Diversity and creativity in cross-national teams: The role of team knowledge sharing and inclusive climate

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Abstract

Diversity literature has demonstrated negative effects of surface-level diversity and positive effects of deep-level diversity. How do two types of diversity among cross national team members influence team knowledge sharing and team creativity? The purpose of this study is to explore conditions that leverage the positive and restrain the negative effects of team diversity on team knowledge sharing, which leads to team creativity. We expect inclusive climate as the significant condition and knowledge sharing as the profound intervening mechanism between team diversity and team creativity relationship. We tested the hypotheses with data from a sample of 60 cross-national research teams from several universities in China. The results support the hypothesized relationships among inclusive climate, team knowledge sharing, and team creativity. Our findings contribute to the advancement of team diversity and team creativity literature, and their theoretical and practical implications are discussed.

Keywords: surface-level diversity, deep-level diversity, team inclusive climate, team knowledge sharing, team creativity

Received 31 August 2015. Accepted 10 August 2016

INTRODUCTION

Organizations are increasingly operating in multicultural and multinational contexts (Tsui, Nifadkar, & Ou, 2007). In 21st century, the metaphor of a 'flat world' (Friedman, 2005) comprehensively represents the contemporary business world. Furthermore, team creativity is very important for organizational performance and their survival in the global market (Shin, Kim, Lee, & Bian, 2012). Therefore, many firms recruit people with specialized expertise and creative potentials, beyond national borders, to develop unique and novel products (Hinds, Liu, & Lyon, 2011). Hence, the need to examine the relationship between team diversity and team creativity is becoming essential more than ever (Jackson, Joshi, & Erhard, 2003). However, team diversity is a double-edged sword and has been a significant challenge in contemporary organizations (Chi, Huang, & Lin, 2009). Despite that comprehensive attention has devoted to diversity–creativity relationship, there is still a relative dearth of exploring mechanism between them (Hoegl, Parboteeah, & Muethel, 2012). Harrison, Price, Gavin, and Florey (2002) and Mannix and Neale (2005) have concluded that demographic (surface level) diversity tends to be more likely to have negative effects and psychological/functional (deep level) diversity mostly positively related to outcomes. Relatively, two questions

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remained unanswered: how organizations can overcome the negative effect of surface-level diversity and leverage the positive effect of deep-level diversity in terms of team creativity?

Although researchers have investigate the influence of team diversity, both surface and deep-level diversity, on team creativity (Harrison et al., 2002; Harrison & Klein, 2007; van Knippenberg & Schippers, 2007; Hoever, van Knippenberg, van Ginkel, & Barkema, 2012; Shin et al., 2012), but the process of diversity–creativity relationship has been, relatively, overlooked. Therefore, researchers have called for investigating the mechanisms and conditions under which organizations can harvest the positive outcomes of team diversity (Schippers, Den Hartog, Koopman, & Wienk, 2003; van Knippenberg & Schippers, 2007; Joshi & Roh, 2009; Shin et al., 2012). Knowledge and information sharing of diverse team members value diversity (Tang & Naumann, 2016) that may lead to team creativity (Cummings, 2004; Tang & Naumann, 2016). Mannix and Neale (2005) demonstrate that carefully examining the mediating mechanism could help to clarify the process between diversity and outcomes. Therefore, how team knowledge sharing mediates the relationship between team diversity (surface level and deep level) and team creativity?

The purpose of this study is to explore the conditions that elevate the positive and dilute the negative effects of team diversity on team creativity. Moreover, we examine the underlying mechanism between team diversity and creativity that explains how team diversity leads to creativity. Team members' perception of team diversity and team climate has important effect on their behavior and outcomes (Schneider & Reichers, 1983; Anderson & West, 1998). Diversity effect relies on perception (Lawrence, 1997), and it reflects the psychological importance and subjective impact of actual diversity. Moreover, Nishii and Mayer (2009) have suggested that an individual feels self-identity and psychological empowerment when s/he perceives inclusion in a diverse group. An inclusion climate makes diverse team members feel less discrimination and facilitates their interpersonal relationship and knowledge sharing. Therefore, team members' perception of team diversity and climate influence their behavior and outcomes.

This study contributes to team diversity and team creativity literature in three ways. First, we investigate and test a model that integrates perceived team diversity and team creativity in cross-national research teams. It provides deep insight into distinct effects of team diversity on team knowledge sharing and creativity. Second, we examine the knowledge sharing as intervening mechanism, which helps to understand the process between team diversity and creativity. Third, we empirically explore the moderating effect of team inclusive climate factor between team diversity and knowledge sharing, which enhances the positive and diminishes the negative effects of team diversity.

THEORETICAL BACKGROUND AND HYPOTHESES

Team diversity and team creativity

Diversity has been defined in several ways; most researchers focused on the effects of diversity, which can result from any characteristic people use to tell themselves that another person is different (Williams & O'Reilly, 1998; van Knippenberg, De Dreu, & Homan, 2004). In our study team diversity is defined as the differences among members of an interdependent work group with respect to specific demographic and psychological attributes (Jackson, Joshi, & Erhard, 2003; Joshi & Roh, 2009). The existing studies predict higher team creativity when team members are different in terms of task-relevant perspectives and knowledge (Hoever et al., 2012). Therefore, work teams can promote creativity through effective cross-fertilization of ideas that are conducive to better decision making and innovation (Shin & Zhou, 2007; Chi, Huang, & Lin, 2009).

Research has concluded that different types of diversity may have different effects on the outcomes (Williams & O'Reilly, 1998). To better understand how diversity influences teams, it is necessary to understand the different types of diversity (Dahlin, Weingart, & Hinds, 2005). Harrison, Price, and

Bell (1998) categorized work group diversity into surface-level diversity and deep-level diversity. Surface-level diversity refers to the extent to which a team is heterogeneous on overt characteristics such as gender, age, physical features, and ethnicity. Deep-level diversity refers to heterogeneity among team members' psychological characteristics such as attitudes, personality, beliefs, and values (Harrison, Price, & Bell, 1998; Harrison et al., 2002).

We emphasize on team members' perception of diversity (surface level and deep level) because it represents their psychological meaning and importance to diversity. Although Tsui, Egan, and O'Reilly (1992) and Williams and O'Reilly (1998) have focused to measure demographic variables (e.g., age, gender, and race) objectively (index), Harrison et al. (2002) suggest that objective and perceived measures of team diversity are significant correlated. Besides, Shemla, Meyer, Greer, and Jehn (2014) argued that focus on objective diversity has challenged and a growing number of researchers are focusing on perceived diversity because people react to their perception of reality rather than reality *per se* (Hobman, Bordia, & Gallois, 2004). Furthermore, Shemla et al. suggested that 'perceived diversity do not only provide an additional set of insights about group composition, it may even offer a superior substitute to objective diversity measures' (2014: 13). Therefore, we consider perceived team surface-level diversity as the extent of perception about demographic (age, gender, race, and nationality) heterogeneity of team members. Whereas we refer perceived team deep-level diversity as the extent of perception about psychological (attitude, personality, and values) heterogeneity of team members (Joshi & Roh, 2009).

Figure 1 shows the theoretical framework of this study.

Team creativity is defined as the joint novelty and usefulness of ideas generated or developed by a group of people (Amabile, Conti, Coon, Lazenby, & Herron, 1996). The relationship between team diversity and creativity has been studied widely; however, relationship was contingent on type of diversity, team setting, and other contextual factors (Hoever et al., 2012; Huang, Po-An Hsieh, & He, 2014). Individual with different knowledge, skills, perspectives, and thinking styles can be hotbeds of team creativity (Shin et al., 2012). The members of cross-nation team possess diverse knowledge, skills, and expertise, which demonstrate value for team creativity. If the cross-national team members effectively cross-fertilize their ideas and knowledge, they will promote team creativity (Shin & Zhou, 2007). Failing to effectively manage team diversity could lead to functional or relational conflict (Jehn, Northcraft, & Neale, 1999). Thus, if the team members suffer from high level of task conflict or relational conflict, they will be less likely to engage in process efficiency or generating novel and useful ideas (Mannix & Neale, 2005; Seong & Choi, 2014).

Drawing on social categorization and information-processing theories, Mannix and Neale (2005) argued that it is almost impossible to understand the diversity-process-outcome link without integrating theoretical perspective, clear context, and team's purpose. Dahlin, Weingart, and Hinds (2005) proposed that effects of surface-level differences are better explained by social categorization theory,
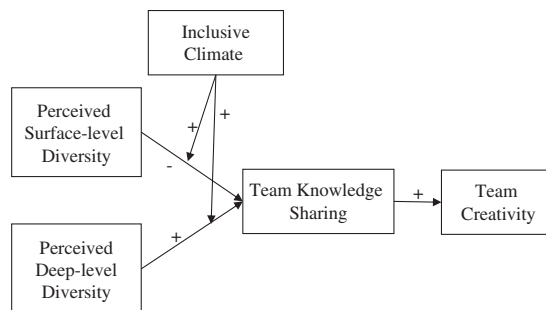

FIGURE 1. RESEARCH FRAMEWORK

whereas deep-level differences are better explained by information-processing theories. Based on the arguments of Mannix and Neale (2005), we expect that surface-level diversity negatively relates to team creativity and deep-level diversity positively relates to team creativity.

The diversity literature demonstrates, people in a diverse group differentiate themselves according to their demographic attributes and characteristics that negatively influence group processes and outcomes (Hogg & Terry, 2000). Furthermore, Dahlin, Weingart, and Hinds (2005) suggested that surface-level diversity is likely to trigger social categorization processes that prevent team members from exploiting the potential benefits of their heterogeneous knowledge, skills, and experiences. The fragmented overt differences among team members will impede social integration and less knowledge and information sharing, which result fewer novel and useful ideas. Creativity is the generation of novel and useful ideas in any domain (Amabile et al., 1996). Therefore, for team to be creative, it is necessary for team members to share and integrate diverse knowledge and skills. Perceived overt differences engender social categorization among cross-national team members that hamper social interaction and restrain knowledge sharing, which impede team creativity. Therefore, we hypothesize

Hypothesis 1a: Perceived surface-level diversity in a cross-national team is negatively related to team creativity.

Harrison et al. (2002) demonstrated that individuals feel, relatively, comfortable to interact with others who have symmetrical psychological characteristics because that interaction reinforces their fundamental values and beliefs. The deep-level diversity characteristics (values, attitudes, knowledge, experience, and personality) represent psychological and cognitive diversity among the team members. The cognitive diversity between the team members engenders problem solving behavior and creativity (Harrison & Klein, 2007; Shin et al., 2012). Variance in team members' knowledge, skills, and experience that diversity brings, according to information and decision-making theories, promotes creativity (Tziner & Eden, 1985). Also, members of a diverse team could have greater access to information networks outside their team (Ancona & Caldwell, 1992) that may lead to team creativity. In this way, deep-level diversity characteristics are positively associated with team creativity. The psychological approach demonstrates that a team composition based on individuals' psychological capital (Post, 2012) promotes creativity, but connecting thinking integration is necessary. Hence, a diverse team's functioning (Perry-Smith & Shalley, 2014), and knowledge variety leverage team creativity and problem solving (Hoever et al., 2012). Thus, we hypothesize

Hypothesis 1b: Perceived deep-level diversity in a cross-national team is positively related to team creativity.

Team diversity and team knowledge sharing

Knowledge sharing is defined as, the exchange/provision of information and know-how to help and collaborate with others to solve problems and develop new ideas (Cummings, 2004). Knowledge sharing occurs through communication and information exchange between individuals. Organizations attempt to remove barriers and promote knowledge sharing among team members to achieve creative performance, which helps to accelerate group processes and creative ideas (Hu & Randel, 2014). The diversity-knowledge sharing relationship is contingent on the form of diversity and team members' perspective on the relationship. Previous studies have found that surface-level diversity is negatively associated with team functioning (Mohammed & Angell, 2004; Casper, Wayne, & Manegold, 2013). For instance, drawing from social identity and social categorization theory (Tajfel, 1978), Harrison et al. (2002) suggested that team members differentiate themselves on the basis of overt demographic characteristics that result in less information sharing among diverse team members (Williams & O'Reilly, 1998; Horwitz & Horwitz, 2007). Based on the arguments above, we hypothesize

Hypothesis 2a: Perceived surface-level diversity in a cross-national team is negatively related to team knowledge sharing.

Hu and Randel (2014) found that social capital, team members' diverse knowledge and integration, is the effective source of knowledge sharing among team members. Cross-national research teams, investigated in this study, have a collaborative work structure and an interdependent task nature. It provides them information about other members' knowledge and values that they can share to complete team task. The diverse knowledge of team members helps develop alternative solutions and resists 'groupthink' in decision processes (Joshi & Roh, 2009). Diverse team members exhibit high knowledge sharing when they have high learning motive and focus less on their social identity (Lin, 2007; Lauring & Selmer, 2012). Deep-level diversity concerns with team members' knowledge, education, and experience, therefore according to information and decision-making perspective deep-level diversity could positively influence team knowledge sharing (Bell & Berry, 2007; Shin et al., 2012). Hence, diversity in deeply embedded factors encourages knowledge sharing. We thus propose

Hypothesis 2b: Perceived deep-level diversity in a cross-national team is positively related to team knowledge sharing.

Team knowledge sharing and team creativity

Knowledge sharing is referred as provision or exchange of ideas and information (Cummings, 2004). Researchers use knowledge sharing among diverse team members to predict team creativity (Hu & Randel, 2014) because knowledge diversity and nonredundant information significantly affect creativity (Hansen, 2002; Shin et al., 2012). Therefore, diverse team members' knowledge sharing can elicit new combinations of ideas and insights (Cummings, 2004), which lead to team creativity. In general, knowledge sharing is one of the fundamental means through which team members can contribute to knowledge applications, innovation, and creativity (Wang & Noe, 2010). Literature has suggested that knowledge sharing enhances creativity and innovation capability (Tsai, 2001). Furthermore, team creativity is also contingent on skills, knowledge, and cognitive diversity of team members (Shin et al., 2012; Perry-Smith & Shalley, 2014). Researchers recognize the fact that knowledge sharing is crucial for knowledge creation (Tsai, 2001; Srivastava, Bartol, & Locke, 2006). Therefore, we hypothesize

Hypothesis 3: Team knowledge sharing in a cross-national team is positively related to team creativity.

The mediating role of team knowledge sharing

Knowledge sharing explains the relationship between diversity and creativity (Hu & Randel, 2014). The social categorization perspective suggests that individuals in a diverse group differentiate themselves according to their demographic attributes and characteristics (Hogg & Terry, 2000) and therefore team members would be less likely to involve or engage in knowledge sharing. When knowledge sharing is rare, diverse team member may not be able to develop novel and unique solutions to problems. In this way, knowledge sharing mediates the relationship between surface-level diversity and team creativity. Thus, we hypothesize

Hypothesis 4a: Team knowledge sharing mediates the relationship between perceived surface-level diversity and team creativity.

However, it has been demonstrated that a diverse team with collective goals outperforms a homogeneous team because diverse team members hold broader range of, nonredundant, task-relevant

knowledge, skills, and abilities (Williams & O'Reilly, 1998). This strengthens the argument that deep-level diversity triggers new thoughts and novel ideas. As argued in the literature, cognitive diversity (deep-level diversity) is positively related to creativity (Shin et al., 2012). The new thoughts and novel ideas will lead to team creativity, when they are shared with other teammates. Therefore, sharing new knowledge and information leads to team creativity. Huang, Po-An Hsieh, and He (2014) have identified knowledge sharing as the intervening mechanism in the diversity–creativity relationship. The value diversity view point (Ely & Thomas, 2001) acknowledges the mediating role of knowledge sharing between diversity and creativity (Lauring & Selmer, 2012). Therefore, we recognize knowledge sharing as an intervening mechanism in deep-level diversity and team creativity:

> Hypothesis 4b: Team knowledge sharing mediates the relationship between perceived deep-level diversity and team creativity.

The moderating role of team inclusive climate

Team inclusive climate is defined as the overall perception of diverse team members of fair treatment, integration of differences, and inclusion in decision making in a team (Nishii, 2013). It is demonstrated that individuals from different backgrounds will outperform, if they are fairly treated, valued for who they are, and included in core decision making (Nishii, 2013). We are drawing on Nishii's (2013) assumptions of inclusive climate, which means in order to reduce problems associated with diversity, conflict, and turnover organizations need to create an inclusive environment. The inclusive environment promotes social and cultural inclusion (Azmat, Fujimoto, & Rentschler, 2014). When cross-national team members perceive that they are fairly treated and valued for who they are, they will tend to consider themselves in-group, commanding respect, and power. These perceptions and intended outcomes will stimulate friendly environment develop psychological safety and promote frequent communication among cross-national team members, which will result in open discussions and knowledge sharing with each other (Ferdman, 2014). It has discussed that the surface-level diversity is negatively associated with team knowledge sharing (Williams & O'Reilly, 1998). To mitigate the social categorization effect and to enhance social cohesion, an inclusive environment is needed (Nishii, 2013). An inclusive climate facilitates social capital development, particularly team-bonding social capital, which is positively associated with team creativity (Han, Han, & Brass, 2014). Hence, team inclusive climate could attenuate the negative effect of surface-level diversity on team knowledge sharing. We thus hypothesize

> Hypothesis 5a: Team inclusive climate moderates the relationship between perceived surface-level diversity and team knowledge sharing in a way that the negative relationship will be mitigated when team inclusive climate is high.

The climate literature argues that an inclusive climate can catalyse the relationship between deep-level diversity and knowledge sharing (Nishii, 2013; Wang, Rode, Shi, Luo, & Chen, 2013). Therefore, we can infer that in a highly inclusive climate cross-national team members engage with each other in more constructive ways. We believe that diverse team members contain and generate new thoughts and novel ideas, but they will share these ideas when feel included in the team. The underlying argument is that the inclusive climate promotes divergent thinking and encourages team members to share with teammates. Based on the arguments above, we propose

> Hypothesis 5b: Team inclusive climate moderates the relationship between perceived deep-level diversity and team knowledge sharing in a way that the positive relationship will be strengthened when team inclusive climate is high.

METHODOLOGY

Sample and procedure

To test our hypotheses, we collected data from cross-national research teams in Chinese universities. The research teams consisted of international and Chinese graduate and postgraduate students working on research projects under their supervisors. We target cross-national research teams because team diversity, both surface and deep level, is more salient in cross-national teams. Tsui, Nifadkar, and Ou (2007) stressed that to achieve true findings research sample must represent characteristics of population and match with study objectives. In intranational teams diversity, especially deep-level diversity, may not be discern. Hence, cross-national teams precisely serve the objectives of this study. Teams were from different fields including life science, engineering, and business and administration. We distributed survey questionnaires to 239 participants that constitute 63 teams. In our study, the supervisor was considered as the team leader. Further, apart from the daily research activities of the team members in their labs, the supervisors hold team meetings for 2–3 h every week during which team members report their research progress and intensively discuss their research ideas with the supervisor and with other team members.

We requested team members to fill in the questionnaire during their break time in daily research activities. The questionnaire was contained in an envelope, and handed over to each team member. Each team member was asked to return the sealed questionnaire envelope to us. To evaluate the level of team creativity, teams' supervisors, the team leaders were requested to evaluate teams' creativity. An envelope containing the team creativity questionnaire, one page description about research, instructions about questionnaire, and prepaid envelope with return address were delivered to each supervisor through personal visit or by mails. We received valid responses from 223 team members (response rate = 93.31%) and 60 team leaders (95.23%). The average size of each team was 3.72 (SD = 0.89). Of the team members, 62.0% were male and the average age was 27.08 years (SD = 3.68).

Measures

Perceived deep level and surface-level diversity

Scale used to measure the perceived deep level and surface-level diversity was adapted from Harrison et al. (2002). The team members rated their responses on a 5-point Likert scale. The questionnaire asked to what extent team members are similar or different, 1 = 'very similar,' to 5 = 'very different,' on seven deep-level diversity variables (personal values, attitude about research work, personality traits, educational background, work commitment, objectives, and priorities at research work). A sample item was 'The personal values of team members are "very similar" to "very different".' Using the same response format, four dimensions measured surface-level diversity (age, gender, race, and nationality). A sample item was 'The age of team members is – ("very similar" to "very different").' We reported the Cronbach's α for perceived surface-level diversity because the perception of team members on four surface-level diversity items was correlated. The Cronbach's α for the perceived deep level and perceived surface-level diversity scales was 0.73 and 0.76, respectively. According to the recommended reliability criteria by previous researchers (Churchill & Peter, 1984), the reliability value, Cronbach's α > 0.70 is acceptable.

Knowledge sharing

We adapted a questionnaire from Chen and Lin (2013) to measure knowledge sharing among the team members. The team members rated their responses on a 5-point Likert scale ranging from 1 = 'strongly disagree' to 5 = 'strongly agree' on four knowledge sharing items (experience, expertise, ideas, and research material). A sample item is 'In our research team, we share our experiences with

each other'. All the items drawn from the mentioned source and text of the items were modified to fit our research context. For example, the original instrument measured ideas sharing as 'We share our ideas about job with one another'. We slightly modified this item to 'We share our ideas about research work with one another'. The Cronbach's α for the team knowledge sharing scale was 0.85.

Inclusive climate
To measure inclusive climate, a shorter version of the scale used by Nishii (2013) was adapted. The team members responded on a 5-point Likert scale ranging from 1 = 'strongly disagree' to 5 = 'strongly agree' on 19 inclusive climate items of three dimensions, equitable practices (four items), integration of differences (eight items), and inclusion in decision making (seven items). Sample items are respectively 'There is fair reward and recognition of activities in our team, Our team has a culture in which members appreciate the differences the members bring to team, and 'In our team member's input is actively obtained and pursued'. The Cronbach's α for equitable practices was 0.90, integration differences was 0.92, and inclusion in decision making 0.92. All three dimensions were highly correlated; therefore, the overall Cronbach's α for the inclusive climate scale was 0.95.

Team creativity
Team creativity was measured using scale developed by George and Zhou (2001). To reduce the potential threat of common method variance (Podsakoff, Mackenzie, Lee, & Podsakoff, 2003), the supervisor of the research team rated team creativity at 5-point Likert scale ranging from 1 = 'strongly disagree' to 5 = 'strongly agree'. The Cronbach's α for the team creativity scale was 0.78. A sample item is 'The team members suggest new ways to achieve goals and objectives'.

Control variables
Several variables were controlled for in order to reduce the concern that those variables may systematically influence the study results. Team leaders' age, gender, education, and tenure were our primary control variables. Also, we controlled for team size because team size may influence the interaction and dynamics among team members (Kwak & Jackson, 2015).

Preliminary analysis
Aggregation of variables at team level
Team creativity was measured at the group level by team supervisors. The remaining variables were measured at the individual level. The literature suggests that there should be agreement within team on responses to variable questions before aggregating any variable to the team level (Harrison et al., 2002). Therefore, to fulfil this assumption, we calculated the intermember agreement (r_{WG}) and reliability interclass correlation (ICC) (1) and ICC (2) indices for each variable that was measured at the individual level.

Table 1 represents the results of the aggregation of the variables. For perceived surface-level diversity the mean r_{WG} was 0.90, which indicates strong agreement within the teams (LeBreton & Senter, 2008). The r_{WG} values were above the conventionally acceptable r_{WG} value of 0.70 (James, Demaree, & Wolf, 1993). In addition, ICC (1), and ICC (2), were 0.35 and 0.70 ($F(59, 163) = 1.52, p < .05$), respectively, for perceived surface-level diversity. The ICC (1), ICC (2), and the mean r_{WG} values for perceived deep-level diversity were 0.38, 0.71 ($F(59, 163) = 1.75, p < .01$), and 0.91, respectively. The ICC (1), ICC (2), and the mean r_{WG} values for team knowledge sharing were 0.47, 0.78 ($F(59, 163) = 2.42, p < .001$), and 0.86, respectively. Similarly, ICC (1), ICC (2), and the mean r_{WG} values for inclusive climate were 0.38, 0.71 ($F(59, 163) = 1.68, p < .01$), and 0.99, respectively. The results confirmed the variables aggregation; hence, we used them at team level.

TABLE 1. AGGREGATION OF VARIABLES

Variables	Between	Within	F	ICC (1)	ICC (2)	r_{WG}	Reliability
Perceived surface-level diversity	39.50	71.86	1.519* (59, 163)	0.35	0.70	0.90	0.73
Perceived deep-level diversity	32.84	51.82	1.751** (59, 163)	0.38	0.71	0.91	0.76
Team knowledge sharing	50.20	57.38	2.417*** (59, 163)	0.47	0.78	0.86	0.85
Team inclusive climate	35.42	58.12	1.684** (59, 163)	0.38	0.71	0.99	0.95
Team creativity							0.78

Note. $*p < .05$, $**p < .01$, $***p < .001$.

TABLE 2. COMPARISON OF MEASUREMENT MODELS

Models	Factors	χ^2	df	$\triangle\chi^2$	RMSEA	IFI	TLI	CFI
Model 1	Four Factors	867.75***	489		0.06	0.90	0.90	0.90
Model 2	Three factors: perceived surface-level diversity and perceived deep-level diversity combined into one factor	944.93***	492	77.18***	0.06	0.88	0.87	0.88
Model 3	Three factors: inclusive climate and team knowledge sharing combined into one factor	1042.33***	492	174.58***	0.07	0.85	0.84	0.85
Model 4	Two factors: perceived surface-level diversity and perceived deep-level diversity combined into one factor; inclusive climate and team knowledge sharing combined into one factor	1,119.46***	494	251.71***	0.08	0.83	0.82	0.83
Model 5	One factor: all variables combined into one factor	1,478.73***	495	610.98***	0.10	0.74	0.72	0.74

Note. RMSEA = root mean square error of approximation; IFI = incremental fit index; TLI = Tucker–Lewis index; CFI = comparative fit index.
$***p < .001$.

Confirmatory factor analysis

Before testing the relationships among the constructs, we assessed their distinctiveness using confirmatory factor analysis. Against the baseline model of four factors (Model 1), we examined four alternative models (Models 2–5). Overall model fit was assessed by the comparative fit index (CFI), incremental fit index (IFI), Tucker–Lewis index (TLI), and root mean square error of approximation (RMSEA) (Marsh & Hau, 1996). The confirmatory factor analysis model is considered good fit when RMSEA is below 0.08 and IFI, TLI, and CFI values surpass 0.90 (Ngo, Foley, & Loi, 2009). As shown in Table 2, the nested models exhibited significantly worse fit than the baseline model, as seen from the significant χ^2 difference tests and model fit indices. The baseline model of four factors fitted the data well ($\chi^2 = 867.75$, $df = 489$, RMSEA = 0.06, IFI = 0.90, TLI = 0.90, CFI = 0.90). The standardized loadings of all indicators on their specified constructs were significant at the 0.01 level.

Since common method variance (Podsakoff et al., 2003) is considered a potential threat to the validity of research findings, we minimized this issue in two ways. First, we collected data from two sources: research team members and their immediate supervisor (Richardson, Simmering, & Sturman, 2009). Second, we used the Harman (1960) single-factor test to examine the potential influence of common method variance. Results of our exploratory factor analysis using all variables in this study, yielded four factors with eigenvalues >1 that accounted for 55.75% of the total variance, with the first

factor accounting for 35.76% of the variance. Therefore, a single factor did not emerge and one factor did not account for the bulk of the variance.

RESULTS

Descriptive statistics

Table 3 presents the means, standard deviations and intercorrelations of all variables in the study. Specifically, as hypothesized, the zero-order correlation between perceived surface-level diversity and team creativity was –0.18 ($p < .05$). This shows a significant negative association between team surface-level diversity and team creativity. The correlation was 0.21 ($p < .05$) between perceived deep-level diversity and team creativity, showing a significant positive association between team deep-level diversity and creativity. The correlation was 0.55 ($p < .001$) between team knowledge sharing and team creativity, showing a significant positive association between team knowledge sharing and creativity.

Moreover, other results were consistent with and provided initial support for our hypotheses.

Hypothesis testing

We used multiple regressions to test the hypotheses. The results are shown in Table 4. In model 2, perceived surface-level diversity was negatively related to team creativity ($\beta = -0.32$, $p < .05$). The Hypothesis 1a was supported. Further, we found perceived deep-level diversity was positively related to team creativity ($\beta = 0.32$, $p < .05$). Hence, Hypothesis 1b was supported.

Moreover, in model 2 of knowledge sharing, perceived surface-level diversity was negatively related to team knowledge sharing ($\beta = -0.31$, $p < .05$). This supports Hypothesis 2a. Perceived deep-level diversity was positively related to team knowledge sharing ($\beta = 0.52$, $p < .05$), supporting Hypothesis 2b. In model 3 of team creativity, we found that team knowledge sharing was significantly related to team creativity ($\beta = 0.41$, $p < .05$). It is supporting Hypothesis 3. We tested the mediating hypotheses, following the causal steps outlined by Baron and Kenny (1986). When team knowledge sharing was entered in a regression equation with team surface level and deep-level diversity, the relationship with team creativity became nonsignificant ($\beta = -0.19$, NS), ($\beta = 0.10$, NS), respectively. While team knowledge sharing remained positively related to team creativity ($\beta = 0.41$ $p < .05$). It supports Hypotheses 4a and 4b.

Results for the moderator hypotheses are shown in Table 4. Following the requirements recommended by Edwards and Lambert (2007), we tested the moderation of inclusive climate on the relationship of perceived diversity and knowledge sharing. The interaction between perceived surface-level diversity and team inclusive climate was positively related to team knowledge sharing ($\beta = 0.36$, $p < .01$). Hence, Hypothesis 5a is supported.

We plotted simple slopes following the procedure suggested by Aiken and West (1991) at one standard deviation above and below the mean for team inclusive climate, shown in Figure 2. The plots show that perceived surface-level diversity is more strongly associated with team knowledge sharing for a higher level of team inclusive climate.

Similarly, following the same procedure for testing Hypothesis 5a, we run the moderation model to test Hypothesis 5b. As shown in Table 4, the interaction between perceived deep-level diversity and team inclusive climate is positively related to team knowledge sharing ($\beta = 0.24$, $p < .05$). Thus, our Hypothesis 5b is supported. We again plotted the simple slopes for the relationship, shown in Figure 3. The plots show that perceived deep-level diversity is more strongly associated with team knowledge sharing for higher level of team inclusive climate.

TABLE 3. DESCRIPTIVE STATISTICS, ZERO-ORDER CORRELATIONS, AND α RELIABILITY COEFFICIENTS

Variables	Mean	SD	1	2	3	4	5	6	7	8	9	10
Leader-level variable												
1. Gender	0.38	0.49										
2. Age	27.08	3.68	−0.01									
3. Education	2.49	0.59	0.09	0.56***								
4. Tenure	1.96	1.11	0.01	0.32***	0.44***							
Team-level variable												
5. Team size	3.72	0.89	0.18	−0.27	0.01	−0.04						
6. Perceived surface-level diversity	3.65	0.42	−0.06	0.24	0.16	0.04	−0.30*	(0.73)				
7. Perceived deep-level diversity	3.43	0.39	0.01	0.21	0.03	0.14	−0.41**	0.14	(0.76)			
8. Team knowledge sharing	3.77	0.46	0.14	−0.23	−0.18	−0.09	−0.13	−0.15	0.44***	(0.85)		
9. Inclusive climate	3.72	0.40	0.14	−0.18	−0.21	0.08	0.21	−0.28*	0.13	0.48***	(0.95)	
10. Team creativity	3.65	0.39	0.06	−0.28*	−0.04	−0.07	−0.04	−0.18*	0.21*	0.55***	0.13	(0.78)

Note. *$p < .05$, **$p < .01$, ***$p < .001$.

TABLE 4. THE REGRESSION RESULTS

Variables	Team creativity			Team knowledge sharing			
	1	2	3	1	2	3	4
Control variables of leaders							
Gender	0.09	0.06	0.01	0.18	0.13	0.11	0.23*
Age	−0.34*	−0.30*	−0.19	−0.29	−0.27*	−0.24	−0.25*
Education	−0.01	0.02	0.07	−0.16	−0.13	−0.08	−0.16
Team size	−0.11	−0.05	0.02	−0.31*	−0.15	−0.20	−0.16
Main variables							
Perceived surface-level diversity		−0.32*	−0.19		−0.31*	−0.24*	−0.37**
Perceived deep-level diversity		0.32*	0.10		0.52***	0.44**	0.31*
Mediator							
Team knowledge sharing			0.41*				
Moderator							
Team inclusive climate						0.28*	0.21
Two-way interaction							
Perceived surface-level diversity × team inclusive climate							0.36**
Perceived deep-level diversity × team inclusive climate							0.24*
R^2	0.11	0.28	0.37	0.17	0.48	0.55	0.64
ΔR^2	0.11	0.17*	0.09*	0.17	0.31***	0.06*	0.09*
F	1.32	2.77*	3.44**	2.35	6.72***	7.23***	7.77***

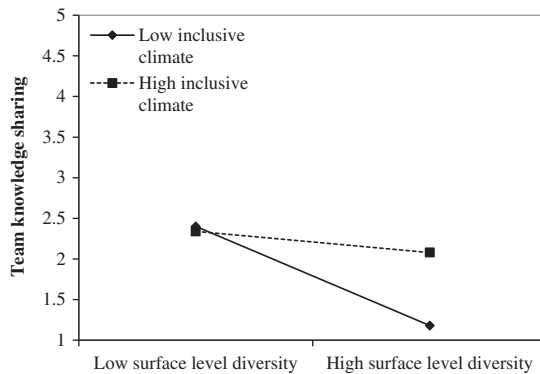Note. *$p < .05$, **$p < .01$, ***$p < .001$.

FIGURE 2. THE MODERATING ROLE OF TEAM INCLUSIVE CLIMATE IN THE RELATIONSHIP BETWEEN PERCEIVED SURFACE-LEVEL DIVERSITY AND TEAM KNOWLEDGE SHARING

Robust test and analysis

Link between objective and perceived surface-level diversity

We used perceived diversity in cross-national teams to examine the relationship and mechanism between team diversity and creativity. To insure the relationship between team members' perception of team diversity and objective team diversity on demographic characteristics (age, gender, race, and nationality), we conducted regression (Harrison et al., 2002). We used Blau's (1977) index of heterogeneity $(1 - \sum Pi^2)$ to calculate objective surface-level diversity (gender, race, and nationality)
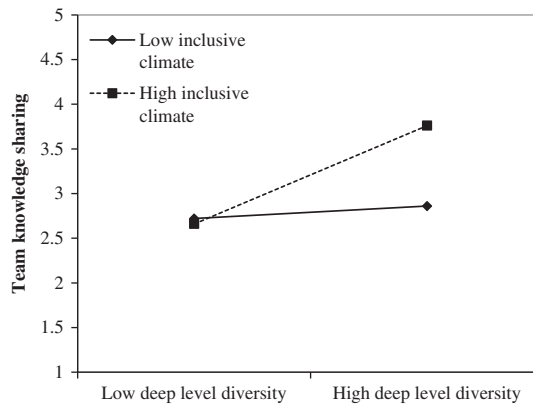
FIGURE 3. THE MODERATING ROLE OF TEAM INCLUSIVE CLIMATE IN THE RELATIONSHIP BETWEEN PERCEIVED DEEP-LEVEL DIVERSITY AND TEAM KNOWLEDGE SHARING

TABLE 5. REGRESSION ANALYSES OF ACTUAL SURFACE DIVERSITY ON PERCEIVED SURFACE DIVERSITY

Independent variable	Perceived surface-level diversity
Control	−0.31**
Team size	
Actual diversity	
Surface level	
Age (SD)	0.32***
Gender index	−0.13
Racial index	0.42***
Nationality index	0.36***
Adjusted R^2	0.60***
F	
All (actual) surface level	18.77***

Note. **$p < .01$, ***$p < .001$.

following the recommendations of Seong, Kristof-Brown, Park, Hong, and Shin (2015). In this formula, Pi is the proportion of a group in each of the i categories on the group. To reflect diversity in age of team members, we used within-group standard deviations. Peacocke's (2001) asserted that the perceptual manifestation of concept significantly represents its objective characteristics. In the Table 5, regression coefficients are significant between objective surface-level diversity (age, racial, and nationality indices) and perceived surface-level diversity. Our robust test shows that the measurement of perceived surface-level diversity is as valid and effective as the objective surface-level diversity.

DISCUSSION

We theoretically presented and empirically examined a model of perceived diversity and team creativity in which team knowledge sharing mediated the relationship. Moreover, we also found that inclusive climate moderates the relationship between perceive diversity and team knowledge sharing. Our findings make some significant contributions to team diversity and creativity research.

Contributions

Our investigation makes three contributions to the literature on team diversity and creativity. First, we established and tested a conceptual model that integrates team perceived diversity and team creativity in cross-national research teams. Our findings demonstrated that surface-level diversity and deep-level diversity have different effects which are consistent with the findings of Harrison et al. (2002). Our findings indicated that surface-level diversity negatively influenced team knowledge sharing and team creativity. Several scholars have agreed that surface-level diversity stimulates social categorization (Chatman & Flynn, 2001; Bell, Villado, Lukasik, Belau, & Briggs, 2011), which may restrain team knowledge sharing, creativity, and innovation. We also found that deep-level diversity was positively related to team knowledge sharing and creativity, which is consistent with the findings of previous studies (Shin et al., 2012; Han, Han, & Brass, 2014). The differentiated effect of perceived surface level and deep-level diversity contributes to diversity and creativity literature. The differentiated effect of diversity provides theoretical grounds that could help future research to examine diversity relationship with innovation, performance, conflict, and trust.

Second, we ascertained the relationship between team diversity and creativity through knowledge sharing. Based on information and decision-making perspective, knowledge sharing mediates the relationships of team perceived diversity (surface level and deep level) and creativity. Team diversity has been recognized as an important factor of team creativity (Shin et al., 2012). Examining knowledge sharing as an intervening factor in cross-national team diversity (surface level and deep level) and creativity strengthens existing research findings (Cummings, 2004). It indicates that knowledge sharing in diverse team affects team creativity. This investigation thus explains a new perspective on understanding how team diversity influences team knowledge sharing, and consequently enhances team creativity. These findings contribute to team diversity–creativity relationship and information perspective.

Third, to our best knowledge, our study is the first in the diversity–creativity literature that empirically investigated a contextual factor, inclusive climate, in cross-national teams. It extends Nishii's (2013) line of thinking and responds to her call for investigating the moderating effects of inclusive climate in group processes and outcomes. We found that the inclusive climate attenuated the negative association between surface-level diversity and knowledge sharing. Thus, high level of inclusive climate diminishes the detrimental effect of demographic diversity. Inclusive climate facilitates deep-level diversity among cross-national team members that could result high team knowledge sharing and may lead to team creativity. Our findings contribute to the research of Shore, Randel, Chung, Dean, Holcombe Ehrhart, and Singh (2010) and Nishii (2013) to investigate the conditions under which team diversity positively relate to creativity. This study also contributes to inclusion literature that inclusive climate is a significant contextual factor that leverages potential of diversity in cross-national teams.

Taken all together, team inclusive climate explained the condition that overcomes the negative effect of perceived surface-level diversity and boosts the positive effect deep-level diversity on knowledge sharing. Consistent with the trailblazer (Nishii, 2013), we found that inclusive climate reasonably explains the context when team perceived diversity positively influences team knowledge sharing, which may lead to team creativity.

Implications

Our investigation sheds additional light on diversity–creativity relationship. Consistent with Harrison et al. (2002), surface-level diversity and deep-level diversity have effect differently. It is very important to know how different types of team diversities influence team creativity (Lauring & Selmer, 2012).

Team knowledge sharing found intervening mechanism that explained the relationship between team diversity and team creativity. The major theoretical implication of this investigation is the contextual factor, inclusive climate, under which positive influence of team diversity nurtures. In line with Nishii's (2013) assumptions, our results provided evidence that inclusive climate leverage positive, and retain negative effects of diversity.

We have demonstrated that team creativity is very important for organization. Our findings implied that team surface level and deep-level diversity could affect team outcomes differently. Thus, managers should consider different outcomes of different diversity type. Hence, they should facilitate the conditions for positive outcome of diversity and compose the team with right mix of diversity (Cheng, Chua, Morris, & Lee, 2012). We found that knowledge sharing was the intervening between team diversity and creativity. It showed how team diversity affects creativity. Thus managers should pay more attention to the mechanism of diversity–creativity relationship. They should seek to promote knowledge sharing among the diverse team members, such as encourage communication, frequent meetings, and collective work, to leverage team creativity. As our findings suggested that inclusive climate significantly moderates team diversity and knowledge sharing relationship. The managers should cultivate an inclusive climate in cross-national teams by appreciating the members' differences, providing them equal opportunities, and involving in decision making.

Limitations and future directions

There are some limitations of this study. First, the external validity of the research findings may be a concern because of the use of a cross-national student team sample. We precisely took special care to sample cross-national research teams which were working on combined projects. The research teams would exist whether or not we conducted this research. Researchers (Harrison et al., 2002; Han, Han, & Brass, 2014) have used similar typologies and stressed that student samples can express the characteristics of the work force. Future research should use research teams from business organizations, research institutes, and R&D centers to explore the cross-national team diversity and creativity. Second, subjective measures for team creativity were used because teams included in the sample were from different fields. However, we used widely accepted proxy measures for team creativity (George & Zhou, 2001), rating by a team supervisor. Future research could use objective measures of creativity (patents, applied patents, copy rights) from same field. Third, we found knowledge sharing to be a mediating mechanism between cross-national team diversity and creativity. Perry-Smith and Shalley (2014) and Zhou, Shin, Brass, Choi, and Zhang (2009) demonstrated that heterogeneous team members' network structure potentially influence team outcomes. We predicted inclusive climate moderated the relationship between cross-national team diversity and knowledge sharing. Future research should analyze moderation–mediation or mediation–moderation models. Future studies should use other variables such as team integration, conflict, person-group fit, trust, better communication, and organization climate as intervening and contextual variables to better understand diversity–creativity relationship. We studied cross-sectional phenomena between diversity and creativity in cross-national teams. Future researcher should use a longitudinal design to investigate the relationship between team diversity and creativity, following Harrison et al. (2002). Over time, examination of cross-national team diversity and creativity phenomena could provide new insights of how creativity evolves in diverse teams.

Conclusion

Our results present compelling evidence of the relationship between perceived team diversity and creativity. This study demonstrates meaningful different effect of perceived surface level and deep-level

diversity on team knowledge sharing and creativity. We found negative effect of perceived surface-level diversity and positive effect of perceived deep-level diversity on team knowledge sharing and creativity. Team knowledge sharing is identified as significant intervening mechanism that prudently explain the relationship between perceived team diversity (surface level and deep level) and team creativity. Most importantly, the inclusive climate is found prominent condition that dilutes the negative effect of perceived surface-level diversity and elevates the positive effect of perceived deep-level diversity on team knowledge sharing. Overall, our study suggests that different effect of team diversity (surface level and deep level) offers more realistic findings and explaining mechanism and boundary condition in diversity–creativity relationship portraits comprehensive approach.

ACKNOWLEDGEMENTS

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