also promote the spread of information and thinking. The subjects who
TABLE 1. DEFINITIONS OF CONSTRUCTS

<table>
<thead>
<tr>
<th>Constructs</th>
<th>Definitions</th>
<th>References</th>
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<tbody>
<tr>
<td>Intention to share tacit knowledge</td>
<td>The degree of one’s belief that one will engage in tacit knowledge-sharing behavior</td>
<td>Ajzen (1985)</td>
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<tr>
<td>Attitude toward tacit knowledge sharing</td>
<td>The degree of one’s favorable or positive feeling about sharing one’s tacit knowledge</td>
<td>Fishbein, Ajzen (1975)</td>
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<tr>
<td>Subjective norm about tacit knowledge sharing</td>
<td>The degree of one’s perceived social pressure from important others to share or not to share one’s tacit knowledge</td>
<td>Fishbein, Ajzen (1975)</td>
</tr>
<tr>
<td>Perceived behavioral control about tacit knowledge sharing</td>
<td>The difficult degree of one’s feeling about sharing tacit knowledge with others and the degree that one will be to control or determine tacit knowledge sharing</td>
<td>Ajzen (1985)</td>
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Perceived behavioral control about tacit knowledge sharing

Hypotheses

H1: The stronger team cohesion, the stronger sense of team and cooperation among members. This lead to our first hypothesis:

H1: Interpersonal trust has a direct and positive effect on the intention to share tacit knowledge.

H2: Team cohesion mainly contains task cohesion and social cohesion (Hagstron, 1965; Mikalalackh, 1969). In the university research team, team cohesion makes members have intense belongingness. In order to achieve team’s goal and interest, they would be willing to try their best to work hard and play their potentiality, so, it is more possible that they would share tacit knowledge with others. Conversely, the weaker team cohesion, the weaker positivity and initiative that members contribute to team, thus it is impossible that members are willing to diffuse and transfer tacit knowledge to others [7]. This lead to our fourth hypothesis:

H4: Team cohesion has a direct and positive effect on the intention to share tacit knowledge.

Emerson (1962) and Blau (1964) pointed out that trust is the key factor of exchange. Nahapiet and Ghoshal (1999) believed that interpersonal trust can promote the sharing of intellectual capital. The intention to share tacit knowledge is a precondition of tacit knowledge sharing, but the trust degree between knowledge owners and recipients is the main factor which influences the intention to share tacit knowledge [8]. This lead to our fifth hypothesis:

H5: Interpersonal trust has a direct and positive effect on the intention to share tacit knowledge.

Authorized leadership encourages junior autonomous behavior and members’ teamwork [9]. Kirkman and Rosen (1999) pointed out that authorization is positive correlation with job satisfaction. It is more probable that team members would contribute to their knowledge for team interest if members have high job satisfaction. This lead to our sixth hypothesis:

H6: Authorized leadership has a direct and positive effect on the intention to share tacit knowledge.

Self-efficacy is the core variable of controlling and arousing human’s motivation and behavior [10]. High self-efficacy would promote individual effort to strive for success, and then the successful result would further strengthen the expectation of success. On the contrary, low self-efficacy might lead to that individual ceases effort, and cause the frustrated result, and weaken the competence’s expectation. This lead to our seventh hypothesis:

H7: Self-efficacy has a direct and positive effect on the intention to share tacit knowledge.

The view of resources systems is the core point of view in the resource-based view [11]. One needs to consider the coordination of a lot of resources when he carries out some behavior, such as time, skill, individual knowledge, and so on. It is bad for knowledge sharing when some resources (like knowledge, time, place, cultural climate of knowledge sharing, etc) of knowledge sharing are shortage (Szulanski, 1996; Jiang Tianhui, 2000; Yuan Lin, 2007). This lead to our eighth hypothesis:

H8: Resources adequacy has a direct and positive effect on the intention to share tacit knowledge.

Generally, people believed that heterogeneity has a passive on the emotional responses, like cohesion, degree of satisfaction, team commitment, etc. The higher heterogeneity in team, the higher communication barrier among members to knowledge sharing [12], so, cooperation becomes difficult among members (O’ Reilly,
Caldwell, Barnett, 1989). This lead to our ninth hypothesis:

H9: Heterogeneity has a direct and negative effect on the intention to share tacit knowledge.

Tsui et al. found that individuals have a low loyalty toward organization when they have a big difference in the aspects of gender, age, race, etc. In the university research team, the heterogeneity of age will increase emotional conflict (Jehn, 1997). Different specialized fields would influence confidence (Zenger T R, Lawrence B S., 1989). It is more probable that research team would come about team confidence if the heterogeneity of research team is low. This lead to our tenth hypothesis:

H10: Heterogeneity has a direct and negative effect on the interpersonal trust.

Mayer et al. (1985) pointed out interpersonal trust is that, according to counterpart’s personal characteristics (such as capability, honesty, and so on), one generates a reliable and dependable brief toward others. In face of research difficulties, the climate of mutual trust among team members would strength members’ confidence and would activate members’ potentiality, and then reinforce members’ self-efficacy. This lead to our eleventh hypothesis:

H11: Interpersonal trust has a direct and positive effect on the self-efficacy.

Mathieu and Zajiac (1990) believed that the members of high self-efficacy have high community identity, so they give community a more positive evaluation. The individuals who own high self-efficacy would be willing to devote themselves into organizations. Therefore, the university research team which owns high self-efficacy would enhance team cohesion [13]. This lead to our twelfth hypothesis:

H12: Self-efficacy has a direct and positive effect on the team cohesion.

The existence of altruism would promote the forming of knowledge sharing climate. Altruistic behavior would come about when people feel good about the group where they live in, so people would be more willing to contribute to the group [14]. From this perspective, we can think that altruism would invisibly increase resources of university research team. This lead to our thirteenth hypothesis:

H13: Altruism has a direct and positive effect on resources adequacy.

Authorized leadership respects members’ suggestion, encourages junior autonomous behavior, discusses team’s development direction and striving goal with members, and even codetermine the stage goal with junior (P.Hersey, K.H. Blanchard, 1993). This leadership can build a cooperation climate, promote members to identify team, and make everyone disregard personal interest to work hard for team goal. This lead to our fourteenth hypothesis:

H14: Authorized leadership has a direct and positive effect on altruism.

III. RESEARCH METHODOLOGY AND ANALYSIS

To test the model, we adopted a survey method for data collection and examined the hypotheses using structural equation modeling (SEM) on the data.

A. Measurement and data collection

We developed measurement items by adopting measures that had been validated in prior studies, modifying them to fit our context of tacit knowledge sharing in the university research team. Omit to the restrictions of content space, we does not list the questionnaire items.

Respondents were asked to evaluate the significance of measurement items using a Likert scale of 1–5, where a value of 5 represented “strongly agree,” and 1 represented “strongly disagree.”

The study sample consisted of researchers who contained research team leaders and juniors from Chinese mainland’s universities randomly selected from the directory of Chinese universities.

We started to collect data in 2009/03. In the first stage, we carried out pre-surveying. In the second stage, we began to formally dispense questionnaire which contained electronic and papery edition. A total of 305 questionnaires were sent, and a total of 267 replies were returned. Though 65 were incomplete and so discarded, 202 questionnaires were used for data analysis, a response rate of 66.2%. Table II shows the demographics of the respondents. Respondents had obviously attained a significant degree of knowledge and experience from their education and jobs.

B. Empirical analysis

We first analyzed the reliability and the validity, and determined the significance of the model using SEM, and finally revised the research model.

1) Reliability test

Regarding exploring research, if the cronbach’s alpha coefficient is bigger than 0.7, it is the acceptable minimum value of reliability [15]. Table III shows the
reliability test. In this research, all cronbach’s alpha ranged from 0.71 to 0.81; these are greater than 0.7 and so the constructs were considered reliable.

2) Validity test

In order to guarantee measurement’s content validity, firstly, we adopted measures that had been validated in prior studies and revised them to fit our research; second, we consulted some knowledge management experts about measurement items and then modified them; thirdly, during the pre-surveying, we invited some respondents to provide their ideas about measurement’ readability and intelligibility, and then revised them. Consequently, the content validity of measurement items was considered as good.

Because our measurement items had been modified according to prior studies, it was necessary to examine the structure validity by exploratory factor analysis. We used spss13.0 to play KMO test and Bartlett test, Table IV summarizes the test results.

Every KMO was bigger than 0.5, and every Bartlett’s globular test was significant. Therefore, measurement items were considered suitable for carrying out factor analysis.

Hairet et al. (1992) thought that it is significant when the sample size is bigger than or is equal to 50, and load factor is bigger than 0.30. In order to ensure factors’ significance, the research took 0.5 as lowest critical value of load factor. We made three subscales (personal feature, internal mechanism and support framework) play factor analysis. From the results of factor analysis, observed variables of each subscales accorded with the requirement of statistics, it was proved that structure validity of each subscales was good.

3) Structural equation modeling

The test of the model was carried out using SEM, a confirmatory factor analysis that tests a model and its validity simultaneously. Amos 7.0 was used to perform the SEM analysis.

<table>
<thead>
<tr>
<th>TABLE III. RELIABILITY TEST</th>
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<tr>
<td>Constructs</td>
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<tr>
<td>Intention to share tacit knowledge</td>
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<tr>
<td>Need satisfaction</td>
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<td>Altruism</td>
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<td>Sense of honor</td>
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<td>Heterogeneity</td>
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<td>Authorized leadership</td>
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<td>Interpersonal trust</td>
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<td>Team cohesion</td>
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<td>Self-efficacy</td>
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<td>Resources adequacy</td>
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<th>TABLE IV. KMO AND BARTLETT TEST</th>
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<tr>
<td>Variables</td>
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<td>Personal feature</td>
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<td>Internal mechanism</td>
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<td>Support framework</td>
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Table V shows the overall fit indexes of our model. It shows that our model resulted in good results at the $\chi^2/df.$, RMR, AGFI, CFI, and marginal fitness levels for the indexes of PGFI, and PNFI. We concluded that the overall model fit indexes had reached an acceptable level.

And then we analyzed the path coefficient of model by using SEM. Figure 4 depicts the final results about the path coefficient of the research model. Table VI shows the results of hypothesis test.
4) Model revise

In order to understand the causality and act path of variables in depth, according to adjustment suggestion of amos7.0 and combining with related literature, we revised research model and hypotheses, and rebuilt the model of influencing factors of the intention to share tacit knowledge in the university research team. Figure 5 shows the path coefficient of the revised model.

The indexes (such as GFI, RMR, AGFI, NFI, CFI, and so on) of the revised model were better than original model, which showed that the revised model had good overall model fit indexes.

In the condition of good model fit indexes, we recalculated the causality, act path, and homologous path coefficient among variables. The causal effect between variables mainly contains direct effect and indirect effect (Hou Taijie et al., 2004). Direct effect is that only causal variable (endogenous variable) has direct impact on the outcome variable (exogenous variable). Indirect effect is that causal variable has an indirect impact on the outcome variable by influencing one or more mediator variables. When there is only one mediator variable, the value of indirect effect is equal to the arithmetic product of two path coefficients. Table VII summarizes the total influencing effects among variables about the revised model, and it reflected the relationship between variables. From Table VII, we can find, in the university research team, personal feature (need satisfaction, sense of honor, altruism), internal mechanism (interpersonal trust, team cohesion, authorized leadership), and support framework (resources adequacy, self-efficacy) significantly contributed to the intention to share tacit knowledge, however, heterogeneity significantly had a negative effect on the intention to share tacit knowledge.

IV. DISCUSSIONS AND IMPLICATIONS

Based on the above the results of empirical study, we provided some useful strategies and suggestions to
enhance the intention to share tacit knowledge of university research team for university managers and team leaders from the aspects of personal feature, internal mechanism and support framework.

A. Improving strategies of the intention to share tacit knowledge based on the personal feature

1) Satisfy the needs of the university research team

Empirical study indicated needs satisfaction has a direct and positive effect on the intention to share tacit knowledge. For master and Ph.D., physiology and safety needs are their most urgent needs. For professor and asocial professor, their needs focus on the higher levels, like belongingness, self-respect, self-realization, etc. Therefore, for students, the leader of university research team should first adopt effective incentive mechanism to help them to solve the issues of lives, and then satisfy members’ needs in the aspects of respect, self-realization, etc. For teachers, except salary and bonus, research team should meet their needs of belongingness, self-respect, and self-realization. In this way, the intention to share tacit knowledge can be improved.

2) Encourage altruism of the university research team

Empirical study showed altruism has a direct and positive effect on the intention to share tacit knowledge, so altruistic behavior should be encouraged in the university research team. Firstly, research team should permeate altruism into everyone’s work and life by propagandizing altruism extensively. Secondly, research team should build intensive mechanism and give altruist material or spiritual reward to encourage this behavior. To support and motivate altruism would promote members to exchange research experience.

3) Strengthen members’ sense of honor in the university research team

Empirical study indicated that sense of honor has a direct and positive effect on the intention to share tacit knowledge. The members who own team’s sense of honor and consider team goal as the direction of life would be willing to help others and have high intention to share tacit knowledge. To strengthen the members’ sense of honor, firstly, build a harmonious interpersonal relationship for team. Secondly, cultivate team members’ sense of pride; moreover, cultivate members’ responsibility and sense of mission about research work.

Through these measures, members will consider team’ honor as their honor, and then improve the intention to share tacit knowledge with others for team’s honor.

B. Improvement strategies of the intention to share tacit knowledge based on the internal mechanism

1) Build a trust climate in the university research team

Empirical study revealed interpersonal trust has a direct and positive effect on the intention to share tacit knowledge. High trust climate is a crucial precondition of knowledge dissemination. To build a trust climate in the university, firstly, research team should advocate open, uncontrolled and innovative scholarship culture[16]. Secondly, encourage members communicate with each other formally or informally, promote mutual understanding and then enhance mutual trust; moreover, establish common vision to strengthen members’ trust. These measures will strengthen the members’ intention to share tacit knowledge.

2) Reinforce team cohesion of the university research team

Empirical study indicated team cohesion has a direct and positive effect on the intention to share tacit knowledge. Cohesion is the basis of forming research team’s creativity and competitiveness. To improve cohesion of the university research team, first, guarantee the frontier research fields and make members know their work meaning and work value. Second, concern about members’ life and study, which can enhance team’s centripetal force[17]. Third, create a harmonic relationship among members to reinforce team cohesion.

3) Apply appropriate leadership style in the university research team

A lot of scholars believed that, a leadership style which is appropriate for any organizations and conditions does not exist. For the different lifecycle in the university research team, team leader should adopt different leadership style to adapt the environmental change. For example, adopt imperative leadership style in the formative period of university research team, while adopt authorized leadership style in the harvested period[18].

C. Improvement strategies of the intention to share tacit knowledge based on the support framework

1) Reduce members’ heterogeneity in the university research team

Empirical study indicated that, the members who have great difference in the three aspects of age, professional knowledge and values, owned weak intention to share tacit knowledge. So we should reduce the members’ difference from the three facets. Firstly, keep members’ age balanced and make the best use of every member when setting up university research team[19]. Secondly, select those members who own same or similar professional background as much as possible. The last but not the least, weaken members’ heterogeneity by strengthen members’ communication.

2) Enhance members’ self-efficacy in the university research team

To enhance members’ self-efficacy, firstly, team leader should often encourage members and give members who get achievements praise in time to strengthen members’

TABLE VII. TOTAL INFLUENCING EFFECTS AMONG VARIABLES ABOUT THE REVISED MODEL

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<tr>
<th>DV</th>
<th>IN</th>
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<td>NS</td>
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<td>AT</td>
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<td>RA</td>
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<td>TC</td>
<td>0.34*</td>
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<td>IT</td>
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<td>AL</td>
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<td>0.16</td>
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a. Dependent variables. b. Independent variables

*The number contains indirect effect
self-confidence. Secondly, team should set examples for outstanding members, which can make the other members wake up to that paying out effort can obtain success. Moreover, build a close relationship in the team and make team members do positive evaluation with each other, which can reinforce members’ self-efficacy.

3) Provide adequate resources for members’ communication in the university research team

Adequate basic material resource (such as time, space, technical support, etc) is the basis of transferring and sharing scientific research experience. For instance, holding various exchanging and recreational activities, provide enough discussion room for members, and building an internet communication platform. In addition, encourage aggressively and appraise correctly members’ knowledge sharing behavior, and then construct a favorable knowledge sharing climate. All of these can supply necessary basic resource for team members’ knowledge sharing.

V. CONCLUSION AND LIMITATIONS

Our study was one of the first to provide empirical study about the intention to share tacit knowledge in the university research team systematically and fully. It offers insights to team leaders on the values why members are or are not willing to engage in tacit knowledge sharing within the university research team.

We also found that, personal feature (need satisfaction, sense of honor, altruism), internal mechanism (interpersonal trust, team cohesion, authorized leadership), and support framework (resources adequacy, self-efficacy) significantly contributed to the intention to share tacit knowledge, however, heterogeneity significantly had a negative effect on the intention to share tacit knowledge.

This study has a few inherent limitations. First, on the basis of the simplification of research issues and focusing on the key factors, we hypothesized only nine factors in our model; other factors (such as team goals, familiarity degree, outcome expectations, etc) may also affect outcomes. Second, the university research team had its lifecycle, but we did not distinguish the different cycles (like formation period, development period, maturation period, and harvest period) in our study. Moreover, the data collection was limited to some universities from Chinese mainland.

ACKNOWLEDGEMENTS

The authors thank the support of Chinese national social science fund (project number: N1080080).

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