THE OTHER SIDE OF THE COIN: TRANSACTIVE MEMORY SYSTEMS AND THE PREVENTION OF RESOURCE LOSSES

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ABSTRACT

From transactive memory systems (TMS) theory, TMS indirectly enhances team performance by diminishing resources losses from conflict involvement. Survey data of 107 project management teams and archival team performance reveals conflict involvement mediates the relationship between TMS and team performance, highlighting a role for TMS in reducing intrateam conflict involvement.

INTRODUCTION

The use of work teams has expanded (Sundstrom, De Meuse, & Futrell, 1990), leading to intense focus on team performance drivers (e.g., Kozlowski & Ilgen, 2006; Mathieu, Maynard, Rapp, & Gilson, 2008; Salas, Stagl, & Burke, 2004), including the use of resources such as time, attention and energy (Lewis & Herndon, 2011). Transactive memory systems (TMS) help teams manage resource scarcities (Faraj & Sproull, 2000; Lewis, Lange, & Gillis 2005; Moreland 1999). TMS is "a social network of individual minds" (Wegner, 1987; p. 206) where members maintain a cognitive expertise directory and develop routines to coordinate expertise (Brandon & Hollingshead, 2004; Lewis & Herndon, 2011).

Although TMS helps mobilize resources (e.g., Faraj & Sproull, 2000; Hollingshead, 1998; Lewis, Belliveau, Herndon, & Keller, 2007; Lewis et al., 2005), little research has focused on the role of TMS in preventing *resource losses* from disagreements over the coordination of tasks (i.e., intrateam conflict - Jehn, Rispens, Jonsen, & Greer, 2013). Intrateam conflict is the perception of values, viewpoints, and preferences incompatibility (Carnevale & Probst, 1998), Jehn, 1995; Jehn & Mannix, 2001), and can divert resources away from productive activities (Shaw, Zhu, Duffy, Scott, Shih, & Susanto, 2011). Here, we investigate the role of conflict involvement in the TMS- team performance relationship.

BACKGROUND AND THEORETICAL DEVELOPMENT

TMS and Team Performance

Individuals tend to divide responsibility for learning, remembering, and communicating information for joint tasks (Wegner, 1987; Wegner, Giuliano, & Hertel, 1985). When TMS is present, members interact with one another and have a shared understanding of "who knows what." In a TMS members have differentiated expertise, rely on others' credible task-knowledge, and coordination their expertise (Lewis, 2003). Not surprisingly, TMS is consistently related to team performance (e.g., Austin, 2003; Ellis, 2006; Lewis, 2003; Moreland, 1999; Moreland, Argote, & Krishnan, 1998; Zhang, Hempel, Han, & Tjosvold, 2007).

TMS and Intrateam Conflict Involvement

Intrateam conflict depletes resources (de Wit, Greer & Jehn, 2012), and may spread throughout a team (Jehn, 1997; Smith, 1989), increasing conflict involvement. Conflict can be focused on task, relationship, or process issues (Jehn, 1995; Jehn & Mannix, 2001). We expect that teams with TMS have lower conflict involvement. TMS increases the transparency of domain responsibility, without which members are more likely to disagree about task assignments, task processes, and task objectives.

Inaccurate understandings of "who knows what." With inaccurate or incomplete understanding of who is responsible for what, members tend to spend more time searching for information and seeking expertise from non-experts. This can lead to frustration and anger, and the spread of relationship conflict. Misperceptions of expertise assignments also may lead to misrouting of information to the wrong members and misunderstandings regarding work load. This can lead to members feeling responsible for the same domain, and process conflicts.

Low knowledge credibility. TMS requires established credibility in specific areas. Inaccurate assumptions and doubt of others' expertise may lead to comparing and contrasting disputed expertise with information from third parties (Hollingshead, 1998). This increases the likelihood that members will have different viewpoints concerning tasks, increasing task conflict involvement. When credibility is in doubt, clear-cut responsibilities are difficult to establish, leading to misunderstandings and greater process conflict involvement (Jehn et al., 2013).

***Coordination problems*.** Finally, when a TMS is poorly developed errors in encoding, storage, and information retrieval are more likely to emerge. When members fail to retrieve accurate/useful expertise, waste time searching for expertise, or have difficulty integrating their expertise, this can increase process conflict involvement. When it's realized that no one has key information, this can also lead to "naming and blaming," and spread interpersonal tensions and anger, and relationship conflict involvement, leading to the following:

Hypothesis 1: TMS is negatively related to intra-team a) task, b) relationship, and c) process conflict involvement.

Intrateam Conflict Involvement and Team Performance

Conflicts divert scarce resources from core tasks. As intrateam conflict involvement spreads, fewer resources are available for team tasks (De Dreu & Weingart, 2003; de Wit et al., 2012). Conflict involvement can restrict information processing. Members may withdraw from coordinated information processing, leading to reescalation of conflict and further withholding of critical information (Sparrowe, Liden, Wayne, & Kraimer, 2001). The more team members that are involved conflicts, the greater the resource depletion, leading to the following:

Hypothesis 2: Intrateam a) task, b) relationship, and c) process conflict involvement are negatively related to team performance.

Mediating Role of Intrateam Conflict Involvement

Finally, we propose that the performance benefits of TMS emerge because it diminishes intrateam conflict involvement, and the resource losses typical to teams experiencing conflict.

Without TMS, performance suffers in part because conflicts consume resources otherwise directed toward task activities, leading to the following:

H3: The positive relationship between TMS and team performance is mediated by intrateam a) task, b) relationship, and c) process conflict involvement

METHODS

Sample and Data Collection

Study data were collected from 107 project teams (590 members) engaged in enterprise resource planning software implementation. Respondents filled out a pre-project questionnaire, mid- and post-project surveys.

Measures

Transactive memory systems. Participants responded to Lewis' (2003) 15-item TMS measure on a five-point scale ranging from 1 (strongly disagree) to 5 (strongly agree). We averaged team-member responses to form a composite TMS score. ICC(1) = 0.17, ICC(2) = 0.96 and r_{wg} = 0.84 (with 88% exceeding the .70 threshold) justified aggregation; α = .97.

Intrateam conflict involvement. We operationalize conflict involvement as the density of team's conflict "networks," reflecting member's perception of conflict with each team member, which is computed as a ratio of the number of dyadic ties relative to the total number of possible ties n (n - 1), where n = members in a team. Respondents rated the extent (1 = not at all to 5 = to a great extent that they had conflict with each team member. Following previous research (e.g., Seibert, Kraimer, & Liden, 2001; Zhou, Shin, Brass, Choi, & Zhang, 2009), values > 2 were coded as having a conflict tie: 45.2% of the dyadic relationships a task-conflict tie, 63.6% had a relationship-conflict tie, and 50.5% had a process conflict tie.

Team performance. Projected project cost was subtracted from total project cost and this difference was divided by projected costs, resulting in a percentage difference, with values ranging from 17% under- to 64% over-budget. We subtracted the percent over/under budget value from the sample maximum (64%), and divided this value by the range of sample values (i.e., 81% = 64% + 17%), resulting in a performance range from 0 to 1.00, where 1.00 indicates the team most *under* budget (-.17) while 0 indicates the team that was most *over* budget (.64).

Control variables. We controlled gender diversity (Jehn et al., 2010), calculated as the percentage of females on the team and team size (Palazzalo, 2005).

RESULTS

Means, standard deviations and correlations are presented in Table 1.

Insert Table 1 about Here

Tests of Hypotheses

We ran a hierarchical regression models to test H1qa-H1c. TMS was negatively related to task- (Model 2: β = -.24, p < .05) and relationship conflict involvement (Model 4: β = -.22, p < .05), proving support for H1 a and b.

Insert Tables 2 and 3 about Here

We tested H2a-H2c regressing team performance on conflict involvement. In support of H2a & b, results in Table 3 indicate that both intrateam task (β = -.23, p < .01) and relationship conflict involvement (β = -.28, p < .01) negatively predicted team performance. Hypothesis 3c was not supported (β = -.04, *n.s.*). To test H3a-c we first followed Baron and Kenny (1986). As

can be seen in Table 3, TMS predicted team performance (Model 3: $\beta = .35$, $\Delta R^2 = .11$, $p < .001$), and in Model 4, in the presence of the three mediators, the TMS-performance relationship dropped in significance ($\beta = .26$, $p < .01$.), indicating that task and relationship conflict involvement mediate the TMS-team performance relationship.

To provide a most stringent test, we followed Edwards and Lambert (2007), which allowed us to tests for the total indirect effects of TMS through the mediators as a set. Utilizing the PROCESS routine (Hayes, 2012), we conducted bootstrapping path analysis for indirect effects. Using linear regression with maximum likelihood estimates, 95% bias corrected confidence intervals, and 5000 bootstrap samples we find support for the indirect TMS-performance relationship through task and relationship conflict involvement. A confidence interval excluding zero revealed a significant *total indirect effect* of TMS on team performance through the *combined effects* of task and relationship conflict involvement (coefficient = .04, CI = .007, .077). Confidence intervals excluding zero indicate that TMS indirectly impacts team performance through task conflict involvement (coefficient = .02, CI = .001, .048) and through relationship conflict involvement (coefficient = .02, CI = .001, .056). As a set task and relationship conflict involvement mediate the relationship between TMS and team performance.

DICUSSION

TMS is negatively related to task and relationship conflict involvement, and both form of conflict involvement are negatively related to team performance. Task and relationship conflict involvement *as a set* also mediate the TMS-team performance relationship. The indirect positive effect of TMS on performance emerges through a negative relationship of TMS with conflict involvement, and a negative relationship of conflict involvement with team performance.

We conceptualize TMS as a meta-resource that can increase resources available for core tasks, and also decrease expenditure of resources on unproductive activities such as conflict involvement. TMS emergence may be a proactive strategy to acquire, protect, or prevent the loss of resources (Hobfoll, 1989; 2001). We employ this meta-resource framing to integrate discrete streams of research in the intrateam conflict and TMS areas.

Future research may utilize this frame to explore the resource conservation properties afforded by TMS on team processes other than conflict, such as counter-productive work behaviors (Dalal, 2005) or self-regulatory failure (Muraven & Baumeister, 2000). TMS may be at least in part, as a consequence of tactical resource investments that support the maintenance of a directory of 'who knows what' (Lewis & Herndon, 2011). Managers seeking to help teams conserve resources may actively facilitate investments in the processes and structures underlying TMS. Managers may reward employees for the development and sharing of explicit member expertise maps that codify the informal domain differentiation characterized by TMS. Managers may provide teams with information systems software (Maruping & Agarwal, 2004) to facilitate the development of electronic information catalogues that facilitate the movement of new, incoming information to the right member expert. Managers also may facilitate updating in the TMS network's structure by actively encouraging team members to share what they know with other members (Lee, Bachrach, &Lewis, 2014). Although suggestive, the current design does not definitively support causal inferences. It will be important for future, longitudinal research to measure conflict involvement and TMS at multiple points in time. It will also be important for future research to incorporate a wider breadth of teams to increase the generalizability of the results we report.

REFERENCES AVAILABLE FROM THE AUTHORS

Table 1

Means, Standard Deviations, and Correlations of all Study Variables

Variable	Mean	Std Dev	1	2	3	4	5	6
1. Team Size	5.52	1.24						
2. Gender	0.26	0.19	.06					
3. Intrateam Task Conflict Involvement	0.46	0.34	.-.05	-.10				
4. Intrateam Relationship Conflict Involvement	0.65	0.34	-.05	.05	.02			
5. Intrateam Process Conflict Involvement	0.49	0.32	-.16	.03	-.03	-.09		
6. Transactive Memory System	2.44	0.53	-.32***	-.12	-.18*	-.18*	.06	
7. Team Financial Performance	0.45	0.21	.18*	.00	-.23**	-.29**	-.04*	.25*

N = 107 * $p < .05$. ** $p < .01$. *** $p < .001$.

Table 2

Hierarchical Regression Results for the Relationship between TMS and Intrateam Conflict Involvement

	Task Conflict Involvement		Relationship Conflict Involvement		Process Conflict Involvement	
Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Team Size	-.05	-.13	-.07	-.14	-.17*	-.18*
Percent Female	-.10	-.12	.06	.03	.04	.04
Task Conflict Involvement			.02	-.03	-.03	-.04
Relationship Conflict Involvement	.02	-.03			-.10	-.10
Process Conflict Involvement	-.03	-.03	-.10	-.10		
TMS		-.24*		-.22*		-.02
Total R^2	.01	.06	.02	.06	.04	..04
ΔR^2	.00	.05*	.01	.04*	.01	.00
F	.340	1.353*	.400	1.182*	.990	.792
Df	4, 102	5, 101	4, 102	5, 101	4, 102	5, 101

Note: Standardized regression coefficients are shown. $N = 107$. TMS = Transactive Memory System.

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

Table 3
Mediated Regression Results for the Effects of TMS on Team Performance

Variables	Model 1	Model 2	Model 3	Model 4
Controls				
Team Size	.18*	.15	.29**	.24**
Gender	-.01	-.02	.03	.02
Main				
TMS			.35***	.26**
Mediators				
Intrateam Task Conflict Involvement		-.23**		-.17*
Intrateam Relationship Conflict Involvement		-.28**		-.23**
Intrateam Process Conflict Involvement		-.05		-.04
Total R^2	.03	.16	.14	.22
ΔR^2	.03	.13**	.11***	.06**
F	1.806*	3.891**	5.636***	4.593***
Df	2, 104	5, 101	3, 103	6, 100

Note: Standardized regression coefficients are shown. Listwise $N = 107$.
* $p < .05$. ** $p < .01$. *** $p < .001$.

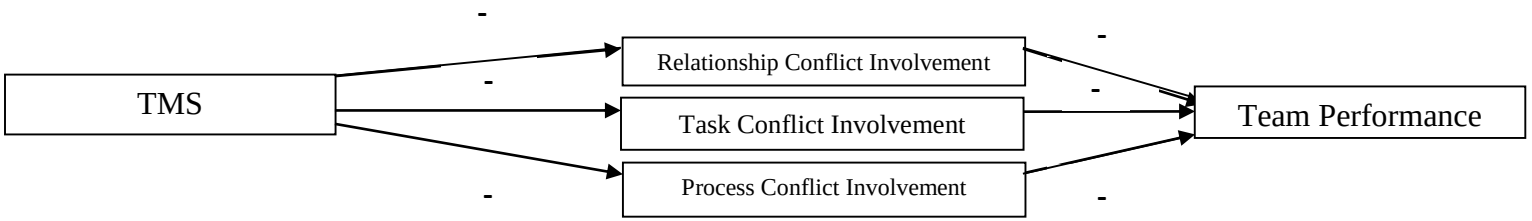

Figure 1. A Mediation Model of TMS, Intrateam Conflict Involvement, and Team Performance