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Interaction between the Knowledge Sharing on Innovation Behavior Based on the Viewpoint of Team Diversity: Empirical Research from China

Meng-Hsiu LEE[1], Ming-Yu YEN[2], Louis PERROMAT[3]

Abstract

In the rapidly changing and challenging environment, the possession of continuous innovation ability is primary for organizations in high-tech industry, which have to constantly apply innovation to maintain and enhance the effectiveness, create corporate value, and pursue organizational excellence so as to promote the competitive advantage for enterprise growth and survival. For organizations toady, work teams are the basic units to complete tasks. A lot of management activities are mostly preceded with teams, relying on the mutual cooperation among members. Besides, team interaction and communication could effectively enhance team performance and organizational performance. Aiming at supervisors and employees of high-tech industry in Fujian Province, total 520 copies of questionnaire are distributed, and 351 valid copies are retrieved, with the retrieval rate 68%. The research results show that 1.team diversity presents positive and significant effects on knowledge sharing, 2.knowledge sharing shows positive and remarkable effects on innovation behavior, and 3.team diversity reveals positive effects on innovation behavior. According to the results, suggestions are proposed, expecting to stimulate team innovation behaviors for high-tech industry applying different value, experience, and professional knowledge of team members.

Keywords: high-tech industry, team diversity, knowledge sharing, innovation behavior, innovation.

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Introduction

Along with increasing competition in global markets and continuously advancing technologies, the possession of continuous innovation ability in the rapidly changing and challenging environment is primary for organizations in high-tech industry. A high-tech organization has to constantly apply innovation to maintain and enhance the effectiveness, create corporate value, and pursue organizational excellence in order to promote the competitive advantage for enterprise growth and survival. Innovation in an organization is regarded as the product of cooperation as well as the process of teams making efforts. Team innovation, as the presentation of team efforts, expects to successfully cope with changes in working environment. The development of team innovation could enhance organizational capability, allow an organization more rapidly, effectively, and properly concentrate resources than other competitors, and have organizational members respond to changing demands and make proper changes. A lot of high-tech businesses enhance the innovation ability and responsibility with team based working systems. When team research is gradually emphasized, an enterprise has to pay attention not only to individual innovation of employees, the development of innovative teams is also urgent in high-tech industry.

For organizations nowadays, work teams have become the basic units to complete tasks. Lots of management activities are preceded with teams, relying on the cooperation among members. Team interaction and communication could effectively enhance team performance and organizational performance. Team diversity could result in both positive and negative effects. On one hand, diversity could result in diverse knowledge, increase useful information for a team, and add broad information and ideas to assist in the problem solving for creativity generation, enhance team innovation and performance quality, and generate higher quality innovation strategies and higher quality ideas. A diversified team with high task dependency would present positive effects on team innovation. Knowledge sharing and knowledge creation would also reveal positive effects on team innovation. Along with diversified composition of team members, composing employees with distinct background and experiences in a team and developing the comprehensive effect would be worth deeper discussion, especially team diversity. Accordingly, it becomes an urgent problem for all enterprises to gather individual creativity of team members, apply different value, experience, and professional knowledge of team members, and induce team creativity to become the core competitiveness of an enterprise. Based on the viewpoint of team diversity, this study intends to discuss the effect of knowledge sharing on innovation behavior in high-tech industry, expecting to apply distinct value, experience, and professional knowledge of team members to induce the team innovation behavior.

Literature review

Team diversity

Sun *et al.* (2015) mentioned that the definition of team diversity would be distinct according to different research fields. Researchers on decision making mostly defined diversity as the difference in information or experience (Ansari *et al.*, 2016), while those on demographic statistics would focus on explicit characteristics of gender, age, and race or work related attributes like competency background and seniority (Omri, 2015). Fransen *et al.* (2015) defined diversity as the situation of an actor' attributes towards the preference. Zhou, Zhang, & Shen (2017) regarded diversity as team members tending to distinguish the explicit characteristics of each other. Hussain, Konar, & Ali (2016) revealed diversity as a new word, referring to "the attitudes of an organization to systematically refuse stereotype" and "the implementation of organizational members' potential".

Referring to Zhou, Zhang, & Shen (2017), team diversity is divided into three parts in this study, namely informational diversity, social category diversity, and value diversity.

    (1) Informational diversity: referring to the difference in team members' knowledge basis and point of view, e.g. education background, experience, and professional knowledge.

    (2) Social category diversity: referring to team members' explicit difference as demographic variables, e.g. age, gender, race, and nationality.

    (3) Value diversity: referring to team members' different opinions about team tasks, objectives, and mission.

Knowledge sharing

Wang *et al.* (2015) regarded knowledge sharing as spreading individual information or knowledge to others for the opposite party knowing and possessing the same information or knowledge. Knowledge sharing involved in sharing individual knowledge, sharing learning opportunities, and encouraging others' learning. Adjei & Die (2015) pointed out knowledge delivery as a selective "supply" process, while knowledge acceptance as the "demand" process. The mutual exchange between knowledge suppliers and demanders was the idea of "flow". Robinson & Stubberud (2015) indicated that knowledge sharing could be the push-pull balance behavior with the objective and value to increase individual knowledge and experience as well as develop the multiple and comprehensive effects on a team or an organization. Kraiczy, Hack, & Kellermanns (2015) regarded knowledge sharing as the delivery behavior of people in an organization acquiring knowledge from others. In the research on knowledge sharing with the viewpoint of transaction costs, Baker, Grinstein, & Harmancioglu (2016) measured the strength of willingness to share knowledge presented by individual behavior

and judge the presentation of knowledge sharing behavior by others' understanding of individual knowledge, technology, or experience. In this case, organizational members with higher willingness to share would present knowledge sharing behavior and the colleagues would show distinct opinions about them.

Referring to Lee & Hidayat (2018), knowledge sharing is divided into willingness to share knowledge and knowledge sharing behavior for the measurement. The operational definitions are explained as below: (1) *Willingness to share*: The degree of knowledge possessors being willing to deliver the work experience, technology, and ideas to others; (2) *Sharing behavior*: The degree of knowledge possessors being willing to specifically deliver the work experience, technology, and ideas to others and expect others, after understanding, actually applying to the work.

Innovation behavior

Uduma *et al.* (2015) indicated that innovation behavior was not simply invention and creation, but the process to generate new knowledge. Creativity was the start of innovativeness, while innovativeness was the tactic to enhance organizational performance; and, the meaning of innovation behavior lied in employee behavior attempting to achieve innovativeness (Cace *et al.*, 2011). Louis & Murphy (2017) considered that innovation behavior was not simply restricted to technological changes, but contained execution process and new creativity. Innovation behavior could be used for judging the flexibility of an organization and was a key to grasp the changing competitors, markets, and demands generated from technological innovation (Armisen & Majchrzak, 2015). Schermuly & Meyer (2015) defined innovation behavior as employee behavior to achieve innovativeness; such innovation behavior could be the multi-level innovation activity.

Referring to Hsu, Li, & Sun *et al.* (2017), innovation behavior contains three dimensions as followings: (1) *Idea generation*: referring to novel and useful ideas generated in any fields; (2) *Idea promotion*: In order to effectively apply creative concepts to practice at work, employees have to acquire the organizational support and identification to continuously develop the creative concepts; (3) *Idea practice*: It refers to employees' creative concepts being identified by the organization, presenting development, and further being realized at work or products to promote organizational performance.

Research hypothesis

Sun *et al.* (2015) found out the positive effect of function diversity on team members' communication frequency. Bergendahl & Magnusson (2015) also claimed that ones with similar industrial experience could better communicate with each other. Zhou, Zhang, & Shen (2017) discovered that a team with sufficient communication would enhance the efficacy. In other words, team members might enhance the communication opportunities due to diverse information and rich

knowledge sources to broadly collect task related information as well as enhance members' opinion discussion through knowledge sharing to benefit the promotion of team innovation (Mageswari, Sivasubramanian, & Dath, 2015). Team members' knowledge and opinion sharing could be regarded as the reciprocal exchange relationship among members; it was an important feature of team members' exchange relationship. Accordingly, it is assumed in this study that

H1: Team diversity shows positive and significant effects on knowledge sharing.

Wang *et al.* (2015) indicated that information diversity would result in task conflict; however, task conflict was healthy opinion conflict to benefit team communication and knowledge & opinion exchange as well as effectively integrate different points of view and coordinate members' different opinions (Dinu, Grosu, & Saseanu, 2015) to further enhance the positive effect of innovation behavior on team performance. Moreover, different opinion exchange in a team could enhance team decision-making quality (Baker, Grinstein, & Harmancioglu, 2016) and promote problem-solving ability to avoid team myth (Martinez, 2015) and keep flexible thinking model in order not to be restricted to old thinking frame due to similar education or work experience. It therefore could promote innovative ideas and generate innovation behaviors (Lee & Hidayat, 2018). It is therefore assumed in this study that

H2: Knowledge sharing reveals positive and remarkable effects on innovation behavior.

Zhou, Zhang, & Shen (2017) indicated that the integration of complementary skills and experience among team members to exceed the sum of the members' individual ability could enhance team performance. Individual team member with insufficient professional ability could be assisted by other members' professional abilities. Under the information exchange and cooperation among team members, the team task could be smoothly achieved. Farmer, Van Dyne, & Kamdar (2015) pointed out larger attraction among members with the same gender to generate better interaction; on the contrary, members in a team with mixed genders could more easily appear conflict to result in tense interpersonal relationship and be averse to team performance. Olaru *et al.* (2015) pointed out the importance of value to individuals to affect individual thinking model and behavior generation. For this reason, value difference might cause distinct opinions about the same affair to show various opinions about tasks, objectives, or mission (Armisen & Majchrzak, 2015). Similar value allowed team members presenting common beliefs, ideas, and regulations as well as similar languages or terminologies among team members to make the communication easier and faster achieve team consensus (Hsu, Li, & Sun, 2017; Cojocaru, Bragaru, & Ciuchi, 2012). In this case, it is assume in this study that

H3: Team diversity presents positive effects on innovation behavior.

Sample and measuring indicator

Research sample and object

Aiming at supervisors and employees of high-tech industry in Fujian Province, 520 copies of questionnaire are distributed in this study. Total 351 valid copies are retrieved, with the retrieval rate 68%.

Reliability and validity test

Confirmatory Factor Analysis (CFA) is an important part in SEM that two-stage CFA measurement is preceded in this study. The structural model should be first tested; when the model fit is acceptable, the second stage SEM is further preceded. The dimension analyses with CFA in this study reveal that the factor loadings appear in.70~.90, the component reliability appears in .78~.92, and the average variance extracted appears in .60~.80, conforming to the standards of 1.factor loadings being higher than .5, 2.component reliability being higher than .6, and 3.average variance extracted being higher than .5. The dimensions therefore present convergent validity.

Results

Structural model analysis

Structural model analysis contains the fit analysis and overall explanation power of the research model. By referring to researchers, 7 numerical indicators are applied to test the overall model fit, including chi-square ($\chi2$) test, $\chi2$-degree of freedom ratio, fit index, adjusted fit index, average approximate root mean square error, comparative fit index, comparative hypothesis model, and independent chi-square test. The overall analysis results are organized in *Table 1*.

In sum, using $\chi2$ and the degree of freedom ratio for testing the model fit, it is considered the smaller the better. The $\chi2$-degree of freedom ratio of this research model shows < 3 (1.63). GFI and AGFI are better close to 1, without an absolute standard to judge the model fit. GFI > .9 and AGFI > .8 are acceptable. GFI and AGFI of this research model reveal .94 and .88, respectively. RMSEA in .05~.08 presents a good model and the reasonable fit. RMSEA of this research model is .05. The allowance of CFI is > .9, and CFI of this research model shows .91. NFI

should be at least higher than .9; NFI of this study appears .90. Overall speaking, the fit indices conform to the standards, revealing the acceptable model. The data of the research samples therefore could be used for explaining the actual observation data.

From above overall model fit indices, the structured model and the observation data present favorable goodness-of-fit, showing that the theoretical model could fully explain the observation data. In this case, the correlation coefficients and coefficient estimates of team diversity to knowledge sharing and innovation behavior could be further understood.

Table 1: Model fit analysis

Fit Indices	allowable range	this research model	judgment of model fit
χ2 (Chi-square)	the smaller the better	21.42	
χ2-degree of freedom ratio	<3	1.63	conformity
GFI	>.9	0.94	conformity
AGFI	>.8	0.88	conformity
RMSEA	<.08	0.06	conformity
CFI	>.9	0.91	conformity
NFI	>.9	0.90	conformity

The research data are organized in *Table 2*. The complete model analysis result reveals that three dimensions of team diversity (informational diversity, social category diversity, and value diversity) could significantly explain team diversity ($t>1.96$, $p<0.05$), two dimensions of knowledge sharing (willingness to share and sharing behavior) could remarkably explain knowledge sharing ($t>1.96$, $p<0.05$), and three dimensions of innovation behavior (idea generation, idea promotion, and idea practice) could notably explain innovation behavior ($t>1.96$, $p<0.05$). Apparently, the overall model in this study presents favorable preliminary fit.

In terms of internal fit, team diversity shows positive and significant correlations with knowledge sharing (0.86, $p <0.01$), knowledge sharing reveals positive and remarkable correlations with innovation behavior (0.87, $p <0.01$), and team diversity reveals positive and notable correlations with innovation behavior (0.82, $p <0.01$) that H1, H2, and H3 are supported.

Table 2: Overall linear structural model analysis

evaluation item	parameter/evaluation criteria		result
preliminary fit	team diversity	informational diversity	0.69*
		social category diversity	0.65*
		value diversity	0.66*
	knowledge sharing	willingness to share	0.70**
		sharing behavior	0.72**
	innovation behavior	idea generation	0.75**
		idea promotion	0.73**
		idea practice	0.71**
internal fit	team diversity→knowledge sharing		0.86**
	knowledge sharing→innovation behavior		0.87**
	team diversity→innovation behavior		0.82**

*Note: * stands for p<0.05, ** for p<0.01, and *** for p<0.001.*

Conclusion

The research results reveal that informational diversity in high-tech industry could combine ideas and creativity from various fields. Team members with different profession, skills, and experience could create several beneficial points of view for the team and result in positive effects on team innovation behavior. Team members in high-tech industry would not appear bad communication or improper interaction, due to different gender and age, to further negatively affect team innovation. It is possibly because that, in a team with large age difference, younger members would respect elder ones to more easily accept the opposite party's opinions; conflict therefore would not be generated. Members in high-tech industry would easily generate same opinions because of consistent team tasks, objectives, or mission that they could easily present consensus on task related problems. Team diversity in high-tech industry would positively affect team members' exchange relationship to further enhance innovation behavior. With the same ultimate task objectives, the key point to concern about tasks would be generated to enhance the motivation to devote to the team. The employees in high-tech industry therefore are willing to share and exchange the opinions about tasks as well as assist other members in completing tasks to generate innovation behavior.

Suggestions

According to the research results and findings, following practical suggestions are proposed in this study.

(1) High-tech businesses and the managers are suggested to take the composition of team members into account for a project team or selecting team members. In addition to the education, major, and seniority of team members, the value difference among members should also be considered so as to avoid interpersonal problems caused by large value difference to further affect the cooperation intention, reduce mutual assistance, sharing, and exchange behaviors, and be averse to innovation behavior.

(2) A high-tech business should set same task objectives and mission for teams and create consistent beliefs for the members in order to promote members' identification and coherence to the team as well as avoid the generation of sub-group in a team. It also allows team members making more efforts for the common objective of the team to enhance the team innovation behavior. A team with diversity would not necessarily acquire the benefits from it when the members could not effectively cooperate.

(3) A high-tech business could hold education training or cross-team discussion and even job rotation to enrich the professional background of members. Furthermore, open and extrovert members would positively affect team innovation. However, to avoid prejudice and misunderstanding caused by large personality difference, the consistency of personality traits should be taken into account when allocating members.

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