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A Research Review on Team Knowledge Heterogeneity

Jie Dong*

Shanghai University, Shanghai 200444, China

Abstract

This study uses the method of literature review to comb the literature on the heterogeneity of team knowledge. The research includes the concept, dimension, measurement of team knowledge heterogeneity, and related research and review. This paper tries to provide some references for the study of knowledge heterogeneity in teams from the perspective of literature review.

Keywords

Team; Knowledge Heterogeneity.

1. Introduction

With the rapid development of knowledge economy in the new era, enterprise employees and managers have gradually realized the importance of knowledge resources. Back in the 1960s, "knowledge will replace land, labor, capital, machinery and equipment as the most important factor of production," the management Peter Drucker once predicted. Enterprises not only need to rely on knowledge resources to build competitive advantage, but also need certain ability to re-create and re-apply knowledge to obtain sustainable competitive advantage (Brown et al. , 2006) .Today, business management is operating as Peter Drucker predicted, and knowledge management is becoming the core of the organization of the future. The most important thing for organization managers in the future is no longer "carrot and stick", but to provide employees with an enabling knowledge management system, that is, an environment and tools for them to be more open and share knowledge information.

The smallest group unit of a knowledge management system is the team of different departments of the enterprise. A "team" is usually a group of two or more employees who work together to achieve certain work goals. Different from the general concept of group, people carry out high task-dependent production activities in a team by using complementary and heterogeneous resources (Alchian & Demsetz, 1972). With the development of the global economy, the characteristics of the organization are gradually becoming knowledge-intensive, team members are increasingly diverse and differentiated from one another in terms of educational background, knowledge, skills, and professional experience (Hors K et al., 2007; Wang Jing, 2020), that is, the majority of real-life teams are heterogeneous teams, and basically there is no complete homogeneity of the people. In addition, studies have shown that knowledge heterogeneity among members is a major component of team research (Mao Qinli, 2012).

2. The Concept of Team Knowledge Heterogeneity

The terms of "information heterogeneity", "deep heterogeneity", "expertise heterogeneity" or "cognitive diversity" are often used in the early research on the heterogeneity of team knowledge. George et al. (1980) was the first to explain the heterogeneity of knowledge, arguing that the inevitable "fragmentation" of knowledge and experience led to differences in team knowledge. Jehn et al.(1999) explained the team heterogeneity from three aspects, the other is information heterogeneity, which refers to the difference in knowledge level caused by the

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different education background, professional experience and professional skills of team members. Paulus & Coskun (2003) divided knowledge heterogeneity into two aspects: educational background and professional knowledge. While Anand & Clark (2003) held that team members' unique knowledge is integrated by team knowledge structure, that is, team knowledge heterogeneity is based on the difference of team members' knowledge structure. Liu Zhou and Chen Shijun (2008) extended the concept of knowledge heterogeneity, and considered that the subjective factors such as values, knowledge basis and the objective factors such as the environment of the subject all belong to this research category. Li Xiaonan et al (2012) narrowed the research scope of team knowledge heterogeneity to the differences of team members' knowledge structure, knowledge background and so on. On this basis, Sun Kai, Liu Yanting and Liu Xiaoting (2016) further standardized the concept, pointing out that knowledge heterogeneity should mainly include team members' cognitive style, education experience and knowledge hierarchy.

3. Dimensions and Measurement of Team Knowledge Heterogeneity

Milliken & Martins (1996) put forward 14 indicators of team heterogeneity, of which 5 indicators are related to the research topic: career background, job background, education background, industry experience and membership status. Jehn & Northcraft (1999) pointed out that the concept of knowledge heterogeneity is like that of information heterogeneity. the research methods of information heterogeneity can be used for reference in the specific measurement, which are mainly carried out from three dimensions: member's educational background, professional background and professional experience. Gu Jiajun and Hu bei (2008) used the Herfindal-Hirschman coefficient, or Blau coefficient, to divide the team knowledge heterogeneity into three dimensions: the heterogeneity of members' educational background, professional background and professional experience. Subsequently, some scholars pointed out that the heterogeneity of team knowledge is the difference of team members' knowledge and experience, and the reason for its existence is related to their work experience, life experience and educational background, etc., team knowledge heterogeneity should be measured by dividing it into knowledge skills, educational background, and professional experience (Wayne Wang, 2011). In addition, some scholars started from the connotation of the heterogeneity of knowledge, according to whether the heterogeneous knowledge can be transferred in a structured way, team knowledge heterogeneity is divided into three dimensions: explicit knowledge heterogeneity, pseudo-tacit knowledge heterogeneity and true tacit knowledge heterogeneity (Wang Yingluo et al., 2002).

Table 1. Measure of knowledge heterogeneity

Variable	Item of measurement
Educational background	CK1: Team members have different educational backgrounds
	CK2: Team members vary widely in their majors
Knowledge and skills	CK3: Team members have a wide range of expertise
	CK4: Team members have different roles depending on their expertise
	CK5: I have a task-related knowledge that no other member has
	CK6: Each member of the team has mission-related expertise
Professional experience	CK7: Team members vary widely in their values
	CK8: Team members differ in their understanding of the task at hand
	CK9: The team members were divided on how to accomplish the task
	CK10: Team members vary widely in what they value most in their teams

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The dimensionality of team knowledge heterogeneity is different between domestic and foreign scholars, but the definition of team knowledge heterogeneity is the same. This study intends to draw on the maturity scale designed by Jehn et al. (1999) and Zhang Gang (2009), as shown in Table 1, which divides team knowledge heterogeneity into three dimensions, specifically: educational background related to personal values, professional experience directly related to the task, and knowledge and skills.

4. Research and Review on the Heterogeneity of Team Knowledge

4.1. Team Knowledge Heterogeneity and Team Performance

After reviewing the researches on the relationship between team knowledge heterogeneity and team performance at home and abroad, I find that the existing researches are mainly discussed from two theoretical perspectives: social classification perspective and information or Decision-making perspective (Williams & o'Reilly, 1998).

4.1.1. Perspective of Social Classification

The social categorization perspective holds that people appreciate each other on the basis of similarity (Pfeffer, 1983). Therefore, a higher degree of knowledge heterogeneity among team members means that there is less similarity between members, which leads to more emotional and relationship conflicts (Jehn et al., 1999; Mannix & Neale, 2005), and reduces team cohesion and commitment (Riordan & Shore, 1997). What's more, membership changes are more likely (Wagner, Pfeffer, & o'Reilly, 1984) . Miller (1998) suggested that differences in cognition and experience among team members lead to more communication costs in the Decision-making process, which in turn reduces team performance.

4.1.2. Information or Decision-making Perspective

Scholars with an information or Decision-making perspective contradict the above comments, and tend to believe that heterogeneous teams tend to have higher team performance than homogeneous teams (DE Dreu & West, 2001). The reason is that heterogeneous teams have a wider range of knowledge, capabilities and skills, and unique knowledge resources do not overlap, but rather provide different perspectives and recommendations for team task execution. Ancona & Caldwell (1992) pointed out that the heterogeneity of a team's knowledge can lead to an unexpectedly divergent perspective, providing a more creative solution. In addition, when team members are exposed to a wealth of resources and knowledge (West, 2002), the cross-fertilization of ideas between team members leads to more team innovation (Perry-smith & Shalley, 2003), which in turn leads to improved team performance.

In summary, the social categorical perspective focuses more on the team relationship dimension, while the information or Decision-making perspective focuses more on the team task dimension (LÜ Jie, 2013), based on a different perspective, researchers hold opposite views on the relationship between team knowledge heterogeneity and team performance. In addition, some scholars believe that there may be some nonlinear relationships between the two, and empirical researchers have found that there is an inverted U-shaped relationship between team knowledge heterogeneity and team performance, it is also moderated by the quality of social networks and the climate for innovation (Xia Han, 2018).

4.2. Team Knowledge Heterogeneity and Team Innovation

The researches on the relationship between team knowledge heterogeneity and team innovation at home and abroad have shown that there is no agreement on the relationship between the two.

ISSN: 2688-9323

4.2.1. Positive Impact

Grimpe (2010) believed that teams with high knowledge heterogeneity have higher internal knowledge mobility, thus innovation performance will be improved. Team members' heterogeneous knowledge, which is closely related to organization and task, is beneficial to their creativity (Gilson & Shalley, 2004). By making up for the lack of enterprise knowledge, the heterogeneous knowledge resources within the team provide more dimensions of the solution strategy, which helps to improve innovation performance (Lin, 2011). In addition, EI Louadi M (2008) proposed that the heterogeneity of team knowledge stimulates managers' creative potential, enhances their innovation ability, and promotes innovation performance.

4.2.2. Negative Impact

Heterogeneous knowledge is not sufficient for innovation at the managerial level of a business (Rodan et al., 2004), heterogeneous knowledge resources from outside costs more in additional costs (Almirall et al., 2010), and conflict between heterogeneous team members can intensify (Tong Zehua, Han Chunhua, 2017). For example, the increase of knowledge conflict hinders the promotion of internal communication by knowledge heterogeneity, thus inhibiting innovation (Huang Qiongya, 2015). Therefore, the promotion of team knowledge heterogeneity to team innovation is not inevitable (Paulus & Coskun, 2003). In addition, If the heterogeneous team is a temporary formation, concepts, or languages outside the common domain of knowledge of team members may be the cause of disagreements or conflicts (Zhang Gang, ni Xudong, 2007), which will have a negative impact on team innovation.

To sum up, the study of the impact of team knowledge heterogeneity on innovation performance and team creativity presents a "double-edged sword" effect.

4.3. Team Knowledge Heterogeneity and Knowledge Sharing

According to the researches on knowledge heterogeneity and knowledge sharing of team members at home and abroad, it is found that there is no agreement on the relationship between them.

4.3.1. Positive Impact

Team knowledge heterogeneity facilitates knowledge exchange and perspective communication among team members (Soekijad et al., 2003; Nonaka I et al, 1995). Based on social exchange theory, both the exchange condition and the exchange motive of team knowledge heterogeneity are beneficial to the knowledge sharing behavior among members (Duan Guang, Yang Zhong, 2014). Team members use communication and communication channels to transfer their heterogeneous knowledge to others and absorb and internalize the heterogeneous knowledge of others (Yangliuqing, 2018). However, Wang Xingyuan et al. (2013) used the method of dividing group knowledge into three dimensions: explicit knowledge heterogeneity, pseudo-implicit knowledge heterogeneity and true tacit knowledge heterogeneity, knowledge sharing is regarded as a part of team interaction, and it is proved that explicit knowledge heterogeneity has no significant effect on knowledge sharing, and pseudo-tacit knowledge heterogeneity helps to promote team knowledge sharing behavior, however, the heterogeneity of true tacit knowledge will hinder the team knowledge sharing process.

4.3.2. Negative Impact

Stasser (1992) found that groups with higher levels of heterogeneity tend to focus only on knowledge resources shared by members, as opposed to groups with lower levels of heterogeneity, and too little attention will be paid to the parts that are not yet universally accepted (Gigone & Hastie, 1993). Too high heterogeneity of team knowledge makes it difficult to share knowledge, which will inhibit the emergence of knowledge sharing behavior (Hamel G, 1991). Members' diverse knowledge backgrounds make it difficult to understand each other's

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proprietary knowledge resources, requiring more time and efforts, and complicating the communication process (Ancona D G et al., 1992).

To sum up, the researches on the influence of team knowledge heterogeneity on knowledge sharing in different problem situations also present a "double-edged sword" effect.

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