A MULTI-LEVEL MODEL OF TRANSFORMATIONAL LEADERSHIP AND TEAM OUTCOMES: A KNOWLEDGE-FOCUSED PERSPECTIVE

By

YUAN JIANG

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ABSTRACT OF THE DISSERTATION

A Multilevel Model of Transformational Leadership and Team Outcomes: A Knowledge-Focused Perspective

By YUAN JIANG

Dissertation Director:

Professor Susan E. Jackson

Despite a large literature on leadership and team dynamics respectively, research examining leadership and knowledge-oriented team processes and outcomes has been limited. In this dissertation, I focused on transformational leadership (TFL) style and its influence on psychological and behavioral processes as well as team outcomes of performance and learning. Taking a multi-level approach to leadership, I examined TFL at both individual and team levels, and its relationships to collaborative norms, knowledge sharing, team goal commitment, individual learning and team performance. Results confirmed the roles of process variables as important mediating mechanisms between leader behaviors and team outcomes. In addition, I found that team knowledge sharing had particular relevance to team performance when tasks presented high levels of knowledge intensity. This dissertation extends our knowledge about effects of leader behaviors by attending to multi-level leadership processes and a knowledge-work boundary condition.

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CHAPTER ONE: INTRODUCTION AND DISSERTATION OVERVIEW

Over the past few decades, one of the most prominent phenomena in business organizations is that they have adopted team-based structures to organize their production processes, to service their customers, and to learn and grow in the long run (Cohen & Bailey, 1997; Osterman, 1994). Effective teams, or teamwork, may facilitate flexible work arrangements and complex task accomplishment, as well as act as a source of dynamic capability that ensures organizational long-term effectiveness (Teece, Pisano, & Shuen, 1997). To date, management scholars have extensively investigated teams as both production units and social systems (see Ilgen, Hollenbeck, & Johnson, 2005), focusing on both their internal processes (e.g., Marks, Mathieu, & Zaccaro, 2001) and external environment (e.g., Ancona & Caldwell, 1992a).

Of the many functions of team-based systems, the creation, dissemination and application of knowledge have recently been among the top priorities that many firms are striving for in order to create a knowledge-based competitive advantage (Barney, 1991; Dierickx & Cool, 1989; Grant, 1996b; Nonaka, 1994). Contemporary firms, in order to successfully achieve their strategic imperatives, have to manage intensive knowledge flows by engaging their employees in knowledge-oriented behaviors such as sharing and applying knowledge (Argote, Gruenfeld, & Naquin, 2001). Team-based work systems, by enhancing connections and collaborations among people and different units, can serve as a functional structure that facilitates collective knowledge creation and utilization (Mohrman, Cohen, & Mohrman, 1995). Consequentially, in order to meet the environmental demands and adapt to team-based structures, managers, especially those who directly lead a team, need to develop their toolkit to effectively manage teams as a

whole, and team members as individuals. During their interactions with team members, leaders' behaviors can influence others' emotions, attitudes, and performance (Bass, 1990).

1.1 Value of Team-Based Structure

The value of team-based structures in organizations engaged in knowledge-based competition has received much theoretical attention. Drawing on organizational theory (March & Simon, 1958) and the resource-based view (Barney, 1991), Grant (1996a, 1996b) suggested that the essence of organizational capability is the integration of individual-held knowledge. Knowledge per se does not create a competitive edge. It is the integrative mechanisms in the form of coordinating teamwork that results in value creation.

Further, Nonaka and Takeuchi (1995) discussed knowledge creation and transformation and argued that, since tacit knowledge is difficult to convey in explicit mechanisms such as presentations and documents, firms that depend more on tacit knowledge to compete and that embed the knowledge in their people or the networks that involve people can minimize knowledge spillover to other firms. Similarly, Argote and Ingram (2000) also suggested that tacit knowledge in these networks is the most difficult to transfer or copy. Therefore, teams can be used as an integrative mechanism—a way of organizing to leverage individual members' knowledge towards value creation. The contribution and focus of this dissertation research is to examine team processes and outcomes from a knowledge management perspective and study an important phenomenon—leadership—as an antecedent of team processes and outcomes.

1.2 Knowledge Team versus Knowledge Intensity of Team Tasks

The role of teams or team-based structures in knowledge-work settings has been highlighted and investigated by management scholars. Certain types of teams--including research teams, new product development teams, cross-functional project teams, and management consulting teams--have been referred to as *knowledge teams*. Examining the composition, structure, processes and innovative outcomes has been the major focus of research on knowledge teams (Ancona & Caldwell, 1992a, 1992b; Denison, Hart, Kahn, 1996; Dougherty, 1992; Hansen, 1999; Hansen, Mors, & Løvås, 2005; Keller, 1992, 2001; Mohrman et al., 1995)

However, the importance of knowledge-centered collaborative activities applies to most types of teams in the current dynamic and complex environment. For example, functional teams such as sales and marketing and human resources are expected to know about strategic shifts and the subsequent restructuring within the organization, as well as external economic fluctuations and market competition. Knowledge and information regarding these issues must be acquired, shared, and utilized among team members. Therefore, research needs to extend its scope and examine these activities with more types of teams than those typically defined as knowledge teams (Jackson, Chuang, Harden, & Jiang, 2006; Swart & Kinnie, 2003). Responding to this call, in this dissertation I define and operationalize ***knowledge intensity of team tasks*** and sample a variety of teams in order to generate results that have implications for a broader context.

1.3 Role of Leadership

While successful management of knowledge flow hinges on a variety of characteristics of teams and their context, among the most important is effective leadership that can define teams' directions and ensure enabling structures and supportive contexts

(cf. Elkins & Keller, 2003; Hackman, 2002; Zaccaro, Rittman, & Marks, 2001). When teams face complex and challenging tasks that require them to share information internally and reach out for new information from the external environment, it is usually team leaders' responsibility to clarify the direction and facilitate the exchange of knowledge and information among team members and with external units. To ensure satisfactory team performance, they generally have to act with dual roles—a task role, which shifts the team's functional emphasis in response to the dynamics of task cycles, and a developmental role that focuses on the process of the team evolution (Kozlowski, Gully, McHugh, Salas, & Cannon-Bowers, 1996). Indeed, leadership is perhaps the most critical factor in the success of organizational teams (Kozlowski & Bell, 2003; Yukl, 2002). Even when teams are self-managed and the leadership roles are shared by the team members, resources and coaching provided by an external leader are important for team performance (Kirkman & Rosen, 1999; Pearce & Sims, 2002; Wageman, 2001).

Despite a large literature on leadership and team dynamics respectively, research that examines leadership and knowledge-oriented team processes and outcomes has been limited (Argote et al., 2001; Bass, 1990; Berson, Nemanich, Waldman, Galvin, & Keller, 2006; Yukl, 2002; Zaccaro et al., 2001). However, the relationships have been investigated in a handful of prior studies. For example, a leader's cognitive ability and experience can directly contribute to group performance (Murphy, Blyth, & Fiedler, 1992). Leaders of project teams, through their influence on staffing, pay, and promotion decisions, may motivate and direct project participants' effort and performance (Katz & Allen, 1985). Additionally, leader's emotional intelligence can lead to subordinate creativity, which impacts team innovation (Zhou & George, 2003). Further, a team leader's behavior can

directly influence various team processes and outcomes (Burke, Stagl, Klein, Goodwin, Salas, & Halpin, 2006).

When tasks involve knowledge bases that span beyond any single individual's repertoire, team leaders need to motivate members to share their information and help them reach out for new information and knowledge. Additionally, knowledge work is generally challenging due in part to its ambiguous and exploratory nature (Mohrman et al., 1995). Therefore, to warrant expected performance, team leaders must build members' commitment to team goals by enhancing their sense of self-confidence and collective identification (Shamir, House, & Arthur, 1993). In this context, transformational leadership (TFL; Burns, 1978; Bass, 1985)—a leadership style that emphasizes leaders' abilities in articulating a collective vision and direction, stimulating intellectual curiosity in followers, as well as supporting followers' needs and development—can be particularly relevant to knowledge work and organizational innovation (e.g., Jung, Chow, & Wu, 2003; Keller, 2006).

1.4 A Multi-level Approach

Despite the fact that TFL has become one of the most popular leadership theories in the past two decades, little empirical research on TFL has been related to a team's knowledge processes and outcomes, and the level of the conceptualization has remained unclear (Berson et al., 2006; Judge & Piccolo, 2004). Further, most prior works has treated TFL either only at the individual level (e.g., Barling, Loughlin, C., & Kelloway, 2002; Benjamin & Flynn, 2006; Piccolo & Colquitt, 2006; Pillai, Schriescheim, & Williams, 1999; Walumbwa, Avolio, & Zhu, 2008; Wang, Law, Hackett, Wang, Chen, 2005), or only at the team level (e.g., Bass, Avolio, Jung, & Berson, 2003; Eisenbeiss, van Knippenberg,

& Boerner, 2008; Kearney & Gebert, 2009; Zohar & Tenne-Gazit, 2008). Very few studies have investigated TFL at both the individual and group level for subordinates belonging to the same group (Liao & Chuang, 2007; Yammarino & Dubinsky, 1994).

To bridge this gap, the present study develops and empirically tests an integrated, multilevel model of TFL and team outcomes from a knowledge-based perspective. As leadership has been conceptualized as a multilevel construct (e.g., Hall & Lord, 1995; Yammarino & Bass, 1991; Yammarino, Dionne, Uk Chun, & Dansereau, 2005), my theorizing will also take a multilevel approach, through which TFL is conceptualized as both an individual and team level construct. In particular, TFL is directed toward the team as a whole, yet it is uniquely perceived by each team member. This multilevel approach of TFL clarifies its linkage to outcomes at different levels. The outcome of team-level performance is proposed to be related to team-level TFL, for both the constructs are defined and the relationships unfold at the team level, and the team of interest is regarded as a unified whole. On the other hand, the outcome of individual-level personal learning is examined as resulting from a team member's perception of and the interactions with the leader.

1.5 Dissertation Overview

To unravel the psychological and behavioral processes in which certain knowledge-related team outcomes are elicited in response to team leaders' transformational behaviors, I develop a multilevel model that includes two outcomes—team performance and individual learning. According to Hackman (2002), one important aspect of team effectiveness, besides team performance and viability, is individual member's learning. Through working with people holding different specialties

and perspectives, individual members may adjust their cognitive structures and/or gain new skills in order to coordinate their work, resolve discrepancies, and generate novel ideas. Consequentially this learning may contribute to an individual's performance as well as performance of the whole team (Denison, Hart, & Kahn, 1996; Druskat & Kayes, 2000). Even though my hypotheses will be developed around team performance and individual learning, I acknowledge that there may be a linkage through individual performance that connects individual learning and team performance.

The model incorporates two mediators—team knowledge sharing and collaborative norms—in the team-level TFL—performance relationship, and one mediator—individual commitment to team goal—in the individual-level TFL—learning relationship. Two cross-level relationships are also specified such that team knowledge sharing is proposed to have a top-down effect on individual member's learning, while individual commitment to team goal is manifest as a predictor to team performance. Figure 1 presents this integrated framework.

Insert Figure 1 about here

Besides examining knowledge sharing as a behavioral channel between leadership and team outcomes, I also consider the degree of knowledge intensity in team tasks as a contextual factor that moderates the leadership-outcome relationships. In particular, when tasks are highly knowledge-intensive, I propose that TFL may have a stronger effect on both outcomes than when tasks are low in knowledge intensity. Further, the mediating mechanism of knowledge sharing may be amplified in the context of high knowledge

intensity. By focusing on the task context for teams, the model aims to delineate the interaction of leader behaviors and knowledge intensity in influencing team outcomes.

Overall, this dissertation aims to contribute to the extant TFL and team knowledge management research in thereby two ways. First, it integrates leadership with team knowledge management and extends the current boundaries of both literatures. By investigating the impact of TFL on two knowledge-related team outcomes and disentangling certain mediating processes, the current study enhances our understanding about leadership processes in team contexts. By examining task knowledge intensity as a contextual factor, I establish a boundary condition of the leadership-outcome relationships. Second, I examine the leadership-outcome relationships through a multilevel model that posits the transforming effects of leaders on both team goal commitment (at the individual level) and collaborative norm and knowledge sharing (at the team level). An understanding of these intermediate attitudes and behaviors will help clarify the processes through which TFL influences team outcomes such as team performance and individual learning.

CHAPTER TWO: THEORETICAL FRAMEWORK AND HYPOTHESES

2.1 Transformational Leadership Theory

Transformational leadership (TFL) theory was first introduced by Burns (1978) in his treatment of political leadership. It describes a process through which leaders influence followers to make self-sacrifices and put the needs of the organization above their materialistic self-interests. Some leaders establish transactional relationships with followers. In a transactional relationship, the followers' needs are met in exchange for their effort and performance. By comparison, TFL motivates followers to achieve higher performance by raising their consciousness about the importance and value of desired outcomes, by getting them to transcend their own self-interest for the sake of the collective, and by arousing their higher-order needs. This process reflects leaders' appeal to followers' values and emotions, which is central in current theories of TFL (Bass, 1985, 1998).

Essentially, TFL theory integrates earlier leadership research on leader traits and behaviors. By demonstrating their charisma and infusing followers with their high standards and values, transformational leaders serve as role models and inspire their followers to identify with them. They also exhibit behaviors of stimulating followers to be creative and open to new ideas, as well as supporting and coaching followers (Yukl, 2002). Since its introduction, TFL has received much attention and been one of the focuses of leadership research. For example, Lowe and Gardner (2000) reviewed publications in *Leadership Quarterly*—a major academic journal concentrating on leadership research—in 1990s and reported that one third of the research on leadership was about transformational or charismatic leadership.

Results of several meta-analyses have demonstrated the linkage between transformational leadership and work-related outcomes. An earlier meta-analysis of 39 published and unpublished studies using Multifactor Leadership Questionnaire (MLQ; Bass & Avolio, 1995) reported that the three dimensions of TFL correlated with leader effectiveness measures, with overall validities .71 for charisma, .60 for intellectual stimulation, and .62 for individualized consideration (Lowe, Kroeck, & Sivasubramaniam, 1996). Further, the authors found that the mean effect size of the correlations between TFL dimensions and leader effectiveness was significantly higher in public than in private organizations for the scales charisma ($z = 2.22$, $p < .05$) and intellectual stimulation ($z = 2.94$, $p < .01$). Significantly higher positive relationships were found for subordinate perceptions of effectiveness than for organizational measures of effectiveness (for charisma, .81 and .35, $z = 16.01$, $p < .01$; for intellectual stimulation, $z = 13.85$, .68 and .26, $p < .01$; for individualized consideration, .69 and .28, $z = 13.34$, $p < .01$). Similarly, another meta-analysis that focused on leader charisma also found positive relationships between leader charisma and both leader and subordinate effectiveness (.74 for leader effectiveness and .31 for subordinate effectiveness) (DeGroot et al., 2000). When differentiating subordinate performance between group and individual level, correlation was found to be stronger at the group level (.49) than was at the individual level (.21).

A more recent meta-analysis by Judge and Piccolo (2004), which included 68 journal articles, 18 dissertations, and 1 unpublished data set, reported a comparable overall validity (.49). The association of TFL with leader effectiveness (.64) and subordinate attitudes (satisfaction and motivation; ranging from .53 to .71) was significantly stronger than with performance (.27 for leader job performance; .26 for group or organization

performance). They also found that TFL had a greater validity in cross-sectional than in longitudinal studies ($z = 4.00$, $p < .01$) and a greater validity when both leadership and the criteria were measured by the same (rather than by different) sources ($z = 5.46$, $p < .01$). Finally, Burke and colleagues conducted a meta-analysis of various team leadership behaviors and found that TFL was related to both quality (.34) and quantity (.25) performance criterion (Burke et al., 2006).

Overall, two general findings emerge from prior meta-analyses. First, TFL appears to be more strongly associated with attitudinal than with performance criteria. Second, the correlation tends to be greater in magnitude when measures of leadership and the criteria are collected from the same (rather than different) sources.

To date, TFL theory has been examined in a variety of contexts, including military settings (e.g., Bass, Avolio, Jung, & Berson, 2003; Dvir, Eden, Avolio, & Shamir, 2002; Lim & Ployhart, 2004), financial service (e.g., Howell & Avolio, 1993; Kark, Shamir, & Chen, 2003; Schaubroeck, Lam, & Cha, 2007), and restaurant service (e.g., Detert & Burris, 2007; Liao & Chuang, 2007), among others. Prior studies have also been conducted in settings characterized by intensive knowledge flows, such as research and development (R&D) organizations. Based on a review of leadership in R&D organizations, Elkins and Keller (2003) suggested that a transformational project leader can encourage followers to view problems from new perspectives, provide support and encouragement, communicate a vision, and engender emotion and identification. These behaviors should enhance individual effort and performance, and eventually lead to the improvement of project quality and performance. Further, they suggested that the relationship between leader behaviors and project performance can be moderated by the type of project and level of

leadership. Project effectiveness may be most related to TFL behaviors displayed by project leaders in research projects and higher-level leaders in development project. Other findings have been consistent with the proposed relationship (Keller, 1992, 2006; Waldman & Atwater, 1992).

Further, leader behavior can form a supportive work environment for individual creativity (Amabile, Schatzel, Moneta, & Kramer, 2004). A transformational leader may encourage followers to challenge the status quo and old ways of doing work. Followers are likely to be motivated to reformulate issues and problems, and generate ideas and solutions to satisfy their intellectual curiosity. This learning-oriented goal can foster knowledge creation and upgrade (Sosik, Godshalk, & Yammarino, 2004). Shin and Zhou (2003), in a study of R&D employees, found that TFL is positively related to follower creativity, with intrinsic motivation as a partial mediator. Moving up to organization-level innovation, Jung and colleagues (2003) found that TFL was positively related to both empowerment and an innovation-supporting climate. They also found a positive relationship between CEO TFL and organizational innovation in a sample of 32 Taiwanese companies in the electronics/telecommunications industry.

2.1.1 Multi-level leadership for teams

The original formulation of TFL style referred to leadership of work groups and larger organizations (Bass, 1985). However, subsequent empirical work has been conducted at different levels of analysis. This is echoed by Yammarino and his colleagues in a recent review of publications in the field of leadership from 1995 to 2005 (Yammarino et al., 2005). They found that only approximately 30% of articles on TFL explicitly addressed levels of analysis in theory and hypothesis development. In fact,

levels-of-analysis issues and multiple-level approaches have become increasingly important in recent decades (Klein, Dansereau, & Hall, 1994; Kozlowski & Klein, 2000; Rousseau, 1985), and leadership research is one of the areas that attracts much related commentary (Castro, 2002; Dansereau & Yammarino, 1998; Yammarino & Bass, 1991).

Individual-level TFL. TFL can be conceptualized and examined as an *individual-level* construct, representing the leader behaviors/style as experienced and perceived by an individual follower. Each follower has different implicit theories about leadership and leaders, processes and store information differentially, and so holds different perceptions and behaves differentially (see Hall & Lord, 1995). For example, leaders transform their followers, in part, through their effects on follower self-concepts (Shamir et al., 1993). The mission and vision articulated by a leader increases the salience of various aspects of the follower's self-concept or identity, which is valued by the follower and engaged by mission-related activities. A transformational leader cues a follower's ideal self, and thus makes the follower constantly aware of his or her own long-term objectives. This may in turn motivate the follower to interpret work situations in terms of their potential for his or her self-growth and development.

As noted by Shamir and colleagues (1993), such views of transformational leadership emphasize follower values and identities as much as the qualities of leaders. As a consequence, each follower can develop his or her own experience and attributions of the same leader. Therefore, according to this individual differences view of leadership, each subordinate perceives his or her superior uniquely, or individually; likewise, a superior perceives each of his or her subordinates as a unique individual. Leadership is viewed as

implicit in nature and based on the information processing of individuals (Yammarino & Dubinsky, 1994; Yammarino, Spangler, & Dubinsky, 1998).

Dyadic-level TFL within groups. The vertical dyad—a superior and a subordinate—represents a somewhat different perspective regarding the levels-of-analysis issue in leadership research. A theoretical basis for this level of analysis is the work of Graen and his colleagues (Dansereau, Graen, & Haga, 1975; Graen & Scandura, 1987). This view indicates that superior-subordinate relationships are managed by a superior and differ within the group of his or her subordinates, who are identified by the superior as either an in-group or out-group member. The in-group is composed of followers of the leader's cadre, receiving more supports from and having a high quality relationship with the leader. In contrast, out-group members view the exchange with their leader as a formal contractual agreement. This perspective emphasizes leaders' initiation and control of the relationships with subordinates, and reports of both superiors and subordinates about their perceptions of behaviors and interactions are required (e.g., Yammarino et al., 1998). Since the current study particularly focuses on subordinates' views about their leader's transformational behaviors and their effects, I do not include dyadic-level of analysis in hypotheses development and testing. Additionally, when excluding leaders' self-perceptions of their behaviors, the dyadic-level of analysis is equivalent to the individual-level of analysis, with only leadership perceptions from subordinates.

Team-level TFL. Conceptually, TFL theory asserts that leadership behaviors affect group outcomes by transforming team members' motivational states (Bass, 1985). A transformational leader may affect team identity, norms, and potency in ways that extend beyond his or her accumulated dyadic relationships with individual team members. The

charisma exhibited by the leader may inspire the whole group and lead to stronger collective performance (Degroot et al., 2000). A team level theory of TFL requires specification of transformational effects not only in terms of subordinates' commitment and identification, but also in terms of team processes and characteristics. For example, groups develop role structures and exhibit various properties such as cohesiveness and motivation, which may have important implications for members' behavior. The reaction of individual subordinates to the leader may be different in a group setting than when working alone. Meanwhile, group leaders are generally evaluated based on the performance of their groups rather than on the performance of any one individual.

Gavin and Hofmann (2002) explained that the underlying assumption in treating leadership as a team level variable is that the individual members "who have common leaders, are exposed to a similar leadership environment in terms of the behaviors and actions of the leaders. This common leadership environment manifests a shared leadership climate within the unit" (p.21). Consistent with their view, *team-level TFL* can be conceptualized as an overall pattern of leadership behaviors/style exhibited to the whole team, and thus as a form of ambient stimuli (cf. Hackman, 1992) diffused and shared among team members. Leader attributions or perceptions held by members of a group may become homogeneous as groupthink caused by peer pressure alters individual views and even causes self-censorship of individual deviations from group consensus (Janis, 1982). As such, TFL behaviors are directed toward the group as a whole, and thus should be treated as a group level construct. (see Schriesheim, Mowday, & Stogdill, 1979; Shamir, Zakay, Breinin, & Popper, 1998). Further, Yukl (2002) noted that the transformational

leadership literature has focused too narrowly on dyadic processes, and he called for greater attention to team-level study.

The current study conceptualizes TFL as both an individual- and team-level construct. Further, both individual- and team-level TFL are proposed to be associated with team performance and individual learning through certain mediating relationships (see Liao and Chuang, 2007; Shamir et al., 1998).

2.1.2 TFL as a Multidimensional Construct

Bass (1985) proposed that transformational leadership behaviors are composed of idealized influence/charisma, inspirational motivation, intellectual stimulation, and individualized consideration (Avolio, Bass, & Jung, 1999). *Charisma*, or *idealized influence*, is the degree to which the leader behaves in admirable ways that cause followers to identify with the leader. Followers are appealed to on an emotional level. *Inspirational motivation* is the degree to which the leader articulates a vision that is appealing and inspiring to followers. Leaders challenge followers with high standards, communicate confidence about goal attainment, and instill meaning into the task at hand. *Intellectual stimulation* is the degree to which the leader challenges assumptions, takes risks, and solicits followers' ideas. Leaders transform followers by changing their cognitive structure, beliefs, and values, so as to encourage creativity in their followers. *Individualized consideration* is the degree to which the leader attends to each follower's needs, acts as a mentor or coach to the followers, and practices delegation consistent with current levels of followers' competence and need for growth opportunities.

Bass (1985) argued that these four dimensions are subsumed under TFL and that together they account for the transformational process. Moreover, prior empirical studies

have shown high correlation among these dimensions (mean correlation was .93 after reliability correction). Accordingly, the four dimensions of TFL are treated as indicators of a higher-order TFL construct (Judge & Piccolo, 2004). The corresponding hypotheses and tests reflect this perspective. Nevertheless, the rationale and proposition of hypothesized relationships elaborate on the role of these four dimensions of TFL in shaping team and individual outcomes.

2.2 TFL as a Predictor of Team Performance

Bass (1985) asserted that the central component of TFL involves an underlying influence process that motivates followers to transcend their self-interest for the sake of group goal accomplishment. A transformational leader, with vision articulation and inspiration, can create an impression of high competence and optimism about goal attainment. A leader with charisma is likely to act as a role model for a follower and evoke personal identification by which the follower molds his or her beliefs, feelings, and behaviors according to those of the leader (Shamir et al., 1993). Meanwhile, by successfully connecting the follower's self-concept to the mission and to the group, the follower is likely to incorporate the group objectives into his or her own goals (Kark, Shamir, & Chen, 2003; Shamir et al., 1998). As such, subordinates respond with an enthusiasm and commitment to the team's goals (Dvir et al., 2002).

According to Bass (1985), TFL inspires and activates subordinates to perform and achieve goals beyond normal expectations. In teams formed by people with differing perspectives and knowledge, the transformational leader can convince to fuse their personal goals with the team mission, thereby facilitating the integration of diverse knowledge bases and viewpoints. This can also create team potency and cohesion through

developing members' pride and confidence in their team (Bass, Avolio, Jung, & Berson, 2003; Jaussi & Dionne, 2003). As a consequence the team reaps the benefits of performance gains.

Further, by stimulating team members with questions and critiques, the leader may engender followers' arousal and changes in problem awareness and problem solving, as well as of more fundamental beliefs and values that are beyond immediate action. Members are encouraged to challenge the status quo and reformulate issues and problems. These activities are likely to enhance innovative work processes and products (Shin & Zhou, 2007; Taggar & Ellis, 2007).

Additionally, TFL involves individualized attention and a developmental or mentoring orientation toward subordinates. Transformational leaders pay attention to their subordinates' needs and concerns, show support and empathy, and encourage self-expression. Doing so gets subordinates interested in and focused on the tasks instead of extraneous worries. Followers may thus be more likely to take interpersonal risks to freely explore and experiment with new ideas and approaches (Edmondson, 1999). Moreover, leaders high in individualized consideration focus on developing followers' capabilities, provide information and resources, and give them delegation consistent with subordinates' current levels of competence and need for growth. Subsequently, members are more capable of developing their knowledge and skills and solving the problems. Even though transformational leaders can act differently toward their members, they can balance out the attention to various subordinates such that each subordinate will still perceive the leader as being considerate and supportive (Bass, 1985).

Based on the discussion above, I propose:

Hypothesis 1a: Team-level TFL will be positively related to team performance.

In a knowledge-intensive context, teams are often assigned challenging and complex tasks characterized by high levels of uncertainty (Mohrman et al., 1995). In this situation, the role of TFL may be amplified. For instance, a transformational leader can impose a clear and inspirational mission and persistently focus on it, which helps clarify goals and maintain motivation (Berson, Shamir, Avolio, & Popper, 2001).

According to Bass (1985), transformational leaders engage in *idealistically oriented intellectual stimulation*, which attends to growth, adaptation, learning, variety, and creativity. Transformational leaders can constantly gather additional information and generate new solutions as necessary. On the other hand, *existentially oriented intellectual stimulation* aims to integrate a great deal of information and generate many solutions for implementation. Both types of stimulation are particularly important for teams with knowledge-intensive work, in which team members generally face problems that require incremental modification based on the current routines and procedures (single-loop learning) and/or radical invention to generate a whole new set of ideas and techniques (double-loop learning) to find novel solutions (Argyris & Schön, 1978). These creativity-related processes are particularly important for teams engaging in knowledge-intensive tasks, which entail combining diverse knowledge stocks into new ideas and useful products (Kearney & Gebert, 2009).

Further, when tasks involve intense knowledge, team members need to gain, share, and apply knowledge in order to accomplish the tasks successfully. Transformational leaders may support their team as both valuable knowledge sources and bridges for team members to reach out for external knowledge. Therefore, I propose:

Hypothesis 1b: Knowledge intensity of a team's tasks will moderate the relationship between team-level TFL and team performance, such that the relationship will be stronger for high level of knowledge intensity than low level of knowledge intensity.

2.2.1 The mediating role of team knowledge sharing

Team knowledge sharing refers to the process by which team members engage in distributing new knowledge and routines (Argote et al., 2001; Wilson, Goodman, & Cronin, 2007). It occurs when team members retrieve knowledge and information and share it with each other via discussion or documentation. Within organizations individuals can share their knowledge with one another, reach out to other parts of the firm, or even cross organizational boundaries for seeking and transferring information. In fact, knowledge sharing is perhaps the most important practice for a company to manage its knowledge system (Alvesson, 2004; Hansen, 1999; Hansen et al., 2005; Hansen, Nohria, & Tierney, 1999; Hoegl & Gemuenden, 2001; Reagans, Zuckerman, & McEvily, 2004; Zellmer-Bruhn & Gibson, 2006). As shown in Figure 1, I propose that team knowledge sharing acts as a partial mediator of the relationship between team-level TFL and team performance.

In order to effectively share their knowledge, team members must recall it, perceive it as relevant, and be motivated to share it. TFL may influence these individual cognitive and emotional processes (see Bass, 1985). First, once members in a team are emotionally appealed to by their leader' charisma, the leader is likely to inspire them to strive toward the leader's conceived goals and build commitment to the goals. Their common purpose can bind the members together, and the sense of togetherness or interdependence may

elevate the level of cooperation, which promotes information and knowledge sharing among members. Further, knowledge sharing requires that members feel motivated to share (Szulanski, 1996). TFL encourages members to see things differently. It is likely to counter prevailing beliefs and assumptions, and foster new thoughts and new ways for diagnosing and solving problems. Under these conditions, members tend to generate strong interest in the tasks and problems in hand and discuss them in group meetings. They are also likely to experiment and share their insights through reflective communication (Gibson & Vermeulen, 2003). Finally, the leader transformational behaviors also include teaching and developing members' ability and skills necessary for working as part of the team and sharing knowledge for collaborative decision making and problem solving. All these aspects suggest a positive relationship between TFL and team knowledge sharing.

When team members actively engage in knowledge sharing activities such as discussing task issues, searching for relevant information from each other, and collectively evaluating feasible solutions, their interactions enhance the quality and quantity of sharing processes and the development of collective knowledge within the team (Larson & Christensen, 1993). The team can improve its ability to detect errors and improve its problem-solving capacity (e.g., Paulus & Yang, 2000). In short, knowledge sharing frees up the team's knowledge stocks and ensures their optimal use for task performance, particularly when the team consists of people holding diverse knowledge sources (Collins & Smith, 2006; Edmondson, Bohmer, & Pisano, 2001; Ellis, Hollenbeck, Ilgen, Porter, West, & Moon, 2003; Faraj & Sproull, 2000; Haas & Hansen, 2007; Van der Vegt & Bunderson, 2005).

Meanwhile, TFL may have effects on team performance independent of its effect on team knowledge sharing. For example, TFL may facilitate a positive team climate, which, in turn, fosters individual and team performance (e.g., Liao & Chuang, 2007). Transformational leaders can enhance team potency (Gully, Incalcaterra, Joshi, & Beaubien, 2002) by communicating high confidence, modeling desired behaviors, and providing support to followers, which contributes to team effectiveness (e.g., Bass et al., 2003; Schaubroeck et al., 2007). Further, transformational leaders are likely to arouse followers' social identification with their groups and their feelings of empowerment, thus enhancing team performance (e.g., Kark et al., 2003). Hence, I propose a partial, rather than full, mediation by knowledge sharing.

Hypothesis 1c: The relationship between Team-level TFL and team performance will be partially mediated by team knowledge sharing.

The mediating process through knowledge sharing may be more salient when tasks involve intensive knowledge, and successful executions depend in a large part on the extent to which team members maximize the utilization of knowledge. Knowledge-intensive tasks are characterized by diverse knowledge bases and rapid knowledge flows within and across team boundaries (Alvesson, 2004; Mohrman et al., 1995). The final products are the outcome of value creation on the basis of integration of knowledge across specialties. When teams perform tasks with high levels of knowledge intensity, more knowledge sharing is necessary in order to integrate different knowledge sources to generate new solutions and correct costly errors (Hansen et al., 2005; Hoopes & Postrel, 1999). Hence the role of team knowledge sharing for performance in highly

knowledge-intensity task contexts is likely to be more significant, compared to less knowledge-intensive task contexts.

On the other hand, TFL may lead to greater knowledge sharing when tasks show high knowledge intensity. Due to the ambiguous nature of knowledge-intensive tasks, in order to get problems and issues addressed effectively team leaders need to intervene to promote knowledge sharing and development of shared understandings (Klimoski & Mohammed, 1994). Transformational leaders inspire followers with their vision and collective goals, encourage followers' intellectual curiosity and interest in problems at hand, and develop followers' skills and capabilities to work with each other. When knowledge intensity in tasks is high, leaders' transformational behaviors are likely to induce more knowledge sharing by emphasizing collective purposes and need for information exchanges. By contrast, when tasks involve less intensive knowledge, the focus of leader efforts may shift to coordination and scheduling of activities and obtaining external resources (Ancona & Caldwell, 1992a; Hoopes & Postrel, 1999).

> *Hypothesis 1d: Knowledge intensity of a team's tasks will moderate the mediating effect of team knowledge sharing, such that the mediation effect of team knowledge sharing will be stronger for high level of knowledge intensity than low level of knowledge intensity.*

2.2.2 The mediating role of collaborative norms

Group norms are the informal rules associated with behavioral expectations that are socially shared by members (Birenbaum & Sagarin, 1976; Feldman, 1984). Norms serve as the standards against which team members can evaluate the appropriateness of their own and others' behavior. They originate from interactions among members or between

members and the external environment. Once formed, norms facilitate interactions by making behavior more predictable, saving time and effort for routine matters, and reducing the use of personal power in exchange (Jacobs, 1970: 195-203). Strong norms regulate behavior, making it relatively stable and predictable (Bettenhausen & Murnighan, 1985; Miller & Grush, 1988).

Collaborative norms can be defined as the expectations shared by team members that they should work jointly for their shared objectives (cf. Chatman & Flynn, 2001). This definition is closely related to Durkheim's (1933) idea about organic solidarity, which rises from the necessity for various experts to form temporary relationships to perform work requiring broad-ranging skills (Wagner, 1995: 153). Collaborative norms do not necessarily involve one's affective attachment to his or her team, or to other members in the team. Nevertheless, they set an informal rule that elicits members' cooperative behavior and interpersonal helping in task-performing processes.

Developing collaborative norms means that everyone in the team is expected to work interdependently, focus on shared pursuits, go out of one's way to offer help, and interact actively with one another through open discussions, group meetings, and joint problem solving (Taggar & Ellis, 2007). When the agreement about collaborative behavior both within and between groups is high among members, everyone acts compatibly, which reduces uncertainty and promotes task efficiency (Argote, 1989; Argyris, 1969).

Collaborative norms may be associated with conformity pressure in groups. These norms regulate behaviors reflecting team members' interactions and joint work on their common tasks. When a team establishes strong collaborative norms, its members are expected to focus on collective and interactive processes such as expressing dissenting

opinions and constructive conflicts (Cohen, Ledford, & Spreitzer, 1996; Flynn & Chatman, 2001). Therefore, strong collaborative norms can act as "pressures" for group members to sharing their knowledge, by discussing problems and issues they face, providing their thoughts and perspectives, evaluating the outcomes and reflecting on the processes collectively, etc (Dewhirst, 1971; Quigley, Tesluk, Locke, & Bartol, 2007; Taggar & Ellis, 2007).

The above discussion suggests that collaborative norms can be considered one critical mechanism by which TFL contributes to team knowledge sharing. A leader's initial expectations about appropriate behavior have substantial impact on group norm formation, which, in turn, affects team processes and members' perceptions and behaviors (Taggar & Ellis, 2007). A transformational leader serves as a role model and articulates a compelling vision to his or her team. This shared vision creates interdependence among team members, which requires more cooperation within the team (Wageman, 1995). The explicit mission statement of the leader and his/her other nonverbal behaviors can actively foster shared values, which leads to a sense of commonality and identification with the group (Feldman, 1984). This process of collective identification links individuals' self-concept and self-esteem to their belonging to the group and fuses personal interests with group objectives (Ashforth & Mael, 1989; Kark et al., 2003). Consequently, the team as a whole is likely to display collaborative behaviors such as knowledge sharing, as a result of collaborative norms fostered by its leader.

Likewise, TFL encourages teams to openly discuss work-related issues, and/or even to question prevailing beliefs and values. Team members not only deliver creative solutions for current problems and challenges, but also reengineer the genetic coding of the

team—that is, to broaden or modify its basic values and assumptions for its viability and long-term effectiveness (cf. Hamel & Prahalad, 1994). All these collective activities may encompass conflicts in views and perspectives among team members, but the underlying belief is that they are beneficial to learning and performance (Jehn, Northcraft, & Neale, 1999; Tjosvold & Tjosvold, 1995). Therefore, given that these group activities require members to hold values of openness, joint responsibility, and interpersonal trust, the leader can facilitate these activities partly by developing collaborative norms. Articulating encouragement of these activities per se sends a strong message to the team regarding the leader's expectations about how members act with one another. Over time the leader's expectations are incorporated into each subordinate's daily behavior and this influence pervades the team, resulting in a normative regulation of team collaboration (e.g., Friedkin, 2001).

Further, TFL is likely to facilitate collaboration through paying attention to each follower's needs and personal issues, showing support and understanding, and mentoring and coaching to develop the follower's skill and career path. Even though these are based on one-on-one interactions, doing so will create expectations that encourage team members to focus on helping each other continuously learn and develop. The broader the leader's span of influence, the stronger such expectations (Avolio & Bass, 1995). Eventually, individualized consideration also fosters collaborative behaviors by building such norms.

Meanwhile, TFL may affect knowledge sharing in a team through other processes, in addition to shaping collaborative norms. Transformational leaders fuse followers' personal goals with their team goals, and generate strong commitment to accomplishing

those goals. Goal commitment, in turn, can trigger behaviors which are conducive to achieving the goals (e.g., sharing information and knowledge), without necessarily developing any specific norm (e.g., Piccolo & Colquitt, 2006). For example, TFL may affect team sharing processes by increasing the motivation of team members to analyze problems and learn from one another (e.g., Shin & Zhou, 2003). Also, transformational leaders can develop members' ability to share by transferring their knowledge and experience as well as by training the team in sharing-related skills such as communication and listening. Therefore, I propose a partial mediation of team collaborative norm between TFL and team knowledge sharing.

Hypothesis 1e: The relationship between team-level TFL and team knowledge sharing is partially mediated by team collaborative norm.

2.3 TFL as a Predictor of Individual Learning

Individual learning has long been an interesting phenomenon for scholars from different disciplines. Following Weiss (1990), I define *individual learning* as a relatively permanent change in a person's repertoire of knowledge and skills produced by experience. As shown in Figure 1, I propose that individual learning can be understood as an individual-level phenomenon that is influenced by leadership perceptions as well as team knowledge sharing.

According to Lankau and Scandura (2002), acquiring only technical job knowledge and information about an organization is no longer sufficient. Individuals need to understand the context of their work in order to see themselves in relation to others (Kegan, 1994), and to develop interpersonal skills and organizational awareness (Hall, 1996). In a

team setting, Hackman (2002) suggested that team members' learning and growth represents one important criterion for evaluating team effectiveness.

The task environment of team is often characterized by knowledge flows, providing the possibility for members to gain a substantial body of knowledge from other members, the leader, and the environment. By gaining knowledge from interacting with others, a team member can satisfy his or her own intellectual curiosity and need for self-growth. Further, the skills and knowledge they gain can be stored and utilized in later assignments, either with the same team or a new team (Haas & Hansen, 2007).

At the level of individuals, one's perception of a leader's transformational behaviors (which I refer to as individual-level TFL) can promote individual learning in several ways. First, TFL can elicit follower's enthusiasm and commitment to the team's goals. As team tasks require communications and interactions among team members, in order to accomplish their common tasks and goals, members have to attend to information and knowledge from one another to avoid biased discussion and leverage a larger pool of expertise (Stasser & Titus, 1985). As a consequence, they learn from each other. Further, when their commitment to team goals is high, they are more likely to do so.

Second, a transformational leader can intellectually stimulate his or her followers to question basic assumptions and values, to see old issues and problems in new ways, to take on challenging assignments, and to acquire new knowledge, skills, and abilities. In so doing he or she may enhance a follower's interest in tasks and his or her intrinsic motivation to learn and perform (Shin & Zhou, 2003). The formulation of new ways of understanding and perception can result in personal learning, which is characterized as "learning to learn" (Rawson, 2000).

Finally, when transformational leaders care about members' personal needs and concerns, they act as mentor and coach to teach subordinates, to share their knowledge and experience, and to develop subordinates in their career advancement (Lankau & Scandura, 2002; Sosik et al., 2004). Further, they provide support for obtaining external knowledge and information. TFL is thus likely to stimulate the adoption of a learning goal orientation (Sosik et al., 2004) that causes followers to learn through behaviors such as information seeking (Madzar, 2001). Therefore, I propose:

Hypothesis 2a: Individual-level TFL will be positively related to individual learning in team.

Further, when team tasks involve intensive knowledge flows and count on the utilization of knowledge, the team faces challenges to integrate diverse knowledge and turn it into team products. TFL can encourage a team member to take on the challenges by setting high-performance standards and communicating high confidence about goal achievement. As Bass (1985) asserted that TFL is particularly relevant to situations with great challenges and crises organizations face, these TFL behaviors are likely to generate followers' strong interest in and commitment to team tasks. The more they engage in these collective tasks, by sharing and leveraging knowledge from one another, the more likely they will learn.

When tasks are characterized by high-level of knowledge intensity, a team is more likely to be exposed in new knowledge and novel circumstances. TFL can stimulate a team member into being creative and innovative. Followers are galvanized to try new approaches. Moreover, TFL pays attention to individual needs for achievement and growth by providing coaching and mentoring. These transformational behaviors by a leader are

particularly important for individual learning in knowledge-intensive contexts: the same behavior may stimulate more learning simply because the task context provides more knowledge variety and quantity. Therefore, learning is likely to be amplified when TFL unfolds in knowledge-intensive task contexts.

Hypothesis 2b: Knowledge intensity of a team's tasks will moderate the relationship between individual-level TFL and individual learning, such that the relationship will be stronger under conditions of relatively high knowledge-intensity compared to conditions of relatively low knowledge-intensity..

2.3.1 Team goal commitment as a predictor of individual learning

The effect of TFL on subordinate learning can be partially explained by the augmentation of his or her commitment to team goals. *Goal commitment*, by definition, refers to one's determination to try for a goal and persistence in pursuing it over time (Hollenbeck, Williams, & Klein, 1989; Locke, Shaw, Saari, & Latham, 1981). As one of the most important factors in goal setting theory, commitment to the goal has been regarded as a moderator of the relationship between goals and performance (see Locke & Latham, 1990).

Commitment to team goals may enhance a team member's learning in a team context. Learning includes both cognitive processing and behavioral change. In order to learn, one has to devote extra effort and attention to learning stimuli. Since goal commitment implies the extension of effort toward the accomplishment of an original objective and emphasizes an unwillingness to abandon or to lower the original objective (Campion & Lord, 1982), it can foster learning through overcoming the cognitive burden against required changes. Further, in a team context, the goal generally requires members

to be cooperative in order to promote the team to solve problems and learn from mistakes (Tjosvold, Yu, & Hui, 2004). Committing to team goals (instead of individual goals) is likely to result in more cooperative and interactive team work processes, wherein substantial amount of learning may occur.

TFL can develop subordinate commitment to team goals and thus fosters subordinate learning by enhancing both attraction and expectation of goal attainment. First, TFL conceives and articulates visions and goals, thus making the goals public. Further, TFL helps clarify the environment and reduces ambiguity and distractions, thus making the goals explicit. As a result, goal publicness and explicitness will increase the attractiveness of the goals, thus increasing members' commitment (Hollenbeck et al., 1989; Salancik, 1977). Further, TFL also sets confidence in subordinates about goal attainment and arouses their self-esteem and self-consciousness (Shamir et al., 1993), therefore reinforcing their expectation about goal attainment.

Second, TFL stimulates individuals intellectually, which may create curiosity that is associated with searching and allocating resources and investigating and discovering in novel and challenging experiences (Kashdan, Rose, & Fincham, 2004). This can generate strong willingness and persistence in doing tasks and trying for goals (Piccolo & Colquitt, 2006). Additionally, TFL provides followers with emotional support and resources. Leaders help develop followers' skill sets and career path. These activities serve to enhance goal commitment in two folds: increasing their ability to achieve goals, thus raising expectancy of goal attainment, and creating their perception of personal advancement in relation to team goal attainment, thus raising attractiveness of goal attainment (Hollenbeck & Klein, 1987).

On the other hand, TFL may foster individual learning through other ways besides increasing one's commitment to team goal. For example, TFL can boost followers' intrinsic motivation to perform tasks and solve issues, which stimulate them to learn throughout task performing processes (Shin & Zhou, 2003). Alternatively, TFL includes teaching and developing followers. Therefore, I propose that the mediation effect of individual commitment to team goals is partial rather than full.

Hypothesis 2c: The relationship between individual-level TFL and individual learning is partially mediated by individual commitment to team goals.

2.4 Cross-Level Effects

Besides team- and individual-level hypotheses, I also propose two hypotheses that specify a cross-level relationship , i.e., a predictor at one level and its outcome at another level. In organizations, every phenomenon encounters levels issues. "Micro phenomena are embedded in macro contexts and that macro phenomena often emerge through the interaction and dynamics of lower-level elements" (Kozlowski & Klein, 2000, p. 7). House, Rousseau, and Thomas-Hunt (1995) called for a meso theory of organizations which integrates micro and macro perspectives. Echoing this call, I suggest a top-down effect such that team-level knowledge sharing predicts individual learning, and a bottom-up effect such that individual-level commitment to team goals predicts team performance (Kozlowski & Klein, 2000).

2.4.1 Team knowledge sharing and individual learning

Teams have been recognized as social units in which social processes shape cognition and behavior of individual members (Hackman, 1992). Individuals can acquire information and others' knowledge about the team goals, performance standards, and

interpersonal relationships through socialization (cf. Chao, O'Leary-Kelly, Wolf, Klein, & Gardner, 1994; Morrison, 1993). In this regard, teams are the fundamental learning unit in organizations (Senge, 1990); teams differing in characteristics such as composition, structure, and norms may vary in quality, content, and processes of learning (Edmondson, 2002).

Knowledge sharing consists of multiple phases including deciding to seek knowledge, searching for knowledge, and transferring knowledge (Hansen et al., 2005), each of which involves complex processes that incur the costs of time and effort (Ancona & Caldwell, 1992a; Gupta & Govindarajan, 2000; Hansen, 1999; Reagans & McEvily, 2003; Szulanski, 1996; Tsai, 2002). When team members act through these phases, they need to scan the environment, locate, acquire and absorb information, discuss with other members and provide alternatives to solving problems, and reflect on their experience in task performing processes. The overarching process of knowledge sharing exposes team members to knowledge from various sources regarding various tasks and issues. Exposure to shared body of knowledge makes individuals likely to incorporate it into their own thinking (Crossan, Lane, & White, 1999; Wilson et al., 2007). Knowledge sharing serves as a channel to combine information, skills and prior solutions, which represent effective learning for individuals to develop a coherent knowledge base for future tasks (Henderson & Clark, 1990).

Hypothesis 3a: Team knowledge sharing is positively related to individual learning in teams.

2.4.2 Team goal commitment and team performance

Goal commitment can be a direct contributor to performance outcomes (Klein, Wesson, Hollenbeck, & Alge, 1999; Locke, Latham, & Erez, 1988). Since commitment is the binding of individuals to specific behaviors, individuals committed to their task goals should expend more effort and be more persistent, which may boost their individual performance as well as increase behaviors that are desirable for the organization (Klein & Mulvey, 1995; Klein et al., 1999).

While most research has found that individual goal commitment is associated with individual performance, the same logic can apply when the focus is team goals (Locke et al., 1988). Since individuals perform interdependently in a team, their performance can directly affect the performance of the team as a whole (DeNisi, 2000). Prior research has found that individuals who perform well can reduce team process losses and help enhance team effectiveness (e.g., Chen, 2005). Therefore, I propose that individual commitment to team goals will be positively related to team performance.

Hypothesis 3b: Individual commitment to team goals is positively related to team performance.

As summarized in Figure 1, the hypothesized model describes leadership processes that unfold at two levels of analysis, with team-level TFL predicting team collaborative norms, team knowledge sharing, and subsequent team performance, and individual-level TFL predicting individual commitment to team goals and subsequent individual learning. Team knowledge sharing and individual commitment to team goals are proposed to have cross-level effects on individual learning and team performance, respectively. Additionally, task knowledge intensity is predicted to moderate several

relationships between leadership, team knowledge sharing, team performance, and individual learning.

CHAPTER THREE: METHODS

3.1 Research Procedure

Respondents for the study included employees of 37 organizations in four major cities located in, respectively, northern, southern, eastern and western China. The organizations consisted of state-owned, private-owned and foreign-invested enterprises, which were in industries such as manufacturing, financial service, construction, information technology, etc. The majority of teams (75%) were functionally based such as manufacturing, sales and marketing, HR, technical, etc., whereas there were a few cross-functional, project-based teams.

Before distributing the research survey, I conducted semi-structured interviews with eight teams and their leaders to ensure the appropriateness of the research setting. The surveys were then distributed to team leaders and team members either via emails or paper copies. In the former case, participants received questionnaires sent to their preferred email accounts from the author or a HR administrator in the company. They then filled out the survey and sent it back to the author directly. In the later case, the author administered the surveys onsite at the company and respondents filled out and returned them directly to the author.

Following Brislin's (1980) translation-back-translation procedure, all the measures (except TFL which has a Chinese version) were first translated from English to Chinese by the author. Then another bilingual with English and Chinese proficiencies translated them back from Chinese to English. There were a couple of discrepancies regarding the wording, meaning and/or context of two items. After discussion between the two translators, a consensus was reached for translation of all the measures.

Team members responded to questions about their team leaders' transformational behavior, team collaborative norms, team knowledge sharing, commitment to team goals, their individual learning, and their demographic characteristics. Since both team- and individual-level TFL relationships were hypothesized, a split-team sampling approach was adopted to reduce measurement bias. Based on random selection, some team members answered the questions tapping into team-level constructs and the other team members answered questions about individual-level constructs. In order to ensure the reliability of team-level measures, at least five respondents filled out the team-level survey when the team was made up of less than ten people. When a team included less than five members (N = 32 teams), everyone in the team completed the team-level questionnaire. Therefore, data from smaller teams were used for team-level analyses only. For teams with ten members or more (N = 14 teams), members were split evenly so that half of the team completed the team- or individual-level survey, respectively. Additionally, on a separate questionnaire, team leaders provided data about task knowledge intensity and team performance. The complete survey is summarized in Appendix 1.

Participants. Team leader surveys were distributed to 120 leaders, of which 119 were completed and returned directly to the researcher. Out of 548 team-level surveys distributed, 521 team members completed the survey, resulting in a response rate of 95 percent. Further, 354 out of 356 individual-level surveys were completed and returned, with only two non-responding. Finally, out of the initial 120 teams, there were a few teams that did not follow the split-team data collection rule. To ensure the reliability of information about team processes, these teams were excluded from the final data analysis. Teams with less than three members also were excluded. These procedures generated a

sample of 91 complete teams (76% of the original sample). One way ANOVA of TFL, team collaborative norms, team knowledge sharing and team performance compared included and excluded teams and found no significant difference.

Among the team leaders, 66 percent were male; 78 percent were with the organization for at least 5 years. In terms of the leaders' age, 3% were 21 to 25, 12% were 26 to 30, 25% were 31 to 35, 26% were 36 to 40, 17% were 41 to 45, 8% were 46 to 50, and 9% were above 50. With regard to education level, 2% of leaders were vocational or high school graduates, 17% had two years of college education, 60% had earned a bachelor degree, and 21% had earned a master or doctoral degree.

Of the team members who filled out the team-level survey, 54 percent were male. About 14 percent had been employed by the organization for 1 to 3, 3 to 5, 5 to 10 years, respectively. In terms of age, 20% were 21 to 25 years old, 30% were age 26 to 30, 18% were age 31 to 35, 11% were age 36 to 40, 8% were age 41 to 45, 4% were age 46 to 50, and 3% were older than 50. Regarding education level, 13% had a vocational or high school degree, 24% had a two-year college degree, 45% had a bachelor degree, and 11% had a master or doctoral degree.

Of the team members who completed the individual-level survey, 52 percent were male; 0.9% were at age of 20 or under, 23% were age 21 to 25, 34% were age 26 to 30, 16% were age 31 to 35, 14% were age 36 to 40, 6% were age 41 to 45, 4% were age 46 to 50, and 2% were above 50. Regarding education level, 16% had a vocational or high school degree, 25% had a two-year college degree, 50% had a bachelor degree, and 7% had a master or doctoral degree.

Insert Table 1 about here

Given my sample size for team performance (only 91 teams), I did not include any demographic variables for team-level analyses. The correlations of these demographic variables with team-level TFL, collaborative norms, knowledge sharing and performance were not significant. Nevertheless, I included team members' sex, age and organizational tenure in the analyses for individual learning because my sample size was enough to do so (302 individuals).

Statistical power. Since sample size is extremely important for research to possess sufficient statistical power to detect significant effects. I conducted *a-priori* sample size analyses before collecting data for the study. Based on Cohen, Cohen, West, and Aiken (2003), I set the probability level as .05 and desired statistical power level as .80. Assuming eight predictors in the linear model, I calculated the *a-priori* sample size for both medium and large effect sizes. The results indicated that a sample of 52 teams or individuals was needed to detect large effects ($f^2 \geq .35$) and a sample size of 108 teams or individuals was needed to detect medium effects ($f^2 \geq .15$) (Cohen et al., 2003). The sample size used to test the hypotheses in this study—91 teams at the team level and 302 individuals at the individual level—was approximately enough to detect medium-to-large effects for the team-level analyses and medium effects for the individual-level analyses.

3.2 Measures

As described above, the variables were measured by three sources: the team leaders, a randomly determined portion of team members who responded to team-level leadership and team process questions, and another randomly determined portion of team

members who answered questions regarding individual-level leadership, individual behaviors and individual learning questions. Unless otherwise indicated, all measures employed a five-point response scale (1, "strongly disagree," to 5, "strongly agree").

Individual-level TFL. Using the split-team approach, some team members rated their leader's TFL using Bass and Avolio's (1995) Multifactor Leadership Questionnaire (MLQ) (Form 5X—Short), which assesses idealized influence (8 items), inspirational motivation (4 items), intellectual stimulation (4 items), and individual consideration (4 items). A sample items is "My team leader……instills pride in *me* for being associated with him or her". Respondents indicated the frequency with which each item described their team leader using a five-point Likert response scale (from 1, "not at all," to 5, "frequently, if not always"). Since this measure has been used and validated in a number of studies on TFL (e.g., Avolio et al., 1999; Bass et al., 2003), I conducted a confirmatory factor analysis to assess its factor structure. Results basically supported the four-factor model with satisfactory fit ($\chi^2 = 825.47$, $df = 164$, $p < .01$; CFI = .97, SRMR = .05). Similar to prior studies which mostly found it difficult to separate the four factors (see Judge & Piccolo, 2004 for a review), the factors in my CFA also showed high correlations ranging from 0.75 to 0.86, presenting statistical challenges for analyzing data based on separate factors. Therefore, I combined all the factors and created a composite measure based on all twenty items ($\alpha = .94$).

Team-level TFL. A separate, randomly selected portion of team members provided ratings of team-level TFL. Team-level TFL also was measured by MLQ, employing the referent-shift approach (Chan, 1998). Specifically, using the same scale as for individual-level TFL, respondents answered the questions about their team leader's TFL

toward the whole team. A sample item is "My team leader… instills pride in *members* in the team for being associated with him/her". Applying the procedures used for individual-level TFL, I conducted another confirmatory factor analysis with four factor structure ($\chi^2 = 1223.01$, $df = 164$, $p < .01$; CFI = .97, SRMR = .05). As was true for the CFA results using individual-level TFL, the four factors correlated between 0.72 and 0.88. Therefore, all the items were used to compute a single measure of team-level TFL (α = .95).

Team collaborative norms. The measure for collaborative norms was developed for this study, based on prior work by Wageman (1995) and Chatman & Flynn (2001). Two items adapted from Wageman (1995), one item from Chatman & Flynn (2001), and one item developed by the author were chosen to fit in the current study context. Individuals responded to the items on the basis of their expectation about their members' collaborative behavior in the team. A sample behavior is "……going out of one's way to help a group member". Since norms emerge through a bottom-up process (Kozlowski & Klein, 2000) and represent a higher-level construct, I aggregated individual members' expectations to the team level to form the measure of collaborative norm. Common factor analysis with oblimin rotation (oblique rotation that set delta value at 0.0, allowing for fairly correlated factors; cf. Tabachnik & Fidell, 2006) of the items extracted only one factor with an eigenvalue greater than 1.0. This factor explained 58 percent of the total variance. Therefore, I retained all four items (α = .73).

Team knowledge sharing. Four items adapted from Faraj and Sproull (2000) and three additional items developed by the author were used to assess perceptions of knowledge sharing among team members. A sample item is "people in our team share their

special knowledge and expertise with one another." Reliability analysis revealed the existence of a coding effect of a reverse-coded item, i.e., "There is virtually no exchange of information, knowledge, or sharing of skills among members." This item exhibited significant low correlations with the other items. Therefore, following Schmitt and Stults (1985), this negatively worded item was excluded. Common factor analysis with oblimin rotation of the remaining six items resulted in only one factor with an eigenvalue greater than 1.0. This factor explained 56 percent of the total variance. All six items were retained (α = .84).

Knowledge intensity. Team leaders provided their evaluation of the knowledge intensity of the work performed by the team they led. Two items were developed to measure knowledge intensity, i.e., "Knowledge is important for our team to perform tasks", and "Members in our team have to engage in knowledge-centered behaviors such as sharing, creating, and/or applying knowledge, in order to achieve effectiveness." Factor analysis with oblimin rotation yielded one factor that explained 76 percent of variance (α = .61).

Individual commitment to team goals. Those members who provided ratings of individual-level TFL also answered questions about their commitment to the team goals. Goal commitment was measured by five items from Klein, Wesson, Hollenbeck, Wright, and DeShon (2001), based on the earlier work of Hollenbeck et al. (1989). A sample item is "I think our team goal is a good goal to shoot for." Similar to the team knowledge sharing scale, two reverse-coded items in the Chinese version of this measure exhibited significantly lower correlations with the other three items and when included; including these items resulted in unacceptable low scale reliability (α = .17). Further, common factor

analysis with oblimin rotation yielded two factors, with the two reverse-coded items loaded on one factor and the other three items on the second factor (Table 2-A). Therefore, following the procedure I used for the team knowledge-sharing measure, I dropped the two reverse-coded items. Factor analysis of the remaining three items yielded one factor that explained 58 percent of the variance. These three items were averaged for further analyses (α = .63).

Insert Table 2—A about here

Team performance. Team leaders provided ratings of team performance. Following Lovelace, Shapiro, and Weingart's (2001) work, which is based on prior team research (Ancona & Caldwell, 1992a, 1992b; Katz & Allen, 1985; Keller, 1986; Van de Ven & Chu, 1989), team leaders responded to eight items that described two dimensions of performance: team innovativeness and team constraint adherence. Team leaders evaluated their teams using a five-point scale (from 1, "much lower than average," to 5, "much higher than average"). Factor analysis with oblimin rotation yielded a two-factor solution (explaining 61 percent of variance), with two items of constraint adherence loaded on both factors (Table 2-B). The cross-loaded performance items are "the team's progress compared with the managers' initial expectations", and "its adherence to schedules". Since these two items tap into substantive content of performance, and all together eight items showed satisfactory scale reliability, I created a composite performance measure (α = .81).

Insert Table 2—B about here

Individual learning. Twelve items from Lankau and Scandura (2002) were adapted to assess two types of individual learning—relational job learning and personal skill development. Individuals who responded to the individual-level TFL and goal commitment items also responded to these items. Factor analysis with oblimin rotation showed a three-factor solution (explaining 64 percent of total variance), with factor one having four items of personal skill development and two of relational job learning, factor two containing three items of relational job learning, and factor three having two items of personal skill development. Also, one item of relational job learning cross-loaded on both factor one and two (Table 2-C). Content analysis of these results revealed that the first two factors mostly reflect the two dimensions of individual learning, whereas the third factor taps into general skills for task performance. Therefore, I retained the six items loaded on the first factor to represent the individual learning variable (α = .81).

Insert Table 2—C about here

Control variables. Several variables were included as controls for the model testing. ***Team size***, measured as the total number of team members in a team, was included as a control variable because prior studies have shown it to be related to team communication, team performance, and leader behaviors (Ancona & Caldwell, 1992b; Bass, 1990). Further, I controlled for team member ***demographics***, i.e., sex, age and education level, when conducting analyses to test hypotheses concerning individual-level outcomes. For my measures of individual demographic characteristics, sex was coded as 0,

"male," and 1, "female". Following Farh, Hackett and Liang (2007), age included eight categories: 20 or under, 21–25, 26–30, 31–35, 36–40, 41–45, 46-50, and over 50. Education level had five categories: middle school, high school or vocational school, two-year college, four-year college, and master or doctoral degree. Both age and education level were treated as continuous variables.

3.3 Analyses to Support Aggregation

Three variables in my model—team TFL, collaborative norm, and knowledge sharing—were conceptualized at the team level and measured at the individual level using team as the referent (Chan, 1998). To justify the aggregation of these variables, I first conducted one-way analysis of variance (ANOVA) to obtain evidence of significant between-group differences. As shown in Table 3, results suggested that all three variables differed significantly across teams ($p < .01$ for all three variables).

Insert Table 3 about here

Next, interrater agreement indices (r_{wg}) were calculated to justify the aggregation (James et al., 1984). All of the r_{wg} values were satisfactory. The mean and median values for the three variables—transformational leadership = .94 and .98; collaborative norm = .89 and .92, and knowledge sharing = .90 and .94—indicated high within-group agreement.

Finally, ICC(1) and ICC(2) were calculated to further justify the use of group-level scores (Bliese, 2000; Chen & Bliese, 2002). ICC(1) represents the proportion of the total variance at the individual level that can be explained by team membership, while ICC(2) indicates the reliability of the team means. The ICC values were comparable to the median

ICC values of aggregated constructs in the organizational research (Bliese, 2000) and in prior studies of TFL (e.g., Bono & Judge, 2003; Chen & Bliese, 2002; Liao & Chuang, 2007; Srivastava, Bartol, & Locke, 2006): .19 and .50 for team-level transformational leadership; .19 and .51 for team collaborative norm; and .17 and .47 for team knowledge sharing. The relatively low ICC(2) value for knowledge sharing (.47) indicates that it may be difficult to detect emergent relationships using group means. However, because aggregation is justified by theory and in light of the fact that I found satisfactory within-group agreement (r_{wg}) and significant between-group variance (*F*-test for team knowledge sharing in Table 3), I proceeded with aggregation of this variable, while also acknowledging that results about relationships with information sharing might be underestimated (Chen & Bliese, 2002; Kozlowski & Hattrup, 1992).

3.5 Analyses to Test Hypotheses

Analyses to test team-level hypotheses. Ordinary least square (OLS) regressions were employed to test Hypothesis 1a and 1b. To test two mediation hypotheses, i.e., Hypothesis 1c and 1e, I followed James, Mulaik, and Brett (2006) and examined the structural models using LISREL 8 and maximum-likelihood estimation. Since all the measures had been refined using exploratory factor analysis, given the complexity of the model and the size of the sample, I adopted a single-indicator approach (Joreskog & Sorbom, 1993). Paths between the manifest variables and the latent constructs were set to the square root of the reliability of the respective measures; the error variance of each manifest variable was set to one minus the reliability of the measure times the variance of the measure. For the single-item measures, i.e., team size, I adopted a reliability value of .90 (Anderson & Gerbing, 1988). Following Hu and Bentler's (1999) two-index

presentation strategy, I interpreted goodness of fit using standardized root-mean-square residual (SRMR) and comparative fit index (CFI), and adopted cutoff criteria suggested by these authors (SRMR close to .06 and CFI close to .95) (Hu & Bentler, 1999).

To test the proposed moderated mediation relationship (Hypothesis 1d), drawing on prior studies testing moderation with SEM (Dulac, Coyle-Shapiro, Henderson, & Wayne, 2008; Mathieu, Tannenbaum, & Salas, 1992), I added both the interaction terms and their components into the model. To calculate a reliability value for the interaction terms, I employed the formula proposed by Bohrnstedt and Marwell (1978), with the reliability generated by dividing the product of the reliabilities of each component term plus the square of the correlation between the components of the interaction by one plus the square of the correlation between the components of the interaction term (e.g., see Mathieu et al., 1992). I then used the generated reliability values to compute the path coefficients and error variances of the manifest variables via the same procedure employed with all the other variables. The component variables used to create interaction terms were centered to minimize multicollinearity between the components and the interaction terms. Further, in the model including the interaction term, the correlations between the latent components and their respective latent product terms were fixed to zero because they should be close to zero as a result of centering (Cortina, Chen, & Dunlap, 2001).

Analyses to test individual-level hypotheses. Individual team members were hierarchically nested within teams, so I employed multilevel random coefficient modeling (RCM) using *R* to test the hypotheses regarding individual learning (Hypothesis 2a, 2b, 2c). Using RCM, I modeled multilevel relationships by partialing out the variance terms and parameter estimates into two levels, i.e., individual-level TFL and goal commitment

were examined as level 1 (individual-level) variables, while knowledge intensity and team size (as a control variable) were included as level 2 (team-level) variables.

Analyses to test cross-level effects. Cross-level effects contain top-down and bottom-up processes that represent relationships between variables at different levels (Kozlowski & Klein, 2000). Hypothesis 3a proposed a top-down effect that team knowledge sharing would be related to individual learning. This hypothesis was tested using random coefficient modeling for a model that included individual demographics, TFL, goal commitment, and team size.

Hypothesis 3b proposed a bottom-up process by which individual commitment to the team goal would be related to team performance. Because there is methodological difficulty associated with modeling emergent, bottom-up processes, I tested the bottom-up effects using two approaches. First, based on Chen's (2005) approach, team performance (level 2) was treated as a predictor of individual commitment to team goal (level 1). The significant coefficient (two-tailed test) indicated an association between goal commitment and team performance. Second, I aggregated individual-level team goal commitment to the team level and then examined its effect on team performance in an OLS regression. The convergence of results from both approaches would suggest the significance level of the relationship.

Because all my hypotheses specify directional relationships, I evaluated the significance of the parameter coefficients with a one-tailed test.

CHAPTER FOUR: RESULTS

4.1 Analysis to Address Common Method Variance

Although I adopted a multi-source data collection strategy to minimize common method variance, some of the variables in the study were from the same respondent. To further refine the measurement models, I followed the recommendation of Podsakoff and his colleagues (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003); I included all measures collected from the same source in Harman's single-factor test. To indicate that a considerable amount of common method variance is present, either a single factor will emerge from the exploratory factor analysis, or a general factor will account for the majority of the variance.

Knowledge intensity and team performance were both evaluated by team leaders (N = 119). Common factor analysis with oblimin rotation yielded a three-factor solution: performance items loaded on the first and third factor, and two knowledge intensity items loaded on the second factor (Table 4-A). Knowledge intensity was differentiated from performance items. The first factor extracted only 36 percent of the total variance. Therefore, the results supported the discriminability of different factors.

Insert Table 4—A about here

Data from team members were analyzed using the two randomly assigned subgroups. One subgroup of team members provided ratings of team TFL, collaborative norm and knowledge sharing (N = 521). I conducted another common factor analysis with oblimin rotation, with four dimension scores of team-level TFL, four items of collaborative

norm, and six items of knowledge sharing. Results supported a three-factor solution: all the items loaded on their respective factors and the first factor accounted for 43 percent of the total variance (Table 4-B). One item of collaborative norm showed minor cross-loading on knowledge sharing; nevertheless, I retained this item to achieve satisfactory measurement reliability.

Insert Table 4—B about here

Finally, individual TFL, individual commitment to team goal and individual learning came from the other subgroup of team members (N = 354). Common factor analysis, with four dimensions of individual-level TFL, three items of goal commitment and six items of individual learning, detected a three-factor structure: all the items clearly loaded on their respective factor (Table 4-C). The first factor extracted only 36 percent of total variance. These results indicated discriminant validity of the measures.

Insert Table 4—C about here

Through the above exploratory factor analyses for the measures collected from the same rater source, convergent and discriminant validity of all measures were established.

4.2 Team-Level Results

Table 5 provides the descriptive statistics, internal consistency reliabilities, and zero-order correlations among the study variables at the team level.

Insert Table 5 about here

Hypothesis 1a predicted that team-level TFL would be related to team performance. As can be shown in Table 6, OLS regression results suggested that team-level TFL did not have a significant relationship with team performance (β = .02, *n.s.*). Therefore, Hypothesis 1a was not supported.

Insert Table 6 about here

Hypothesis 1b proposed that the relationship between team-level TFL and team performance would be moderated by task knowledge intensity. Results of an OLS regression, including team size, team-level TFL, knowledge intensity, and the interaction term (team-level TFL × knowledge intensity), found that, although consistent with my prediction, the interaction term failed to reach significance (β = .16, *n.s.*) (Shown in Table 6). Therefore, Hypothesis 1b was not supported.

Insert Table 7 about here

Hypothesis 1c predicted that knowledge sharing in teams would partially mediate the relationship between team-level TFL and team performance. As shown in Table 6, this model (Model SEM1) produced a good fit to the data (χ^2 (1) = .49, p = .48; CFI = 1.00, SRMR = .02). Figure 2 presents the results for the structural model testing for this hypothesis. Significant relationships were found between team-level TFL and performance

(β = -.30, p < .05), between team-level TFL and knowledge sharing (β = .67, p < .01), and between knowledge sharing and performance (β = .45, p < .01). Therefore, team knowledge sharing partially mediated the effect of team-level TFL on team performance, providing support for Hypothesis 2a. The results of Sobel's (1982) test confirmed the significant indirect effect (z = 2.68, p < .01, one-tailed test).

Insert Figure 2 about here

Hypothesis 1e proposed that team collaborative norms would partially mediate the relationship between team-level TFL and knowledge sharing. A structural model was estimated to test this hypothesis by adding this mediation relationship into model SEM1 (Model SEM2). As shown in Table 6, this model fit the data fairly well (χ^2 (3) = 5.80, p = .12; CFI = .98, SRMR = .04). The path coefficients presented in Figure 3 supported significant relationships between team-level TFL and team collaborative norm (β = .86, p < .01), and between collaborative norms and knowledge sharing (β = .55, p < .05). However, the relationship between team-level TFL and knowledge, after adding the indirect path through collaborative norms, reduced to nonsignificance (β = .19, *n.s.*). Therefore, instead of a partial mediation relationship, I found that collaborative norms fully mediated the effect of team-level TFL on knowledge sharing. Sobel's (1982) test supported the significant indirect effect (z = 1.89, p < .05, one-tailed test).

Insert Figure 3 about here

A test of model comparison—comparing the hypothesized model (Model SEM2) to the model without the nonsignificant path from team-level TFL to knowledge sharing (Model SEM3, see Figure 4))—found that the reduced model fit the data slightly worse than model SEM2 (χ^2 (4) = 6.24, p = .18; CFI = .98, SRMR = .04). Nonetheless, the *Chi*-square difference test was nonsignificant ($\Delta\chi^2$ = .44, Δdf = 1, *n.s.*). These results confirmed the full mediation of collaborative norms between team-level TFL and knowledge sharing.

Insert Figure 4 about here

Hypothesis 1d predicted that knowledge intensity of team tasks would moderate the mediating effect of knowledge sharing on the relationship between team-level TFL and performance. To examine the moderated mediation, I added the knowledge intensity and two of its product terms (knowledge intensity × team-level TFL and knowledge intensity × knowledge sharing) into Model SEM1, and specified four paths in the new model (knowledge intensity **à** knowledge sharing, knowledge intensity **à** performance, knowledge intensity × team-level TFL **à** knowledge sharing, and knowledge intensity × knowledge sharing **à** performance) (Edwards & Lambert, 2007). This model (Model SEM4, see Table 6) fit the data well but slightly worse than the previous models (χ^2 (11) = 10.75, p < .10; CFI = .94, SRMR = .072). Further examination of path coefficients for two interaction terms revealed that while the moderating effect of knowledge intensity for the first stage of the mediation (between team-level TFL and knowledge sharing) did not reach significance (β = -.01, *n.s.*), the second stage (between knowledge sharing and

performance) was significantly moderated by knowledge intensity ($\beta = .25$, $p < .05$) (Figure 5).

Insert Figure 5 about here

To examine the nature of the significant interaction, I plotted the relationship between knowledge sharing and performance at both high and low levels of knowledge intensity (one standard deviation above and below the mean; Aiken & West, 1991). Figure 6 demonstrates that for highly knowledge-intensive tasks, the relationship between knowledge sharing and team performance was stronger than for less knowledge-intensive tasks. Therefore, Hypothesis 1d received partial support.

Insert Figure 6 about here

4.3 Individual-Level Results

Table 8 shows the descriptive statistics, internal consistency reliabilities, and zero-order correlations among the study individual-level variables. Table 9 presents the random coefficient modeling results for Hypotheses 2a through 3b.

Insert Table 8 about here

Hypothesis 2a predicted that individual-level TFL would be positively related to individual learning. The results (shown in Model 2 of Table 9) suggested that this relationship was significant (β = .36, p < .01). Therefore, Hypothesis 2a was supported.

Insert Table 9 about here

Hypothesis 2b predicted that knowledge intensity would moderate the relationship between individual-level TFL and individual learning. To test this hypothesis, individual-level TFL and knowledge intensity were first grand-mean centered; then I added knowledge intensity as a level 2 (team-level) variable and a product term (individual-level TFL × knowledge intensity) as a cross-level variable. A significant product term would indicate a moderated relationship. As shown in Model 4 (Table 9), the product term was nonsignificant (β = -.11, *n.s.*); Hypothesis 2b was not supported.

Hypothesis 2c proposed that individual commitment to team goals would partially mediate the relationship between individual-level TFL and individual learning. In addition to Model 2, which depicts a relationship between individual-level TFL and learning, I also found a positive relationship between individual-level TFL and team goal commitment (β = .38, p < .01; Model in Table 9). When individual-level TFL and team goal commitment predicted individual learning simultaneously, there was a positive relationship between team goal commitment and learning (β = .16, p < .01; Model 3 in Table 9), and the strength of the relationship between individual-level TFL and learning was reduced (comparing to Model 2) but the relationship remained significant (β = .30, p < .01; Model 3). These results

were consistent with a partially mediated relationship, providing support for Hypothesis 2c.

Hypothesis 3a predicted that team knowledge sharing would be positively related to individual learning. To test this hypothesis, team knowledge sharing was included in the model (Model 5 in Table 9) as a level 2 variable to predict learning. The coefficient was not significant (β = -.01, *n.s.*); therefore Hypothesis 3a was not supported.

4.4 Bottom-Up Effect

Hypothesis 3b suggested a bottom-up effect of individual commitment to team goal on team performance. First, following Chen's (2005) approach, this hypothesis was tested by regressing individual team goal commitment (level 1) on team performance (level 2). The coefficient for this relationship failed to reach significance (β = -.06, *n.s.*). Second, individual-level team goal commitment was aggregated to the team level (mean and median r_{wg} are .87 and .93, respectively; ICC(1) and ICC(2) are .19 and .51, respectively). Team performance was regressed on aggregated team goal commitment, as well as team size, team-level TFL, team collaborative norms and knowledge sharing. This regression yielded a similar coefficient estimate (β = -.05, *n.s.*). Therefore Hypothesis 3b was not supported.

Figure 7 summarizes the results that were supported by the above tests.

Insert Figure 7 about here

4.5 Supplemental Analyses

The hypothesized model highlighted the critical role of task knowledge intensity in interaction with leadership and process variables to influence performance and learning. Besides the moderating relationships specified by my hypotheses, it may be worth investigating whether knowledge intensity of team tasks moderates the whole mediation model relating TFL to team outcomes. Therefore, in order to get insight into such relationships, I further explored more comprehensive mediation and moderation analyses using a path analytic framework recommended by Edwards & Lambert (2007).

According to Edwards and Lambert (2007), one can analyze a total effect moderation model, which combines moderation of different stages of the indirect effects with moderation of the direct effects. In my team-level model regarding team performance as the dependent variable, there are three stages from team-level TFL to team performance (team-level TFL **à** team collaborative norms; team collaborative norms **à** team knowledge sharing; team knowledge sharing **à** team performance), as well as two direct effects (team-level TFL **à** team knowledge sharing; team-level TFL **à** team performance). Following Edwards and Lambert (2007), I estimated three equations with OLS regression based on the hypothesized model:

$$TCN = a_{01} + a_{T1}TTFL + a_{K1}TKI + a_{TK1}TTFL*TKI; \quad (1)$$

$$TKS = a_{02} + a_{T2}TTFL + a_{C2}TCN + a_{K2}TKI + a_{TK2}TTFL*TKI + a_{CK2}TCN*TKI; \quad (2)$$

$$TP = a_{03} + a_{T3}TTFL + a_{S3}TKS + a_{K3}TKI + a_{TK3}TTFL*TKI + a_{SK3}TKS*TKI. \quad (3)$$

(Note: TKI = task knowledge intensity; TTFL = team-level transformational leadership; TCN = team collaborative norms; TKS = team knowledge sharing; TP = team performance.)

Direct and indirect effects were tested based on the coefficients from the equations using the bootstrap. The bootstrap sampling approach takes into account the non-normality of

sampling distribution of the product of two or more coefficients (used for computing the indirect effects), by generating a sampling distribution based on a large number of random samples with replacement from the original sample. Coefficient estimates from each bootstrap sample are used to compute the indirect effects and generate a distribution for locating confidence intervals. Confidence intervals are then adjusted for any difference between the result from the full sample and the median value estimated from the bootstrap samples, yielding a bias-corrected confidence interval (Efron & Tibshirani, 1993).

To investigate the moderation, I adopted one standard deviation above and below the mean value as high- and low-level task knowledge intensity, and substituted both into the equations to compute simple effects. Bias-corrected confidence intervals computed based on the bootstrap samples were used to determine whether the simple effect would be significant, as well as the differences for the indirect and total effect.

OLS regressions results were reported in Table 10, and results for simple effects and moderation tests were given in Table 11. Since the primary reason for conducting these analyses was to examine the moderation effect of task knowledge intensity, herein I highlight the results of moderation analyses. Regarding the coefficient estimates for interaction terms, only team collaborative norms interacted with task knowledge intensity to predict team knowledge sharing (Equation 2 in Table 10), although at a marginal significance level (β = -.342, p < .10). This result is equivalent to the moderation test for the second stage in Table 11 (Edwards & Lambert, 2007), which suggested that the relationship between team collaborative norms and knowledge sharing was significant for low but not for high task knowledge intensity (β = .42, p < .01, for low task knowledge intensity; β = .05, *n.s.*, for high task knowledge intensity). This was somewhat

contradictory to the expectation that collaborative norms would influence people to share knowledge with one another when tasks involve high knowledge intensity.

Insert Table 10 about here

Regarding the moderating effects of task knowledge intensity on the direct, indirect and total effects, an indirect effect, with paths from team-level TFL to team collaborative norms to team knowledge sharing, was found to be marginally significant (*difference* = -.28, $p < .10$). However, the direction was opposite to the expectation: the effect was stronger in low task knowledge intensity than in high task knowledge intensity. Finally, the total effect for team performance was positive in high knowledge intensity task context but negative in low knowledge intensity context (see Table 11). Although both effects failed to reach significance (β = -.19, *n.s.;* β = .29, *n.s.*), the difference shows some evidence of significance (*difference* = .47, $p < .10$). Therefore, the results provided some support for the overall performance effect moderated by task knowledge intensity.

Insert Table 11 about here

Similar procedures were also used for individual-level analyses, wherein a total effect moderation model included two stages from individual-level TFL to individual learning (individual-level TFL **à** individual commitment to team goals; individual commitment to team goals **à** individual learning) and a direct effect (individual-level TFL

à individual learning). The two equations based on the hypothesized model were estimated:

$$IGC = a_{04} + a_{T4}ITFL + a_{K4}TKI + a_{TK4}ITFL*TKI; \quad (4)$$

$$IL = a_{05} + a_{T5}ITFL + a_{G5}IGC + a_{K5}TKI + a_{TK5}ITFL*TKI + a_{GK5}IGC*TKI. \quad (5)$$

(Note: TKI = task knowledge intensity; ITFL = individual-level transformational leadership; IGC = individual commitment to team goals; IL = individual learning.)

Table 12 provides regressions results; and Table 13 gives results for simple effects and moderation tests based on the bootstrap technique. As with the investigation of team performance, I focused on the results of the moderation analyses. Consistent with the multilevel linear modeling results, none of the interaction effects in equations 4 and equation 5 was significant (Table 12). Similarly, results for the simple effects shown in Table 13 revealed no significant difference between low and high task knowledge intensity. Therefore, the moderation analyses failed to find any effect on individual learning.

Insert Table 12 & 13 about here

CHAPTER FIVE: DISCUSSION

This dissertation was encouraged by recent academic inquiry into the effects of TFL and team knowledge relevant work processes (Berson et al., 2006; Keller, 2006). To establish the link between leader behaviors and performance and learning in teams, I extended prior work in this area to focus on the behavioral and psychological consequences of TFL. Under a multilevel framework, both individual- and team-level transformational behaviors enacted by a team leader were predicted to result in collaborative teamwork processes, which were predicted to enhance team performance and individual learning.

Transformational leaders infuse their teams with their vision and moral values. They emphasize the importance and meaning of collective goals and inspire team members to sacrifice their own self-interests for their group's well being. Consequently, followers are likely to be inspired by and identify with the leader. Therefore, the ultimate performance and learning outcome for the team may be generated through the process that cues members' collective identity and attention to team goals.

The leader's appeal to followers' values and emotions regarding their common objectives has received much attention in TFL research (Bass, 1998; Judge & Piccolo, 2004). In my dissertation, I extend this research by examining collaborative norms, knowledge sharing behavior, and team goal commitment simultaneously and relate them to both team performance and individual learning in teams. Furthermore, different from most previous work on TFL, which has investigated leader behaviors at a single level of analysis, my study takes a multilevel perspective and examines TFL at both individual and team levels. Integration of multiple outcomes within a multilevel framework advances our

knowledge about the leadership processes that unfold in team-based knowledge work settings.

My results confirmed that TFL is positively associated with collective work processes, and the this relationship occurs because TFL is associated with establishing collaborative norms, encouraging knowledge sharing, and building commitment to common goals. These psychological states and behaviors, in turn, may partially enhance team performance and individual learning. Meanwhile, the mediation relationship through knowledge sharing was amplified when team tasks demonstrated high level of knowledge intensity. Overall, this dissertation contributes to the extant research on leadership, team dynamics, and knowledge management with regard to understanding TFL effects in a team-based, knowledge-focused work context. The psychological states and behaviors identified in this study add to our knowledge about the mediating variables between TFL and team outcomes. Moreover, examining task knowledge intensity as a moderator partially addresses uncertainties about moderating variables in the TFL-outcome relationship. Finally, putting the model in a multilevel framework extends our understanding of how leader behavioral effects unfold within individuals versus among all team members.

5.2 Strengths and Limitations of the Study

Before I provide theoretical and practical implications of the study findings, I acknowledge a few strengths as well as limitations of my study. First, my data contained teams in a variety of task, organizational, and industrial environments. Results based on the sample, therefore, suggested relationships that could apply to a broad context. The investigation of task knowledge intensity, instead of limiting the model testing to only

traditionally defined knowledge teams, also shed insight on managing teams operating for knowledge-intensive tasks.

Further, extending prior work on multilevel leadership, I measured TFL at both individual and team levels. Different from most studies that aggregated individual-level TFL to create the team-level TFL (e.g., Liao & Chuang, 2007), I adopted a split-team sampling approach and measured the team-level TFL using the "referent-shift consensus model" (Chan, 1998). Finally, questions were split into three surveys that were completed by team leaders and two subgroups of team members. The multi-source design reduced problems of common method variance created by a single-source report.

In addition, there are several weaknesses in the study. First, as my sample consisted of a variety of types of teams from different companies in different industries, although this design may increase the representativeness of different groups in the population, there may be extraneous effects due to different products, market niches, organizational culture, human resource management systems, etc. Future research is needed to disentangle these macro-contextual effects.

Also, the cross-sectional nature of my data limits my ability to draw causal direction of the relationships I found. Further research should employ longitudinal designs so as to provide greater insights into the temporal dynamics in which leader behaviors influence teamwork processes and outcomes. Finally, in order to compare criteria across teams in my sample, I adopted subjective manager ratings of performance. Such ratings may incorporate some assessment errors such as halo effect and leniency. Likewise, individual learning was self-evaluated. Future research needs to include multiple sources for criterion evaluation as well as obtain objective measures, if possible.

5.2 Theoretical Implications

TFL has been one of the most popular theories in leadership research in the past two decades. Earlier TFL research was mainly conducted in military and educational settings and later extended to business contexts (Lowe et al., 1996; Judge & Piccolo, 2004). The central component of TFL, according to Bass (1985), is leaders' appeal to followers' higher-order needs and values. When transformational leaders lead a team and emphasize the importance of desired team goals and outcomes, they may take priority over those of individuals. Following the line of this logic, the current study shows that team-level TFL i.e., a leader's behavioral patterns shared by team members, was indeed related to collective norms and behaviors that are oriented towards collaboration among members in order to accomplish team tasks. Subsequently, these collaborative processes were associated with team performance.

The specific behaviors encouraged by the norms clarify the content, while the extent to which members agree on those norms indicates the norm strength (Jackson, 1965). Norms for collaboration regulate team members' behaviors regarding the way they work together toward common objectives. My results show that team-level TFL was positively related to collaborative norms, and that the higher the collaborative norms, the more knowledge shared among team members. Transformational leaders demonstrate high ethical standards, sacrifice for the benefit of the group, and present an attractive vision. Their behaviors are perceived in admirable ways such that followers are likely to identify with both their leader and their group (Kark et al., 2003). Identification in turn can create motivation to behave consistently with the leader's expectation. With the expectation of collaboration, members may be willing to share uniquely held knowledge and information.

It will be interesting for future research to examine the processes through which leaders can facilitate knowledge creation and knowledge application without imposing norms for conformity, which is asserted to be a strong force to hinder creativity and innovation (see Goncalo & Staw, 2006).

The collective behavioral process examined in this study—knowledge sharing—may be particularly important for knowledge-intensive tasks. Sharing knowledge can incur considerable cost in taking time and expending effort to share (Argote & Ingram, 2000; Hansen, 1999; Quigley et al., 2007; Szulanski, 1996). Therefore, attention to knowledge sharing may dilute other activities, e.g., coordination and implementation, which can contribute to effective teamwork (Cohen & Bailey, 1997). Unless task success predominantly depends on quality and quantity of information and knowledge exchanged among team members, knowledge sharing may not have significant consequences for performance outcome. In this study, I found that the association of sharing behaviors with team performance was stronger when tasks were highly dependent on knowledge. This result is consistent with the claim that knowledge sharing and transfer can be costly and that its effectiveness is conditional on contextual factors such as nature of task assignments.

Further, I found that the leader's transformational behaviors in one-on-one interactions with followers (individual-level TFL), enhances individual learning in teams. Individual learning and self-growth via working in a team have been proposed as important for team viability and effectiveness (Hackman, 2002). When teams face organic and challenging environments that require members to acquire new information and adapt to changes, it is likely that team leaders can promote followers' learning by motivating them

to learn in order to accomplish group tasks, stimulating their intellectual inquiry, and developing their skills. My findings suggested the impact of transformational leaders' behaviors on members' learning outcomes. Shin and Zhou (2003, 2007) found that TFL promoted creativity in R&D projects through boosting members' intrinsic motivation and utilizing their diverse knowledge specialties. My dissertation directly tested the relationship between TFL and learning using different types of teams, which provides evidence for TFL effects on knowledge relevant outcomes in more general circumstances.

Learning contains uncomfortable cognitive evaluation and behavioral adjustment. Transformational leaders can facilitate learning by developing and reinforcing subordinate commitment to team goals. My findings support partial mediation of goal commitment between TFL and personal learning. Transformational leaders inspire their followers by setting high standards and goals as well as building confidence in their ability to meet those standards and accomplish the goals. They also create intellectual curiosity that stimulates subordinates' desire to increase their knowledge and task competence. Further, they coach or support their subordinates to develop skill sets. As a consequence, their team goals become instrumental for their self-development and learning (Dweck, 1986), and commitment to these goals can raise the willingness and confidence about mastery of knowledge and competences.

Psychological and behavioral processes have been claimed as important for team effectiveness and have sometimes been investigated simultaneously (e.g., Cohen & Bailey, 1997; Ilgen et al., 2005; Marks et al., 2001; Mathieu, Maynard, Rapp, & Gilson, 2008; McGrath, 1984). Following in the footsteps of such team researchers, my dissertation attends to both team members' knowledge sharing behaviors and individuals'

psychological commitment to team goals. Contrary to my expectations, however, I found that only knowledge sharing was related to team performance. Although individual commitment to team goals was predictive of individual learning, there was no significant relationship between individual goal commitment and team performance. Since transformational leaders are generally likely to set difficult and challenging goals that focus beyond immediate performance outcomes and require members to acquire new knowledge and skills, attention may have been drawn away from the current task performance in order to focus on longer-term team effectiveness and viability (learning).

Contrary to my predictions, results show that team-level TFL had no direct relationship to team performance. Moreover, when team knowledge sharing was added to the model, there was a significant negative direct effect between team-level TFL and performance. It is possible that this negative effect is simply a statistical artifact, given the high correlation between team-level TFL and knowledge sharing (.74). Another possible reason is that there may be multiple mechanisms through which TFL influences individual and team outcomes (Yukl, 2002). For example, Kark and colleagues (2003) found that transformational leaders created both empowerment and dependency for their subordinates, which are two contradictory processes by which leaders exert their influence on followers.

Similarly, leader behavioral effects on team performance can be complicated. Multiple goals and standards may be adopted by leaders under complex task and organizational contexts. My sample included teams assigned different tasks in various industries. The variety of task and external environments adds another layer of complexity to the relationship between leader behaviors and group performance. These contextual

factors may serve as substitutes for leadership to explain performance of teams in my sample (see Podsakoff & Mackenzie, 1995). On the other hand, data for TFL and team performance came from different sources. Meta-analyses of TFL effects have shown that the association of TFL with unit performance is significantly weaker than that with self-reported, subjective criteria (Judge & Piccolo, 2004; Lowe et al., 1996). Additional research is needed to determine the multiple processes and outcomes correlated with transformational behaviors.

Additionally, the cross-level relationship between team knowledge sharing and individual learning failed to reach significance. Knowledge sharing has been suggested as a central element for both organizational and individual knowledge management; numerous studies have supported its importance in achieving organizational success. However, knowledge sharing involves multiple phases, and different variables may be relevant to different phases (Hansen et al., 2005). In my dissertation, I focus on knowledge transfer behaviors but not on whether knowledge has been received and understood by the recipient (Szulanski, 1996). Presumably learning is likely to be more strongly associated with knowledge receipt rather than knowledge transfer behaviors. Additional research needs to combine different phases of knowledge sharing with learning outcome.

Taking a knowledge-focused approach, I examined whether the relationships among TFL, mediating processes and outcomes were moderated by characteristics of the task. According to Bass (1985), when the environment is organic and challenging, TFL is more likely to emerge and influence people. Tasks involving intensive knowledge flows require team members to absorb new information and develop novel solutions. Thus, knowledge-intensive tasks potentially serve as incubators for transformational leaders to

emerge. In principle, TFL should be more strongly associated with team performance and individual learning outcomes in knowledge-intensive task environments. Even though my findings failed to support moderation of task knowledge intensity on the simple relationships between TFL and performance or learning, knowledge intensity was found to moderate the TFL-performance relationship through the intermediate process of team knowledge sharing. In particular, for highly knowledge-intensive tasks, team-level TFL was found to enhance team performance through a mediating process of team knowledge sharing; when tasks were less knowledge-intensive, team knowledge sharing had little to do with team performance.

5.3 Practical Implications

The findings of this study provide some intriguing implications for managing teams in which knowledge is highly relevant to team performance. Leaders need to give attention to their work context, including the nature of team tasks. Knowledge intensity of the task may attenuate some relationships in the linkage between leader behaviors and team performance. Under this circumstance, transformational behaviors of team leaders may be associated with desirable knowledge work processes and outcomes. In particular, results reveal that team members, when experiencing TFL, were willing to engage in knowledge sharing for performance enhancement. Further, norms for collaboration were found to mediate the effect of leader behaviors on knowledge sharing. Thus, developing and training managers for TFL style may potentially improve their capabilities to manage team effectiveness. Practices such as role plays with the group or on a one-on-one basis and behavioral evaluation and goal setting can help team leaders develop and maintain transformational behaviors (Barling, Weber, & Kelloway, 1996).

Further, my results reveal the importance of commitment to team goals for individual learning. The mediation relationship of goal commitment between TFL and learning suggests that managers, when practicing transformational behaviors, may wish to attend to subordinates' commitment to group goals. Doing so not only motivates team members to accomplish team tasks, but also enhances their acquisition of competencies and skill sets. Therefore, managers need to communicate with members about the benefits of building sustained commitment to their collective objectives, which may generate performance gains for the team and learning for each individual.

Data for this study came from China—an East Asian country having experienced rapid economic and cultural changes during the past three decades. The ideologies and Confucian values, mixed with emerging market norms and regulations, present a different environment than western countries in which most of leadership theories have their roots (Tsui, Wang, Xin, Zhang, & Fu, 2004). Empirical work on TFL in the Chinese context has supported its predictability of workplace outcomes (Liao & Chuang, 2007; Wang, Law, Hackett, Wang, Chen, 2005). This study adds to the existing research and suggests that TFL may launch collaborative processes in teams and subsequently result in performance and learning in the Chinese business environment. This cross-cultural validation has implications for global managers and managers of global teams; they can develop and depend on their transformational behaviors when they interact with their Chinese subordinates. Training for those behaviors is needed to develop Chinese managers for teams.

5.4 Conclusion

This dissertation extends TFL theory and team knowledge work processes and provides the empirical examination of mechanisms linking leader behaviors and team outcomes of performance and learning. The results indicate that transformational leaders may help teams achieve performance gains through building collaborative norms and promoting knowledge sharing behaviors. Meanwhile, they may facilitate subordinate learning partially through establishing their commitment to team goals. Overall, this study unlocks some unexplored processes for leading teams in a knowledge-intensive context.

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TABLE 1
Summary of Demographic Characteristics of Data Sources[a]

		Team leaders (leader questionnaire)	Team members (team-level questionnaire)	Team members (individual-level questionnaire)
Gender	Male	66%	54%	52%
	Female	34%	46%	48%
Age	20 or under	0	0	0.9%
	21 to 25	3%	20%	23%
	26 to 30	12%	30%	34%
	31 to 35	25%	18%	16%
	36 to 40	26%	11%	14%
	41 to 45	17%	8%	6%
	46 to 50	8%	4%	4%
	above 50	9%	3%	2%
Education level	Vocational or high school	2%	13%	16%
	Two-year college	17%	24%	25%
	Bachelor degree	60%	45%	50%
	Master or doctoral degree	21%	11%	7%

[a] There were three data sources: team leader completed the leader questionnaire; a portion of team members who completed the team-level questionnaire; the other portion of team members who completed the individual-level questionnaire.

TABLE 2
Common Factor Analyses of Single Measures[a]

A: Individual Commitment to Team Goal

	Factor	
	1	2
I am strongly committed to pursuing team goal.	.660	
Even though it's not always possible to tell how tough our team goal is until you've been in it a while, I always take this goal seriously.	.639	
I think our team goal is a good goal to shoot for.	.508	
It wouldn't take much to make me abandon team goal. (Reverse-coded)		.797
Quite frankly, I don't care if our team achieves this goal or not. (Reverse-coded)		.661

B: Team Performance

	Factor	
	1	2
The number of innovations or new ideas introduced by the team	.786	
The innovativeness of the team's product	.742	
The team's adaptability to changes	.644	
The team's overall technical performance	.505	
The team's progress compared with the managers' initial expectations	.429	.308
Its adherence to schedules	.382	.333
Its adherence to budgets		.829
The team's cost performance		.687

C: Individual Learning

	Factor		
	1	2	3
I have improved my listening skills	.867		
I better understand how my job or department affects others	.611		
I have become more sensitive to others' feelings and attitudes	.532		
I have developed new ideas about how to perform my job	.531		-.332
I have learned how to communicate effectively with others	.465		
I have a better sense of organizational politics	.421		
I have increased my understanding of issues and problems outside my job	.346	-.343	
I have gained insight into how another department functions		-.762	
I have increased my knowledge about the organization as a whole		-.631	
I have learned about others' perceptions about me or my job		-.547	
I have gained new skills			-.806
I have expanded the way I think about things			-.802

[a] Extraction and rotation method: Principal axis factoring with oblimin rotation. Pattern matrices are reported. Values less than .30 are suppressed.

TABLE 3
Aggregation Indices for Team-Level Variables

	ANOVA F test	Mean r_{wg}	Median r_{wg}	ICC (1)	ICC (2)
Team-level TFL	2.00 ($p < .001$)	.94	.98	.19	.50
Team collaborative norms	2.03 ($p < .001$)	.89	.92	.19	.51
Team knowledge sharing	1.90 ($p < .001$)	.90	.94	.17	.47

TABLE 4
Common Factor Analyses for Harman's Single-Factor Test[a]

A: Knowledge Intensity and Team Performance (from Team Leader)

	Factor		
	1	2	3
The number of innovations or new ideas introduced by the team	.773		
The innovativeness of the team's product	.755		
The team's adaptability to changes	.647		
The team's overall technical performance	.515		
The team's progress compared with the managers' initial expectations	.425		
Its adherence to schedules	.396		
Members in our team have to engage in sharing, creating, and/or applying knowledge, in order to achieve effectiveness		.899	
Knowledge is important for our team to perform tasks		.505	
Its adherence to budgets			-.888
The team's cost performance			-.648

B: Team-Level TFL, Collaborative Norm, and Knowledge Sharing
(from Team Members—Group A)

	Factor		
	1	2	3
Members of our team provide a lot of work-related suggestions to each other	.813		
More knowledgeable team members freely provide other members with hard-to-find knowledge or specialized skills	.772		
Members in our team provide their experience and knowledge to help other members find solutions to their problems	.671		
People in our team share their special knowledge and expertise with one another	.597		
There is a lot of constructive discussion during team meetings	.579		
If someone in our team has some special knowledge about how to perform the team task, he/she will tell other members about it	.516		
team-level TFL (IS)		-.900	
team-level TFL (ID)		-.834	
team-level TFL (IC)		-.828	
team-level TFL (IM)		-.737	
Helping a group member without being asked			.859
Going out of one's way to help a group member			.736
Working jointly toward task accomplishment	.312		.503
Willingness to sacrifice their self-interest for the benefit of the team			.333

[a] Extraction and rotation method: Principal axis factoring with oblimin rotation. Pattern matrices are reported. Values less than .30 are suppressed. ID = Idealized influence. IM = Inspirational motivation. IS = Intellectual stimulation. IC = Individualized consideration.

TABLE 4 (contined)
Common Factor Analyses for Harman's Single-Factor Test[a]

C: Individual-Level TFL, Commitment to Team Goal, and Individual learning (from Team Members—Group B)

	Factor		
	1	2	3
Individual-level TFL (IM)	.874		
Individual-level TFL (IC)	.830		
Individual-level TFL (IS)	.822		
Individual-level TFL (ID)	.741		
I have improved my listening skills		.823	
I have developed new ideas about how to perform my job		.691	
I have learned how to communicate effectively with others		.658	
I better understand how my job or department affects others		.586	
I have a better sense of organizational politics		.557	
I have become more sensitive to others' feelings and attitudes		.497	
I am strongly committed to pursuing team goal			.614
Even though it's not always possible to tell how tough our team goal is until you've been in it a while, I always take this goal seriously			.610
I think our team goal is a good goal to shoot for			.532

[a] Extraction and rotation method: Principal axis factoring with oblimin rotation. Pattern matrices are reported. Values less than .30 are suppressed. ID = Idealized influence. IM = Inspirational motivation. IS = Intellectual stimulation. IC = Individualized consideration.

TABLE 5
Team-Level Descriptive Statistics, Intercorrelations, and Reliability[a]

Variables	Mean	s.d.	1	3	4	5	6	7
1. Team size	8.82	3.97						
3. Team-level TFL	3.80	0.38	-0.04	(.95)				
4. Team collaborative norms	4.08	0.39	-0.04	0.72**	(.73)			
5. Team knowledge sharing	3.78	0.39	-0.12	0.74**	0.66**	(.84)		
6. Knowledge intensity	4.40	0.53	-0.08	0.03	0.05	0.10	(.61)	
7. Team performance	3.44	0.49	-0.19	0.03	-0.07	0.22*	0.20	(.81)

[a] $n = 91$. Values in parentheses are reliability coefficients for the measures. TFL = transformational leadership.
** $p < .01$. * $p < .05$. Two-tailed test.

TABLE 6

OLS Regression Analyses for Team Performance (Hypothesis 1a and 1b)[a]

	Team Performance	
Team Size	-.19*	-.16
Team-level TFL	.02	.03
Knowledge Intensity (KC)		.16
Team-Level TFL × KC		.16
R^2	.04	.10
Adjusted R^2	.01	.05
F	1.65	2.24*

[a] N = 91. Standardized coefficients are reported. TFL = transformational leadership.
** $p < .01$. * $p < .05$. One-tailed test.

TABLE 7
Team-Level Structural Model Results[a]

Model	Description	χ^2	df	CFI	SRMR
SEM1	Mediation: TTFL, KS, and Performance (H1c).	.49 (p=.48)	1	1.00	.019
SEM2	Add mediator CN to Model SEM1 (H1e).	5.80 (p=.12)	3	.98	.040
SEM3	Reduced model from Model SEM2.	6.24 (p=.18)	4	.98	.042
SEM4	Add moderator KC to Model SEM2 (H1d).	10.75 (p=.096)	6	.94	.072

TABLE 8
Individual-Level Descriptive Statistics, Intercorrelations, and Reliability[a]

Variables	Mean	s.d.	1	2	3	4	5	6
1. Sex	0.48	0.50						
2. Age	3.65	1.51	-0.05					
3. Education level	3.47	0.88	-0.04	-0.14**				
4. Individual-level TFL	3.68	0.58	0.11*	0.01	0.12*	(.94)		
5. Individual commitment to team goal	4.16	0.57	0.02	-0.10*	0.05	0.37**	(.63)	
6. Individual learning	3.61	0.57	0.02	0.02	0.09	0.39**	0.28**	(.81)

[a] n = 302. Values in parentheses are reliability coefficients for the measures. TFL = transformational leadership.

** $p < .01$. * $p < .05$. Two-tailed test.

TABLE 9
Two-Level Random Coefficient Modeling Results for Individual Learning (Hypothesis 2a, 2b, 2c, and 3a)[a]

	Individual Commitment to Team Goal	Individual Learning			
Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Level 1					
Intercept	2.92** (0.27)	2.16** (0.26)	1.69** (0.31)	3.51** (0.19)	1.72** (0.50)
Sex	-0.04 (0.06)	-0.02 (0.06)	-0.01 (0.06)	-0.00 (0.06)	-0.01 (0.06)
Age	-0.02 (0.02)	0.00 (0.02)	0.01 (0.02)	-0.00 (0.02)	0.01 (0.02)
Education Level	-0.01 (0.04)	0.02 (0.04)	0.02 (0.04)	0.01 (0.04)	0.02 (0.04)
Individual-Level TFL	0.38** (0.05)	0.36** (0.05)	0.30** (0.06)	0.37** (0.05)	0.30** (0.06)
Individual Commitment to Team Goal			0.16** (0.05)		0.16** (0.06)
Level 2					
Team Size	-0.00 (0.01)	0.00 (0.01)	0.00 (0.01)	0.01 (0.01)	0.00 (0.01)
Team Knowledge Sharing					-0.01 (0.11)
Knowledge Intensity (KI)				0.10 (0.06)	
Cross-Level					
Individual-Level TFL×KI				-0.11 (0.10)	
AIC	495.67	506.47	504.99	513.88	509.53
Log Likelihood of the estimate	-239.83	-245.24	-243.50	-246.94	-244.77

[a] N = 302 (302 individuals in 75 teams). Values for the predicting variables are unstandardized coefficients of the fixed effects. Values in parentheses are standard errors for regression coefficients. AIC and log likelihood of the estimate are two model fit indices. TFL = transformational leadership.

** $p < .01$. * $p < .05$. One-tailed test.

TABLE 10
Coefficient Estimates for a Total Effect Moderation Model of Team Performance

Equation 1	a_{01}	a_{T1}	a_{K1}	a_{TK1}	R^2		
	0.000	0.725**	0.023	-0.046	0.512**		
Equation 2	a_{02}	a_{T2}	a_{C2}	a_{K2}	a_{TK2}	a_{CK2}	R^2
	0.003	0.573**	0.233*	0.069	0.099	-0.342†	0.611**
Equation 3	a_{03}	a_{T3}	a_{S3}	a_{K3}	a_{TK3}	a_{SK3}	R^2
	-0.008	-0.368†	0.577**	0.109	0.316	0.291	0.170**

Note. N = 91. Unstandardized coefficient estimates.
† $p < .10$. * $p < .05$. ** $p < .01$. Two-tailed test.

TABLE 11
Analyses of Simple Effects and Moderation for Team Performance

Moderator	Stage			Effect						
	First	Second	Third	Direct (TTFL-KS)	Direct (TTFL-TP)	Indirect (TTFL-TCN-TKS)	Indirect (TTFL-TKS-TP)	Indirect (TTFL-TCN-TKS-TP)	Total (TKS)	Total (TP)
Low TKI	0.75**	0.42**	0.42	0.52**	-0.54†	0.31**	0.22	0.13†	0.83**	-0.19
High TKI	0.70**	0.05	0.73**	0.63**	-0.20	0.04	0.46**	0.03	0.66**	0.29
Differences	-0.05	-0.37†	-0.31	0.11	0.34	-0.28†	0.24	-0.11	-0.17	0.47†

Note. N = 91. Unstandardized coefficient estimates. TKI = task knowledge intensity; TTFL = team-level transformational leadership; TCN = team collaborative norms; TKS = team knowledge sharing; TP = team performance.)

† $p < .10$. * $p < .05$. ** $p < .01$. Two-tailed test.

TABLE 12

Coefficient Estimates for a Total Effect Moderation Model of Individual Learning

Equation 4	a_{04}	a_{T4}	a_{K4}	a_{TK4}	R^2		
	0.003	0.343**	-0.001	0.089	0.130**		
Equation 5	a_{05}	a_{T5}	a_{G5}	a_{K5}	a_{TK5}	a_{GK5}	R^2
	3.612	0.332**	0.167**	0.106*	-0.149	0.048	0.191**

Note. N = 91. Unstandardized coefficient estimates.

$^{\dagger}p < .10$. * $p < .05$. ** $p < .01$. Two-tailed test.

TABLE 13
Analyses of Simple Effects and Moderation for Individual Learning

Moderator	Stage		Effect		
	First	Second	Direct (ITFL-IL)	Indirect (ITFL-IGC-IL)	Total (IL)
Low TKI	0.26*	0.12	0.47**	0.03	0.50**
High TKI	0.42**	0.21†	0.20	0.09*	0.29**
Differences	0.16	0.09	-0.27	0.06	-0.21

Note. N = 313. Unstandardized coefficient estimates. TKI = task knowledge intensity; ITFL = individual-level transformational leadership; IGC = individual commitment to team goals; IL = individual learning.)

† $p < .10$. * $p < .05$. ** $p < .01$. Two-tailed test.

FIGURE 1
An Integrated Framework for Transformational Leadership and Team Processes and Outcomes

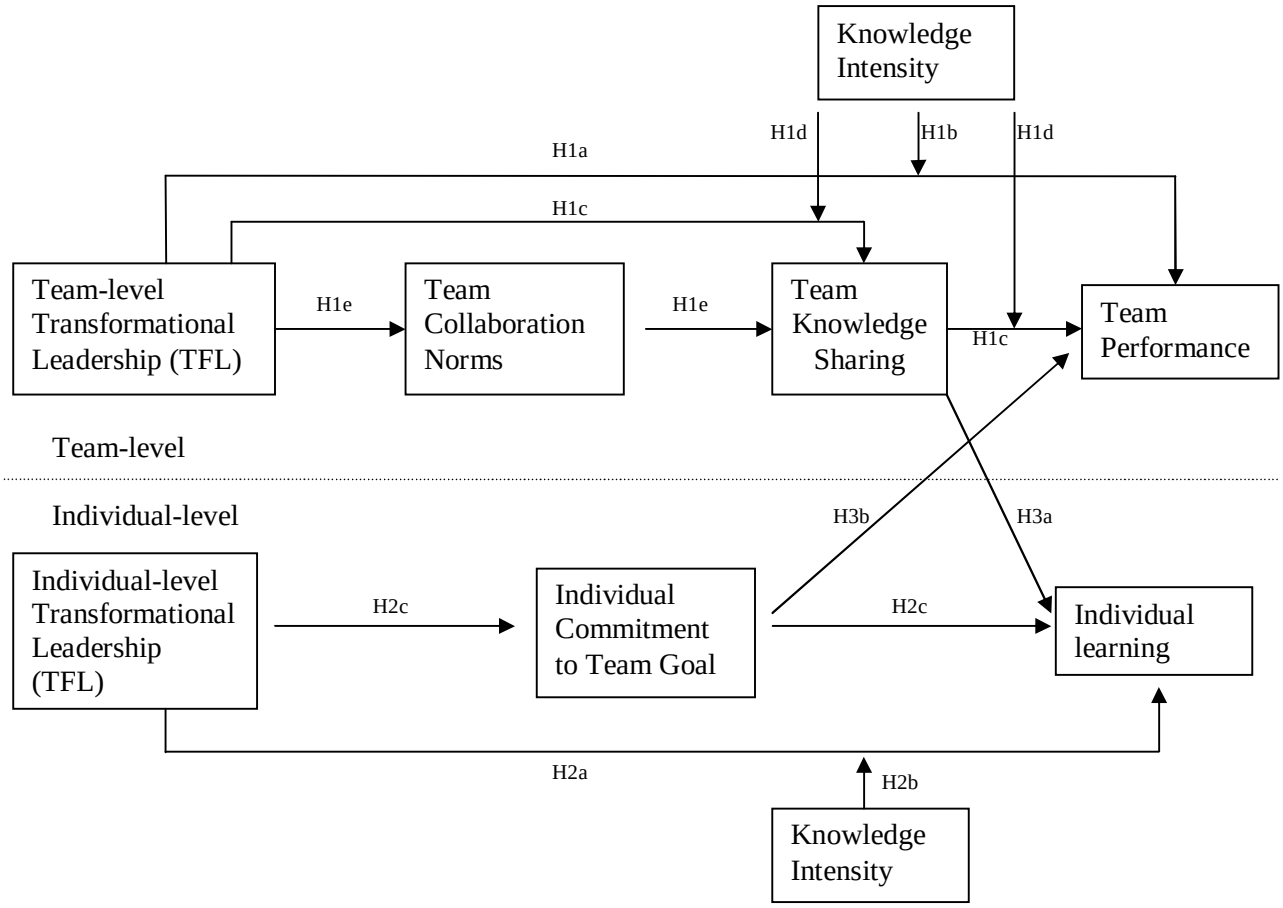
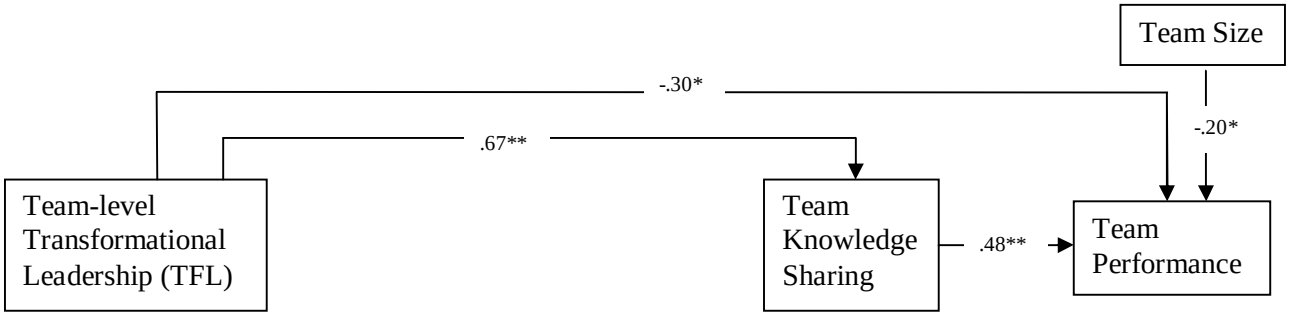


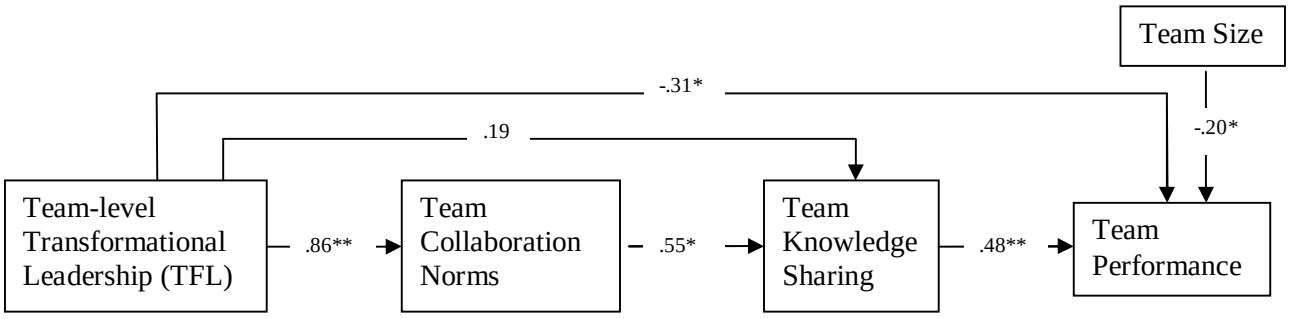
FIGURE 2
Model SEM1—Mediation Model of Knowledge Sharing (Hypothesis 1c) [a]



[a] All of the reported paths are standardized coefficients.
** $p < .01$. * $p < .05$. One-tailed test.

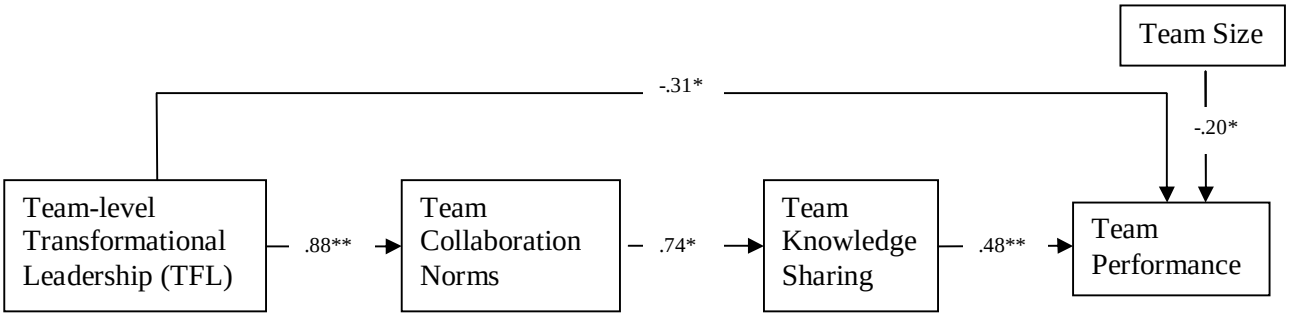
FIGURE 3

Model SEM2—Adding Mediator of Collaborative Norm into Model SEM1 (Hypothesis 1e) [a]



[a] All of the reported paths are standardized coefficients.
** $p < .01$. * $p < .05$. One-tailed test.

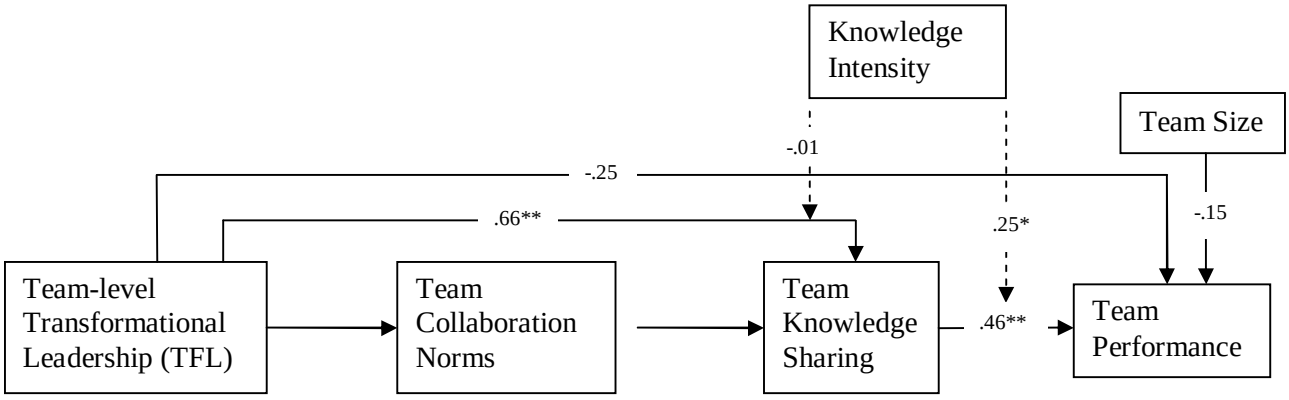
FIGURE 4
Model SEM3—Reduced Model from Model SEM2[a]



[a] All of the reported paths are standardized coefficients.
** $p < .01$. * $p < .05$. One-tailed test.

FIGURE 5

Model SEM4—Adding Moderator of Knowledge Intensity into Model SEM1 (Hypothesis 1d) [a]



[a] All of the reported paths are standardized coefficients. The dashed lines with an arrow denote the interaction effects of knowledge intensity.

** $p < .01$. * $p < .05$. One-tailed test.

FIGURE 6

Knowledge Intensity as a Moderator between Knowledge Sharing and Performance

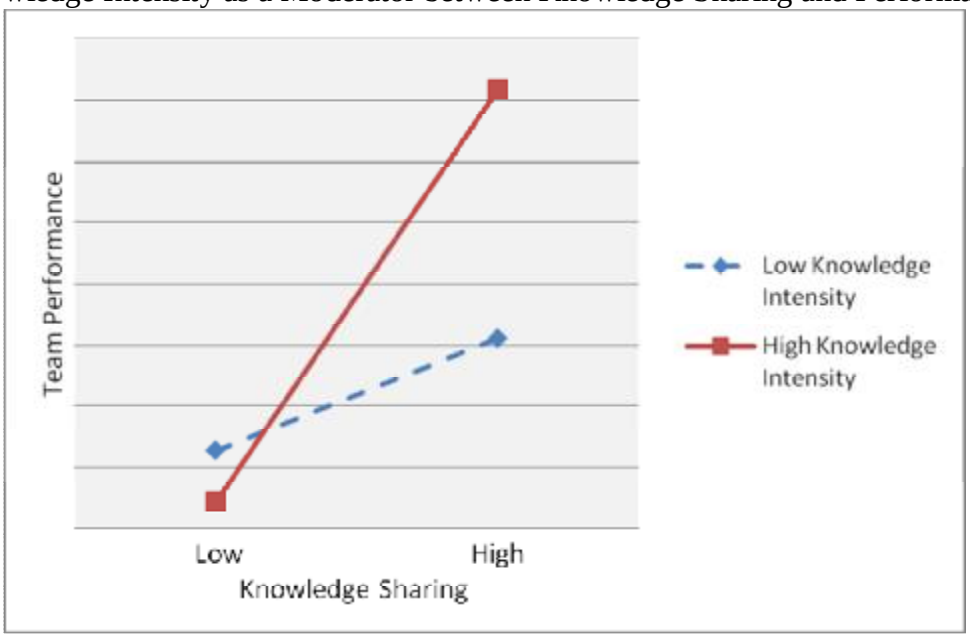
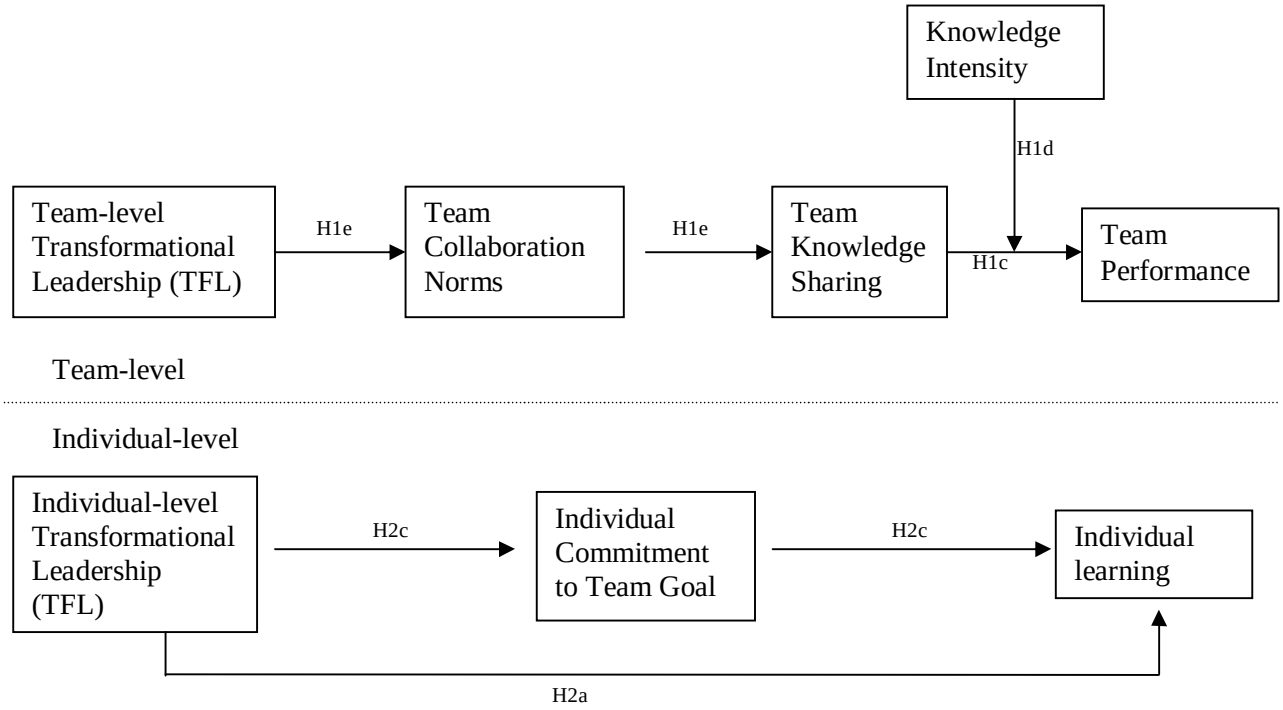


FIGURE 7
Final Model with Supported Relationships



APPENDIX 1: Survey (English)

Team Leader Survey Scales

Knowledge Intensity
Please answers the below questions regarding the tasks your team has generally been assigned (A five-point response format is used ranging from 1 = "strongly disagree" to 5 = "strongly agree").

- Knowledge is important for our team to perform tasks
- Members in our team have to engage in knowledge-centered behaviors such as sharing, creating, and/or applying knowledge, in order to achieve effectiveness.

Team Performance
Please rate your team's performance along with the below dimensions (A five-point response scale was used ranging from 1 = "much lower than average," to 5 = "much higher than average").

- The innovativeness of the team's product
- The number of *innovations* or new ideas introduced by the team
- The team's overall technical performance
- The team's adaptability to changes
- The team's progress compared with the managers' initial expectations
- The team's cost performance
- Its adherence to schedules
- Its adherence to budgets

Team Member Survey Scales—Group A

Team-Level TFL
Please rate the frequency of your team leader's attribute and behavior (A five-point response format is used ranging from 1 = "not at all" to 5 = "to a very great extent").

- Idealized influence (ID)
  - ……Instill pride in members for being associated with him/her
  - ……Go beyond self-interest for the good of the group
  - ……Act in ways that build members' respect for him/her
  - ……Display a sense of power and confidence to team members
  - ……Talk about members' most important values and beliefs
  - ……Specify the importance of having a strong sense of purpose
  - ……Consider the moral and ethical consequences of decisions
  - ……Emphasize to team members the importance of having a collective sense of mission
- Inspirational Motivation (IM)
  - ……Talk with members optimistically about the future
  - ……Talk with members enthusiastically about what needs to be accomplished
  - ……Articulate a compelling vision of the future to members in the team
  - ……Express toward members confidence that goals will be achieved

- Intellectual Stimulation (IS)
  - ……Re-examine with members critical assumptions to question whether they are appropriate
  - ……Seek differing perspectives from members when solving problems
  - ……Get members to look at problems from many different angles
  - ……Suggest members new ways of looking at how to complete assignments
- Individualized Consideration (IC)
  - ……Spend time teaching and coaching team members
  - ……Treat members as individuals rather than just as a member of the group
  - ……Consider members as having different needs, abilities and aspirations from each other
  - ……Help members to develop their strengths

Collaborative Norms

Please describe your team's expectations about the below behaviors (A five-point response format is used ranging from 1 = "strongly disagree" to 5 = "strongly agree").

- Going out of one's way to help a group member
- Helping a group member without being asked
- Willingness to sacrifice their self-interest for the benefit of the team
- Working jointly toward task accomplishment

Knowledge Sharing

Please answer the questions regarding your observation of members' knowledge sharing (A five-point scale is used ranging from 1 = "not at all" to 5 = "to a very great extent").

- People in our team share their special knowledge and expertise with one another
- If someone in our team has some special knowledge about how to perform the team task, he/she will not tell other members about it (Reverse-coded)
- There is virtually no exchange of information, knowledge, or sharing of skills among members (Reverse-coded)
- More knowledgeable team members freely provide other members with hard-to-find knowledge or specialized skills
- Members of our team provide a lot of work-related suggestions to each other
- There is a lot of constructive discussion during team meetings
- Members in our team provide their experience and knowledge to help other members find solutions to their problems

Team Member Survey Scales—Group B

Individual-Level TFL

Please rate the frequency of your team leader's attribute and behavior (A five-point response format is used ranging from 1 = "not at all" to 5 = "to a very great extent").

- Idealized influence (ID)
  - ……Instill pride in me for being associated with him/her
  - ……Go beyond self-interest for the good of the group
  - ……Act in ways that build my respect for him/her

    - ……Display a sense of power and confidence to me
    - ……Talk about my most important values and beliefs
    - ……Specify the importance of having a strong sense of purpose
    - ……Consider the moral and ethical consequences of decisions
    - ……Emphasize to me the importance of having a collective sense of mission
- Inspirational Motivation (IM)
    - ……Talk with me optimistically about the future
    - ……Talk with me enthusiastically about what needs to be accomplished
    - ……Articulate a compelling vision of the future to me
    - ……Express to me confidence that goals will be achieved
- Intellectual Stimulation (IS)
    - ……Re-examine with me critical assumptions to question whether they are appropriate
    - ……Seek differing perspectives from me when solving problems
    - ……Get me to look at problems from many different angles
    - ……Suggest me new ways of looking at how to complete assignments
- Individualized Consideration (IC)
    - ……Spend time teaching and coaching team me
    - ……Treat me as individuals rather than just as a member of the group
    - ……Consider me as having different needs, abilities and aspirations from others
    - ……Help me to develop their strengths

Individual Commitment to Team Goal

Please answer the questions regarding your commitment to the team goal (A five-point response format is used ranging from 1 = "strongly disagree" to 5 = "strongly agree").

- Since it's not always possible to tell how tough our team goal is until you've been in it a while, it's hard to take this goal seriously (Reverse-coded)
- Quite frankly, I don't care if our team achieves this goal or not (Reverse-coded)
- I am strongly committed to pursuing team goal
- It wouldn't take much to make me abandon team goal (Reverse-coded)
- I think our team goal is a good goal to shoot for

Individual learning

Please answer the questions regarding your learning from working in this team (A five-point response format is used ranging from 1 = "not at all" to 5 = "to a very great extent").

- I have gained insight into how another department functions
- I have increased my knowledge about the organization as a whole
- I have learned about others' perceptions about me or my job
- I have increased my understanding of issues and problems outside my job
- I better understand how my job or department affects others
- I have a better sense of organizational politics
- I have learned how to communicate effectively with others

- I have improved my listening skills
- I have developed new ideas about how to perform my job
- I have become more sensitive to others' feelings and attitudes
- I have gained new skills
- I have expanded the way I think about things

APPENDIX 2: Survey (Chinese)

Team Leader Survey Scales

团队任务的知识密集性：
以下各项是关于您的**团队日常工作**的特点的描述，请对每项内容的符合程度给与评估：
1 = 坚决不同意　　2 = 不同意　　3 = 差不多　　4 = 同意　　5 = 很赞成

- 知识对于我的团队执行任务很重要
- 我的团队工作的有效性取决于团队成员对知识的分享、创造和运用

团队业绩：
请对您的团队的**业绩**在以下几方面进行评估：
1=远低于平均水平　2=低于平均水平　3=达到平均水平　4=高于平均水平　5=远高于平均水平

- 团队所提供的产品或服务的创新性
- 团队所推出的创新项目和新的想法
- 团队的综合技术水平
- 团队适应变化的能力
- 团队的工作进展与管理层的最初期望相比较
- 团队成本控制
- 团队进度控制
- 团队预算控制

Team Member Survey Scales—Group A

团队水平的变革型领导行为：
以下各项是关于您的**团队领导**的特征和行为的描述，请对每项描述的符合程度给与评估：
1 = 坚决不同意　　2 = 不同意　　3 = 差不多　　4 = 同意　　5 = 很赞成

- 理想影响力
    - 灌输团队一种与他/她共事的光荣感
    - 注重团队利益大于个人利益
    - 行为表现令团队成员尊敬
    - 对团队成员展现出权力与自信
    - 对团队成员谈论他/她最重视的价值观与信念
    - 为团队成员指明拥有强烈目标感的重要性
    - 考虑到决策所产生的道德与伦理的后果
    - 对团队成员强调有集体使命感的重要性
- 鼓励性激励
    - 对团队成员乐观地谈论未来
    - 谈到团队工作任务时满怀热情
    - 对团队成员清楚地表达一个令人注目的未来愿景
    - 在团队面前表现出实现目标的信心
- 智力激励
    - 反复检验各种关键性的设想，看其是否妥当
    - 解决问题时，会寻求不同的看法与观点
    - 让团队成员从不同的角度来观察问题
    - 针对如何完成工作提供给团队成员新的建议
- 个人化考虑
    - 花时间传授与指导团队成员

- 把团队每个人当作是独立的个体，而不仅仅当作团体中的一员
- 考虑到团队每个人有不同于他人的需求、能力与抱负
- 帮助团队成员发挥各自的长处

合作共识：
以下各项是**您的团队**对每个成员的**期望**，请您对此进行评价：
1 = 坚决不同意　　2 = 不同意　　3 = 差不多　　4 = 同意　　5 = 很赞成

- 我们团队期望每个成员在**本职工作范围之外**互相帮助
- 我们团队期望成员之间**主动**地彼此帮助
- 我们团队期望每个成员愿意为了团队而牺牲个人利益
- 我们团队期望成员之间共同协作以完成任务

知识分享：
以下各项是有关您对**团队知识分享**的看法，请对每项进行评估：
1 = 坚决不同意　　2 = 不同意　　3 = 差不多　　4 = 同意　　5 = 很赞成

- 我们团队的成员彼此分享专业知识
- 如果团队中有人具备执行团队任务的特殊知识，他会告诉其他成员
- 我们团队成员彼此之间**几乎不会**交换信息、知识或分享技能
- 我们团队中比较博学的人会无偿与他人分享他们宝贵的知识和专业技能
- 我们团队成员彼此提供许多工作上的建议
- 我们团队开会时，有许多具有建设性的讨论
- 我们团队成员会提供他们的经验及知识来协助其他成员找到解决问题的方案

Team Member Survey Scales—Group B

个体水平的变革型领导行为：
以下各项是关于您的**团队领导**的特征和行为的描述，请对每项描述的符合程度给与评估：
1 = 坚决不同意　　2 = 不同意　　3 = 差不多　　4 = 同意　　5 = 很赞成

- 理想影响力
  - 灌输团队一种与他/她共事的光荣感
  - 注重团队利益大于个人利益
  - 行为表现令我尊敬
  - 对我展现出权力与自信
  - 对我谈论他/她最重视的价值观与信念
  - 为我指明拥有强烈目标感的重要性
  - 考虑到决策所产生的道德与伦理的后果
  - 对我强调有集体使命感的重要性
- 鼓励性激励
  - 对我乐观地谈论未来
  - 谈到团队工作任务时满怀热情
  - 对我清楚地表达一个令人注目的未来愿景
  - 在我面前表现出实现目标的信心
- 智力激励
  - 反复检验各种关键性的设想，看其是否妥当
  - 解决问题时，会寻求不同的看法与观点
  - 让我从不同的角度来观察问题
  - 针对如何完成工作提供给我新的建议
- 个人化考虑
  - 花时间传授与指导我

- 把我当作是独立的个体，而不仅仅当作团体中的一员
- 考虑到我有不同于他人的需求、能力与抱负
- 帮助我发挥我的长处

团队目标承诺：
以下各项是关于您对团队目标的承诺的描述，请对每项的符合程度给与评估：
1 = 坚决不同意　　2 = 不同意　　3 = 差不多　　4 = 同意　　5 = 很赞成

- 无论实现团队的目标是难是易，我都会认真对待它
- 坦白地说，我并不关心我们团队能否实现目标
- 我对实现团队的目标负有强烈的责任感
- 让我放弃团队目标并不困难
- 我认为我们团队的目标是值得去争取实现的

个人学习：
以下各项是您**通过团队合作的而获取的知识和技能**，请对每项的符合程度给与评估：
1 = 坚决不同意　　2 = 不同意　　3 = 差不多　　4 = 同意　　5 = 很赞成

- 我明白了其它部门是如何运作的
- 我从整体的角度增进了对我们企业的了解
- 我了解到了其他人对于我或我的工作的看法
- 我增加了对于自身工作之外的事情和问题的理解
- 我更好地理解了我的工作或我的部门是如何影响他人的
- 我对于公司政治的感觉更加敏锐
- 我学会了如何与人进行有效沟通
- 我改进了聆听的技巧
- 我对如何开展我的工作有了新的想法
- 我对他人的感受和态度更加敏感
- 我学会了新的技能
- 我扩展了思维方式

Curriculum Vita

Yuan Jiang

Education

2009 Ph.D., Industrial Relations and Human Resources
Rutgers University, New Brunswick, NJ

2006 M.S., Human Resource Management
Rutgers University, New Brunswick, NJ

2001 M.A., International Economics
Sun Yat-Sen University, Guangzhou, China

1996 B.A., Economics
Sun Yat-Sen University, Guangzhou, China

Publication

Jackson, S. E., Chuang, C., Harden, E. E., & Jiang, Y. 2006. Toward developing human resource management systems for knowledge-intensive teamwork. In J. Mortocchio (Ed.), *Research in Personnel and Human Resource Management*, Vol. 25, 27-70.