EMPOWERING TEAMS THROUGH SOCIAL NETWORK TIES

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ABSTRACT:
Effective teamwork and knowledge coordination are becoming increasingly important for all kinds of organizations given the growing use of teams to tackle competitive challenges and sustain competitive advantage. In this study, we develop and validate a model of how two types of social network ties - expressive and instrumental - contribute first to three dimensions of a transactive memory system (TMS) – specialization, credibility and coordination within teams – and subsequently to team efficacy and performance. We tested the model in an empirical study drawing on data from 66 teams in a variety of organizations. The results suggest that both instrumental and expressive ties within teams can facilitate the formation of TMS and the three dimensions of TMS are all, yet to different extents, positively related to team efficacy. Team efficacy is also a powerful predictor of team performance.

Keywords:
Instrumental ties, expressive ties, transactive memory system, team efficacy

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1   INTRODUCTION

In an era where collaboration is crucial to organizational effectiveness, teams are widely employed in organizations, especially in knowledge intensive organizations (Leonard-Barton and Sensiper, 1998). The increased emphasis on teams has aroused substantial interest in exploring determinants of team performance for both organizational researchers and practitioners (Kozlowski and Ilgen, 2006; Zhang et al., 2007). As knowledge is a critical asset for teams and is often distributed across team members, ensuring that the right knowledge is available to the right person at the right time is vital if teams are to be successful (Kwan and Balasubramanian, 2003). In this context, the transactive memory system (TMS) (Wegner, 1987) has been proposed to address the issue of knowledge coordination and utilization by interpreting how team members encode, store, retrieve and integrate knowledge (Hollingshead, 2001).

Wegner (1987) defined the TMS as a combination of knowledge possessed by each individual and a collective awareness of who knows what. He argued that this system provides individuals with access to a vast amount of knowledge that no one individual could possess. Since Wegner's (1987) original study, researchers have paid considerable attention to TMS. In general, TMS is considered to have three aspects: specialization, credibility and coordination (Moreland and Myaskovsky, 2000). Researchers argued that TMS has the potential to allow team members to develop and be aware of each other's specialized expertise, confide in each other's competence and reliability, and integrate each other's knowledge together in a coordinated manner (Akgun et al., 2005; Zhang et al., 2007). In a team with a well developed TMS, individual members greatly enhance their capabilities by: taking advantage of each other's knowledge; reducing each individual's cognitive load; and creating a knowledge system that is larger and more powerful than any of the individuals' own memory systems. Taken together, the resulting TMS enables the team to perform effectively and efficiently.

Most previous researchers studying TMS concentrated on the influence of contextual factors on the development of a TMS. Shared task training, team member familiarity, face-to-face communication and task interdependence have been all articulated to be positively associated with the development of a TMS (Akgun et al., 2005; Jackson and Klobas, 2008; Sharma and Yetton, 2007; Zhang et al., 2007). However, Huang (2009, p.324) found that most previous TMS research tended to "focus on group cognitive interdependence while minimizing member affective states and relationships"; this suggests the existence of a research gap, which we found inspiring. In China, it is notable that interpersonal relationships are crucial for business operations and task completion (Park and Luo, 2001). Previous research has successfully showed that interpersonal relationships among team members have the power to smooth the flow of all kinds of resources within teams (Balkundi and Harrison, 2006); the ties among team members can facilitate knowledge sharing activities (Borgatti and Cross, 2003) and promote interactions within the team, which enables team members to have an accurate understanding of others' expertise and stimulate their commitment to the team. Thus, it is essential to understand the role of social network ties on the development and utilization of TMS.

In the Chinese context, there are two basic forms of interpersonal relationships, involving instrumental and expressive ties (Hwang, 1987; Wong et al., 2007). The former is work related, while the latter is more associated with socio-emotional attachment. Instrumental ties are thought to be conduits of resource flow and pathways

of work-related advice (Ibarra, 1993). In contrast, expressive ties are more affect-laden, and characterized by emotional intimacy and expectations of mutual altruistic behavior (Gibbons, 2004). Previous scholars have explicitly called for new research to pay attention to the expressive dimensions of relationships in networks and suggest that appropriate expressive ties for instrumental purposes might have unintended consequences on performance related outcomes (Cross and Cummings, 2004). In particular, the distinctions between instrumental ties and expressive ties may have important implications for teams in terms of the three aspects of TMS, as the specialization and coordination are work related while credibility is more affect laden. Thus, in this paper, we separately investigate the impact of these two types of ties on the development of TMS.

Besides TMS, team efficacy has also emerged as a critical motivator of team performance. Derived from social cognitive theory (Bandura, 1997), team efficacy is an extension of self-efficacy from the individual level to the collective level. Team efficacy refers to a team's "shared belief in its conjoint capabilities to organize and execute courses of action required to produce given levels of attainment" (Bandura, 1997, p. 477). Though TMS and team efficacy are both significant predictors of team performance, previous research suggested that TMS is a team cognitive process (Kozlowski and Ilgen, 2006), while team efficacy represents a team's "emergent state" (Marks et al., 2001). Team emergent state is different from team cognitive processes, as emergent state describes "cognitive, motivational, and affective states of teams, as opposed to their member interaction" (Marks et al., 2001, p. 357). They argued that a team's emergent state can be influenced by team cognitive processes. This indicates that TMS may influence the team efficacy, which is congruent with Gibson and Earley's (2007) suggestion. Nevertheless, little research has empirically investigated the relationship between TMS and team efficacy. All of these factors stimulate our interest in research on the mediating effect of team efficacy on the relationship between three dimensions of TMS and team performance.

This paper aims to answer the following research questions, viz.: (1) How do interpersonal factors – instrumental ties and expressive ties – influence the development of TMS? (2) How do the three dimensions of TMS influence perceived team efficacy? (3) To what extent do TMS and team efficacy contribute to team performance? In answering these questions, we expect this study will contribute to the both the theory and practice of team performance by interpreting the influences of interpersonal relationships and the formation of TMS and team efficacy which may greatly impact on team performance. In the next section, we will review the relevant literatures. Following this, we will construct the research model and develop the hypotheses. The empirical test of the research model will also be described. The results will then be presented, followed by the discussion of the theoretical and managerial implications, and future research directions.

2   THEORETICAL DEVELOPMENT AND HYPOTHESES

In this section, we draw on social network theory and transactive memory theory to articulate the effects of social network ties on TMS development and the influence of TMS and team efficacy on team performance for work teams. We propose that TMS serves as underlying mechanism through which two types of social network ties exert an impact on team outcomes. The model also considers the mediating role of team efficacy between the three dimensions of TMS and team performance. We summarize the research model in Figure 1.
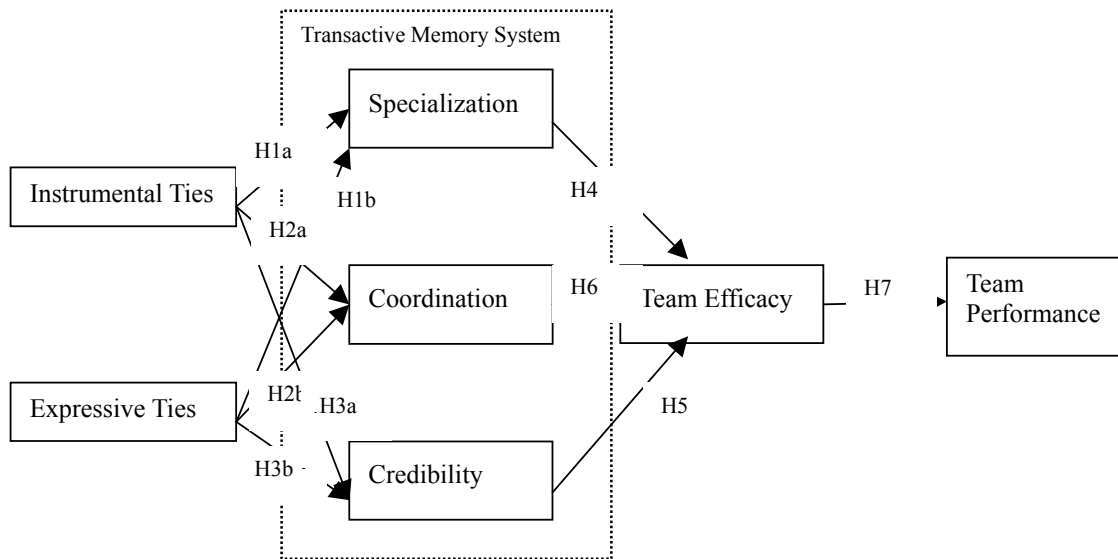
Figure 1: Proposed Research Model

2.1 The Effects of Social network ties on TMS

Previous studies distinguished two different types of guanxi in China based on the tie content, viz. expressive ties and instrumental ties (Hwang, 1987; Wong et al., 2007). Instrumental ties typically arise in the workplace and emerge in the context of formal work relationships; they are more likely to link people who have different backgrounds, areas of expertise or cultural status (Manev and Stevenson, 2001). Instrumental ties can be used to facilitate the transfer of physical, informational or financial resources within units; they are recognized as pathways of work related advice and knowledge (Ibarra, 1993; Umphress et al., 2003). On the other hand, expressive ties involve people who exchange feelings and satisfy their need for care, social support and a sense of belonging (Berman et al., 2002; Manev and Stevenson, 2001; Umphress et al., 2003).

People will be more aware of and value to a greater extent the expertise and specialized knowledge of their ego-centric networks than that of people with whom they are less familiar (Borgatti and Cross, 2003). The instrumental ties within teams allow team members to have more work related communication and resource exchange activities, which facilitates their mutual understanding of each others' roles in the team, expertise and experience, and even others' external personnel resources. The expressive ties among team members can also release work-related information. When team members have many instrumental and expressive links with others, they may have a good 'map' of others' expertise and even be able to anticipate others' work performance; team members may then concentrate on and bear the obligation of developing their own expertise in order to refine their own job performance and enhance their personal specialization. This leads to our first two hypotheses:

H1a: Instrumental ties within teams are positively related to specialization in teams.

H1b: Expressive ties within teams are positively related to specialization in teams.

In general, a dense network of ties within the team may result in better team coordination due to fewer conflicts and a greater degree of collective action (Reagans

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and Zuckerman, 2001). In particular, people who have instrumental ties tend to be involved in resource exchange and advice seeking. The frequent work related communication and interaction can facilitate the comprehension of each other's knowledge, reduce misunderstandings and keep every member informed about the problems that arise as well as current procedures. This may have the consequential effect of enhancing coordination. On the other hand, expressive ties may lubricate the coordination processes, since parties with dense expressive ties always involve open communication, emotional attachment and intimacy (Gibbons, 2004) and are more motivated to provide assistance to or support each other. Accordingly, we propose:

H2a: Instrumental ties within teams are positively related to coordination in teams.

H2b: Expressive ties within teams are positively related to coordination in teams.

As Kanawattanachai and Yoo (2007) suggest, the dimension of credibility of TMS bears considerable resemblance to cognition-based trust. Previous research has empirically tested the effect of instrumental and expressive ties on trust in co-workers (Lin, 2007; Zhou et al., 2010). When people are instrumentally associated with each other, they may be more inclined to have regular communication concerning their approaches to tasks and problems, as well as job-related information, which have been demonstrated to lead to the formation of cognition-based trust (Butler and Cantrell, 1994; Kanawattanachai and Yoo, 2007). Moreover, people are more likely to confide in others who have similar missions, attributes and values to themselves (Marsden, 1988). Meanwhile, the intimacy and expectations of partners' altruistic behaviours embedded in the expressive ties can create shared understanding, clear communication, and acceptance of partners' viewpoints (Gibbons, 2004). Since friends usually behave altruistically towards each other, faith in friends' good intentions probably increases the tendency and willingness to consider and trust their suggestions and performance. Correspondingly, we suggest:

H3a: Instrumental ties within teams are positively related to credibility in teams.

H3b: Expressive ties within teams are positively related to credibility in teams.

2.2 The Effects of TMS on Team Efficacy

Previous research suggests that, in a team, collective awareness of team members' specialized knowledge likely contributes to team efficacy (Gibson and Earley, 2007). They articulate that "as team members develop a fine-tuned set of skills applicable to a key task objective and are aware of the abilities each will contribute, the group will develop a correspondingly higher degree of certainty that they can achieve a task objective" (ibid., p. 443). Specialization makes it possible for individual team members to construct a profound level of knowledge in their own area of responsibility. Accordingly, every member may have the self-efficacy to do their own job well, which greatly contributes to the development of team efficacy (Fernández-Ballesteros et al., 2002). Furthermore, if team members have specialized knowledge that others do not have, the division of the whole task will be more efficient and role ambiguity will be greatly reduced. These differentiated aspects of knowledge and clear role divisions provide a group with the ability to cope with new tasks more implicitly and promote their confidence in dealing with any task related problems effectively. These arguments lead to the following hypothesis:

H4: Specialization in teams will positively influence team efficacy.

Credibility and team efficacy both involve people's faith in the ability and reliability of other team members or the whole team. Previous research has demonstrated that interpersonal trust is linked to a number of behaviours, including organizational citizenship behaviours, a desire for future interaction and knowledge sharing within teams (Naquin and Paulson, 2003; Staples and Webster, 2008). Lin and Peng (2010) have successfully illustrated that organizational citizenship behaviours can "strengthen both team cohesion and the team's confidence in task performance". Durham et al. (1997) also provided indirect evidence of the importance of credibility for team efficacy: in their experiment, they found that perceived leader ability and member ability influenced team performance indirectly through their effects on team efficacy. Thus, we argue that if one has the perception that everyone else in the team can do their own job well, his confidence that the whole team can perform well would be high. Here, we hypothesize that:

H5: Credibility in the team will positively influence team efficacy.

The importance of coordination for team efficacy has been well recognized. "Groups composed of self-efficacious members may not necessarily develop high collective efficacy if there is unsatisfactory interaction and coordination" (Alavi and McCormick, 2008). Lin and Peng (2010) also argued that team efficacy is not merely an aggregation of personal judgments concerning capabilities, but an emergent team level state that results from interpersonal interaction and coordination. Lester et al. (2002) provided indirect support for the significance of fluent coordination on team efficacy; they found that coordination during the early stages of task interaction is significantly related to group potency (general beliefs in a group's effectiveness). The high efficiency of mobilizing resources and expertise also promotes their confidence in the group's capacities. Team members who work in a coordinative manner are more likely to work towards a common goal and share common believes of their capability (Lester et al., 2002). Thus, we propose:

H6: Coordination in teams will positively influence team efficacy.

2.3 The Influence of Team Efficacy on Team Performance

Teams with high collective efficacy are more likely to strive to accomplish their assigned tasks and fulfil their obligations (Bandura, 1986). When encountering failure, high collective efficacy teams demonstrate more "staying power" to overcome difficulties (Bandura, 2000) rather than exhibit withdrawn behaviours. These arguments were further justified by Stajkovic et al. (2009) who summarized that collective efficacy can influence "a group to initiate action, how much effort the group will exert, and how long the group's effort will be sustained". There is also some empirically evidence for these propositions. Gibson et al. (2000) found a positive relationship between collective efficacy and team outcomes such as time to completion, process effectiveness, and perceived team performance; this relationship was further confirmed by Fuller et al. (2007) who suggested that team efficacy could influence group performance through the mediating effect of effort and team member communication. In a meta-analysis of the collective efficacy research, Stajkovic et al. (2009) further verified the positive relationship between team efficacy and team outcomes. Here, we propose:

H7: Team efficacy is positively related to team performance.

3   METHODOLOGY

3.1   Measurement and Data Collection

In order to test our model, a survey was conducted. We developed our questionnaire primarily from previously validated measures. 7-point Likert scales anchored from "strongly agree" to "strongly disagree" were used to measure all items. The independent variables - instrumental ties and expressive ties - are measured with items adapted from Manev and Stevenson (2001). The questions about the two dimensions of transactive memory system - specialization and credibility - are based on the work of Lewis (2003). The coordination items are taken directly from the study of Kanawattanachai and Yoo (2007) on task knowledge coordination. The measures of team efficacy are derived from Salanova et al.'s (2003) work on collective efficacy. Team performance is measured by two dimensions covering team effectiveness and team efficiency, which are drawn from previous work of Jung and Sosik (2002) and from Hoegl and Gemuenden (2001). All construct items were originally developed in English, so we translated the instrument into Chinese and then performed a back translation to ensure equivalence of meaning between the English and Chinese versions.

We first identified organisations that are engaged in knowledge work and where teams are employed in normal business processes from many cities in China. We contacted a total of 43 companies of which 36 agreed to participate in the research. We explained the purpose of the research to the potential respondents and assured them that all the data collected would be kept confidential. In total, 309 responses were received from employees working in 72 teams. After deleting data from teams where less than 3 complete questionnaires were received or where questionnaires were incompletely answered, our final data set consisted of 284 individuals from 66 teams in 34 companies. The number of respondents from a team ranges from 3 to 16. The demographic characteristics of these 284 respondents are presented in Table 1.

3.2   Measurement validity and reliability

We use PLS to conduct the data analysis because it supports both confirmatory and exploratory research (Gefen et al., 2000). We at first tested the content validity and convergent validity based on the individual data. Confirmatory factor analysis of constructs showed that the loadings of one item for specialization and two items for credibility were lower than the acceptability level. Thus, we dropped these three items from further analysis.

3.2.1   Aggregation

Since the unit of analysis in this study was the team, individual responses were aggregated to create a team level score. After the adaptation of the instrument, we then calculated inter-team-member agreement (r_{wg}) for the variables to ensure that individual level data was appropriately aggregated into the group level based on the suggestion of James et al. (1984). Generally, aggregation is considered appropriate when the median r_{wg} of the scale is greater than 0.7 (George, 1990). Calculation results show that r_{wg} medians of instrumental ties (0.857), expressive ties (0.798), specialization (0.802), credibility (0.848), coordination (0.802), team efficacy (0.823), teamwork efficiency (0.912) and teamwork effectiveness (0.827) were all greater than 0.7, which warrants our aggregation approach. Thus, we averaged each individual's variable scores in the same team for the team level score.

Table 1 Demographic Information

Measures	Items	Frequency	Percent	Measures	Items	Frequency	Percent
Gender	Male	180	63.4%	Age range	18-25	131	46.1%
	Female	104	36.6%		26–35	123	43.3%
					36–45	25	8.8%
					46 and above	5	1.8%
Education level	Primary/ secondary school	4	1.4%	Position	Non-Management Employee	232	81.7%
	College	56	19.7%		Manager	46	16.2%
	Undergraduate	194	68.3%		Senior or Executive Manager	6	2.1%
	Master or above	30	10.6%				
Industry Type of the teams	Manufacturing	11	16.7%	Team Location	Zhengzhou (N)§	8	12.1%
	IT industry	28	42.4%		Shenzhen (S)	6	9.1%
	Education	4	6.1%		Fuzhou (E)	8	12.1%
	Construction	9	13.6%		Haikou (S)	4	6.1%
	Finance and Banking	7	10.6%		Beijing (N)	7	10.1%
					Shanghai (E)	10	15.1%
	Logistics and Transportation	5	7.6%		Qingdao (E)	9	13.6
	Others	2	3.0%		Chengdu (W)	9	13.6
					Wuhan (C)	5	7.6
Number of Employees	50 or below	13	4.6%	Team size	10 or below	24	36.36%
	51-100	90	31.7%		11- 20	29	43.94%
	101-500	63	22.2%		21-30	9	13.64
	501-1000	53	18.7%		31 or above	2	3.03
	1001 or above	65	22.8%				
Note: N = North; S = South; E = East; W = West; C = Central							

3.2.2   Measurement model

After aggregation of individual level data into the team level, we examined composite reliability and the average variance extracted (AVE) to assess convergent validity of the team level data. Table 2 below shows our composite reliability values, Cronbach's alpha scores and AVE scores; all scores are above the acceptability level. In addition, all the weights and loadings of the measures are also above the acceptable level. Finally, we measured the square root of the AVE for each construct to assess discriminant validity (see Table 3). These square roots were larger than the correlations between constructs, which confirms discriminant validity.

Table 2 Results of Confirmatory Factor Analysis

Measures	No. of items	Cronbach's alpha	Composite reliability	Average variance extracted
Instrumental ties (IT)	4	0.917	0.943	0.806
Expressive ties (ET)	4	0.909	0.936	0.786
Specialization (SPE)	4	0.706	0.818	0.532
Credibility (CRE)	3	0.908	0.943	0.846
Coordination (COO)	4	0.894	0.928	0.764
Team efficacy (TE)	3	0.932	0.957	0.881
Team performance (TP)	6	0.844	0.893	0.809

Further, as several inter-construct correlations were higher than 0.60, we then analyzed the Variance Inflation Factors (VIFs) and the tolerance values to test for potential multicollinearity. The results showed that the highest VIF was 4.245, well below the 10.0 threshold, and the lowest tolerance value was 0.236, well above the benchmark value of 0.10. Thus, multicollinearity was not a significant problem in this research.

Table 3 Correlations of Latent Variables

	IT	ET	SPE	CRE	COO	TE	TP
IT	0.898						
ET	0.403	0.887					
SPE	0.619	0.519	0.729				
CRE	0.560	0.588	0.581	0.919			
COO	0.668	0.537	0.600	0.649	0.874		
TE	0.729	0.484	0.659	0.709	0.715	0.939	
TP	0.653	0.463	0.653	0.683	0.618	0.714	0.899
Note. The numbers in the diagonal row are square roots of the average variance extracted.							

3.2.3 *Structural model*

After examining the measurement model, we tested the hypotheses proposed before with PLS. The results are shown in Figure 2. With respect to the antecedents of specialization, both instrumental ties and expressive ties are significantly related to specialization. This indicates that both H1a and H1b are supported. However, the instrumental ties are much more important than expressive ties when considering their impact on specialization. As for credibility, H2a and H2b are both supported, suggesting that instrumental ties and expressive ties are both important predictors of credibility. For coordination, both instrumental ties and expressive ties are significantly related to it. Thus, H3a and H3b are both supported. However, the instrumental ties play a more important role than expressive ties for smooth coordination.

When considering the influence of the three dimensions of TMS on team efficacy, all relevant hypotheses – H4, H5 and H6 – are supported, which demonstrates that specialized expertise among team members, trusting beliefs of other members' dependability and coordinative work style are significant precursors of team efficacy. Finally, team efficacy and team performance are significantly related, which accords with prior research.
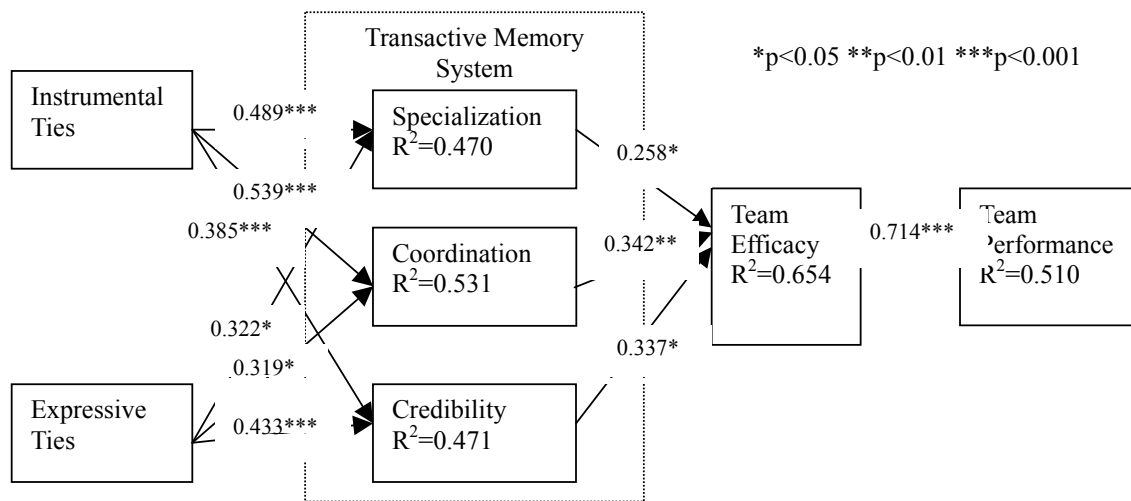
Figure 2: Results of PLS Analysis

We also tested the mediation effect of team efficacy between the three aspects of TMS and team performance. The three-step method was used following the suggestion of Baron and Kenny (1986). The results are shown in Table 4.

Table 4 Results of Mediating Effect Tests

IV	M	DV	Coefficient in Regressions				Mediating
			IV→DV	IV→M	IV+M→DV		
					IV	M	
SPE	TE	TP	0.336**	0.261**	0.268*	0.301*	Partial
CRE	TE	TP	0.368**	0.335**	0.270*	0.301*	Partial
COO	TE	TP	0.182*	0.343***	0.068	0.301*	Full
Note 1: *** significant at the 0.001 level; **significant at the 0.01 level; *significant at the 0.05 level.							

4 DISCUSSION

The effects of two kinds of social network ties on three aspects of TMS were investigated in the Chinese context. Instrumental ties are confirmed to be significantly related to specialization. This is consistent with prior research (Kanawattanachai and Yoo, 2007), where it is suggested that task related communication is beneficial for virtual team members as they develop an expertise map of who knows what. When members are aware of others' knowledge, they may devote themselves to develop and refine their own domains of expertise. With respect to the significant relationship between expressive ties and specialization, this is contrary to the suggestions of Kanawattanachai and Yoo (2007) that expressive ties among team members may cause members to focus primarily on the surface-level diversity which may hinder their ability to take advantage of other's deep work related expertise and knowledge. We argue that when co-workers cultivate better relationships with each other, they may have more outside-work interactions, as well as workplace interactions, which will facilitate their understanding of each other's experiences. Actually, in many cases, expressive ties can contribute more advantage than instrumental ties to the transfer of tacit knowledge (Zhou et al., 2010). Thus, expressive ties can also facilitate awareness of others' knowledge.

We found that both instrumental ties and expressive ties contribute to credibility in other team members. This is consistent with Zhou et al.'s (2010) findings that both instrumental ties and expressive ties are important predictors of cognitive-based trust. However, the significance of expressive ties for credibility is contrary to Kanawattanachai and Yoo's (2007) suggestion that socio-emotional communications may obstruct the development of cognition-based trust. Individuals establishing close friendships with co-workers create a potential subgroup that is likely to yield trust among them through their expressive interactions (Lin, 2007).

We also observed that both instrumental ties and expressive ties are critical precursors for coordination in teams. This finding is in accordance with prior studies in the Chinese context (Chen and Peng, 2008), where they proposed that close guanxi between co-workers might lubricate processes of coordination and cooperation for task accomplishment. It implies that though instrumental ties among team members provide basic conduits for task based communication that are critical for coordination, expressive ties can smooth the process since expressive ties can facilitate the transmission of tacit knowledge, simplify coordination and avoid potential conflicts (Borgatti and Foster, 2003). However, expressive ties among people also suffer from some limitations. Expressive ties often lead to similar perspectives towards work (Gibbons, 2004) and may lead to knowledge redundancy (Reagans and Zuckerman, 2001). Thus, for team coordination which requires diverse knowledge from different team members, instrumental ties can provide more diverse task based knowledge, which is more important than the benefits of mutual social support derived from expressive ties.

The significant impacts of three dimensions of TMS on team efficacy are confirmed. Among the three dimensions, coordination plays the most important role for team efficacy; the significance of credibility is slightly lower than coordination and specialization is the least influential. The results imply that not only can the formation of TMS give inspiration to team construction and teamwork processes, but also it can promote a team's motivational state. It is clear that team efficacy has a significant relationship with team performance.

Interestingly, we found that team efficacy fully mediated the relationship between coordination and team performance. Previous research indicates that team efficacy can influence what people do and how much effort they will put into work as a team member (Bandura, 1997). Thus, team efficacy is a very important antecedent of team performance. These results therefore extend previous research on predictors of team performance by indicating that important function from both team coordination and team efficacy. However, we do not have an explanation for why team efficacy fully mediated coordination yet only partially mediated other factors from TMS. Accordingly, we suggest that future research needs to be conducted in this area in order to elicit further insights into these relationships.

5   IMPLICATIONS

This study makes several important contributions to the study of social networks and TMS. Firstly, most prior studies focused on the impact of contextual factors on the development of TMS, but tended to neglect interpersonal factors among team members. The current research is therefore an initial effort to fill this gap and indicates that the two social network ties – instrumental ties and expressive ties – are both critical to the formation of TMS, though to different extents and following different mechanisms.

Secondly, unlike other previous research that typically bundled the three dimensions of TMS together, in this study we found that they are distinct from each other – and so should be treated separately. They are influenced differently by the two types of social network ties and each has a different impact on team outcomes. Thirdly, previous research just articulated the importance of social networks on teams; however, the underlying processes and mechanisms by which the social network ties exert their influence on team outcomes are not very clear. Our study demonstrates that the ties within teams can help team members understand others' knowledge and refine their own expertise, stimulate them to confide in others' expertise and ease the coordination process. Consequently, the team's emergent state - team efficacy - may increase, and team performance tends to be enhanced. Furthermore, Argote et al. (2003) argue that social relationships might have an impact on knowledge management outcomes and call for further research into the effect of relationships in the knowledge management area. Our research responds to their call by integrating two kinds of social relationships into the TMS framework.

Most prior research about TMS has been undertaken in Western cultures and in controlled settings. Only one study about TMS has been conducted in the Chinese context (Zhang et al., 2007). Research into transactive memory theory in China is thus rather weak. As China is noted for its high levels of in-group collectivism (Triandis, 1989), where collective interests are superior to individual interests, it is critical to investigate the two group level concepts - TMS and team efficacy - on team outcomes. This paper broadens our understanding of team work in China, and demonstrates that TMS and team efficacy have significant impacts on team outcomes. Furthermore, we demonstrate that a Western-derived theory, incorporating three dimensions of TMS can be effectively applied in the Chinese context.

Our research provides a number of implications for practice. Firstly, the direct impact of team efficacy and indirect influence of TMS on team performance has been demonstrated. Organizations, particularly those that take advantage of teams to accomplish tasks, should try to improve team efficacy and pay attention to the development of teams' TMS or even organizational TMS. More specifically, managers should consider developing and disseminating web-based directories of team members' respective knowledge, experience, skills and expertise. Tasks can then be assigned based on members' experience and expertise. A trusting atmosphere is also critical for teamwork. To improve team efficacy, the development of a TMS is important. Besides a TMS, managers should also demonstrate empowering leadership, since this has been confirmed to improve team efficacy (Srivastava et al., 2006). The development of team members' self efficacy is also conducive to the formation of team efficacy (Fernández-Ballesteros et al., 2002).

Owing to the significance of instrumental ties and expressive ties for the development of TMS, managers should encourage team members to have more work related communication and interaction. It will be beneficial for organizations to have frequent formal meetings that give every member the opportunity to demonstrate their expertise and cultivate a mature climate of knowledge seeking and sharing. As for the formation of expressive ties, managers should arrange some organizational off work activities for employees, such as get-together dinners and sightseeing tours that promote the emotional attachment among co-workers.

6   LIMITATIONS AND FUTURE RESEARCH

This study suffers from several limitations. Firstly, we rely on perceptive data. These subjective measures may not fully indicate the actual objective reality. In addition, while we only collected cross-sectional data at one time, the development of TMS is likely to evolve over time (Kanawattanachai and Yoo, 2007). It is worthwhile to undertake a longitudinal study to investigate the impacts of different kinds of social network ties on the development of TMS. Lastly, the study was conducted in a specific context, Chinese teams. Thus, readers should be cautious when generalizing the results to different cultural contexts. As mentioned above, TMS also involves several information processes, viz., encoding, storing, retrieving and integrating. Future research can investigate the influence of social network ties on different TMS processes.

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