

Transformational leadership, team climate, and team performance within the NPD team: Evidence from China

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Abstract This study analyzes the impact of team transformational leadership on team performance during the new product development (NPD) process and the mediating role of team climate. Data were collected from 184 NPD projects of Chinese high-tech firms. The results show that NPD team transformational leadership is positively related to team performance. In addition, team climate mediates the relationship between most dimensions of NPD team transformational leadership (charisma, inspirational motivation, intellectual stimulation, and individualized consideration) and team performance.

Keywords New product development (NPD) team · Transformational leadership · Team climate · Team performance

Because teams are the basic work unit (Lawler, Mohrman, & Ledford, 1995), leadership research on transformational leadership has increasingly paid attention to the team context. Transformational leadership in teams is defined as the style of leadership that heightens consciousness of collective interest among the team members and helps them to achieve their collective goals (Chen, Lin, Lin, & McDonough, 2012; Ishikawa, 2012). It emphasizes the congruence of values, the arousal of positive emotions, and the importance of creativity orientation of employees (Bass & Avolio, 1989, 2000; Garcia-Morales, Jiménez-Barrionuevo, & Gutiérrez-Gutiérrez, 2012; Garcia-Morales, Llorens-Montes, & Verdu-Joverm, 2008a; Garcia-Morales, Matias-Reche, & Hurtado-Torres, 2008b).

Given that team climate is of importance to team performance and that transformational leadership is a critical antecedent of organizational climate, team climate may mediate the relationship between transformational leadership and team performance. Yet,

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little research has investigated these questions: Does team transformational leadership impact team performance? Does team climate mediate the relationship between transformational leadership and team performance during the new product development (NPD) process? The purpose of this study, therefore, is to investigate these important but previously underexplored questions. Specifically, based on previous research, we propose a series of hypotheses on the mediation of team climate on the relationships between four dimensions of transformational leadership and team performance. We then empirically test the hypotheses based on data from NPD teams in Chinese high-tech enterprises.

Although the literature on transformational leadership has identified various mediating variables in the relationship between transformational leadership and organizational performance (Avolio, Zhu, Koh, & Bhatia, 2004; Ishikawa, 2012; Jung & Avolio, 2000; Jung, Chow, & Wu, 2003; Ogbonna & Harris, 2000; Wang, Law, & Hackett, 2005), the understanding of the underlying mechanism through which the leader exerts this influence—especially at the team level—is still limited and largely speculative (Bass & Avolio, 1989; Conger, 1999). This study can enrich our knowledge on this issue. Thus, this study has significant theoretical contributions.

NPD team transformational leadership and team performance

James MacGregor Burns (1978) first introduced the concept of transformational leadership in his descriptive research on political leaders. This term is now used in organizational research as well (Bass & Riggio, 2006). Burns (1978) defined transformational leadership as a process in which “leaders and followers raise one another to higher levels of morality and motivation” (20). In addition, he stresses that the transformational approach creates significant change in the life of people and organizations. It redesigns perceptions and values, and changes expectations and aspirations of employees. Unlike in the transactional approach, the transformational approach is not based on a “give and take” relationship, but on the leader’s personality, traits, and ability to make a difference through example, articulation of an energizing vision, and challenging goals. Transformational leaders are idealized in the sense that they are moral exemplars, working towards the benefit of the team, organization, and/or community.

Bass (1985) added to the initial concepts of Burns (1978) to help explain how transformational leadership could be measured, as well as how it impacts follower motivation and performance. The leader transforms and motivates followers through his or her idealized influence (earlier referred to as charisma), intellectual stimulation, and individual consideration. In addition, this leader encourages followers to come up with new and unique ways to challenge the status quo and to alter the environment to facilitate success.

Charisma and team performance

The environment for NPD is characterized by high uncertainty. In such an environment, charismatic leaders can boost team performance considerably (Waldman, Ramirez, House, & Puranam, 2001) and enhance team job satisfaction (Covin, Kolenko, Sightler, & Tudor, 1997). Charismatic leaders improve team performance by encouraging, advising, and rewarding. They encourage followers to work hard and be confident,

strengthen team morale, create a trusting work atmosphere, and facilitate enthusiasm (House, Delbecq, & Taris, 1998; McClelland & Boyatzis, 1982). Charismatic influences provide followers with competitive cognitive support and contribute to expectations beyond the ordinary (Pawar & Eastman, 1997). Feeling trust, admiration, loyalty, and respect for the leader motivate followers to work harder than originally expected. These outcomes occur because the transformational leader offers followers something more than just working for self gain; they provide followers with an inspiring mission and vision and give them an identity (Bai, Li, & Xi, 2012; Chen et al., 2012).

When it comes to actions, followers may transcend self-interests for the sake of the organization because they are emotionally appealed to by their charismatic leader (Li, Chun, Ashkanasy, & Ahlstrom, 2012). What is more, followers under charismatic leadership may be motivated by a higher level of self-efficiency and challenge themselves with more goals (Waldman et al., 2001). Transformational leaders improve followers' ability to withstand and adapt to environmental uncertainty through empowerment and emotional appeal (Bass & Avolio, 1989). They also communicate with followers effectively—publicly or privately—and as a result, their followers will have a better understanding of team output values (Maitlis, 2005) and contribute more to the organization (Rafferty & Griffin, 2004). Moreover, transformational leaders set individual examples which can reduce inner conflict and improve efficiency and team performance (Nemanich & Keller, 2007). Therefore:

Hypothesis 1 Charisma of NPD team transformational leadership is positively related to team performance.

Inspirational motivation and team performance

Bass (1985) insisted that inspirational motivation should be regarded as an independent dimension when discussing transformational leadership. Leaders of this type could influence followers by inspiring talks and emotional claims (Howard, Foster, & Shannon, 2005; Rafferty & Griffin, 2004). Jung and Sosik's (2002) study of 47 Korean firms found that, by inspiring team members with goals of higher levels, transformational leaders can enhance team cohesion and psychological empowerment which promote self-efficiency of team members, which in turn, boost team performance.

Inspirational motivation can improve job satisfaction because followers believe that they are committed to higher-level tasks (Nemanich & Keller, 2007). When they are satisfied with organizational strategies, they will respond and take action quickly. The group members may not only subscribe to future visions, but also regard these visions as aspirations (Zoogah & Peng, 2011; Zoogah, Vora, Richard, & Peng, 2011). It is necessary for leaders to make performance objectives understood and accepted by group members so they can be satisfied with their product (Rafferty & Griffin, 2004). The sub-dimension of inspirational motivation shows exactly the capability of transformational leaders to articulate the meaning of the work and to affect the group members' understanding of group objectives. In other words, leaders encourage team members to realize the expected goals by providing them with a vivid but overall vision and encourage them to work harder so as to achieve better performance by establishing cognitive models. Because of their leader's efforts, subordinates may feel

that their organization is advancing toward an important goal and their work is of great value. Thus, they will be willing to contribute to the group in order to show gratitude to their leader (Vera & Crossan, 2004). Therefore:

Hypothesis 2 Inspirational motivation of NPD team transformational leadership is positively related to team performance.

Intellectual stimulation and team performance

Intellectual stimulation can enhance followers' ability to better analyze and solve different kinds of problems (Bass & Avolio, 1989). Through intellectual stimulation, transformational leaders not only encourage followers to consider their predecessors' experiences, but also lead them to new cognitive fields (House, 1971). Transformational leaders encourage self-awareness and creativity, challenge their followers' ideas, and stimulate their followers' vision and thinking pattern. Followers are encouraged to work with great enthusiasm toward the team vision (Waldman, Javidan, & Varella, 2004). Intellectual stimulation is also regarded as an important resource of group innovation by some scholars (House, 1996).

As one of the four main dimensions of transformational leadership, research on intellectual stimulation is the most deficient (Lowe, Kroeck, & Sivasubramaniam, 1996). Bass (1985) considered intellectual stimulation as one sub-dimension of transformational leadership. He believed that intellectual stimulation should be regarded as an independent variable though it was similar to charisma to some extent. Intellectual stimulation, compared with charisma, helps solve problems (Waldman et al., 2004). Thite (2000) suggested that a successful project team is positively related to intellectual stimulation implemented by transformational leaders. Therefore:

Hypothesis 3 Intellectual stimulation of NPD team transformational leadership is positively related to team performance.

Individualized consideration and team performance

Bass (1985) described individualized consideration as transformational leaders showing concern for each individual and responding appropriately to their needs. Individualized consideration affects job satisfaction and demand preference directly. It involves concern for followers' welfare and establishment of a supportive psychological environment (House, 1996). Individualized consideration plays an important role in knowledge sharing, organizational identification, and organizational citizenship behavior (Ostroff, Kinicki, & Tamkins, 2003).

Individualized consideration requires special attention to each individual and can help followers work better (Thite, 2000). Leaders who are equipped with this trait can break the traditional form of communication (simple, signal, etc.). They support followers with different backgrounds by socialized construction (Rafferty & Griffin, 2004). Therefore:

Hypothesis 4 Individualized consideration of NPD team transformational leadership is positively related to team performance.

NPD team transformational leadership and team climate

Team climate is most commonly thought of as the typical way that members in the organization describe their team or organization (Chan, 1998). Team climate moderates the relationship between individual perception of an organization and organizational outcomes such as performance and satisfaction (Schneider, Salvaggio, & Subirats, 2002). Although climate is influenced by individuals' attributes, it is manifested at the organizational or team level (Schneider et al., 2002). Generally, climate encompasses the work environment, acting as a continuous factor that influences team composition and team performance. When individuals in the workplace create a positive climate, job satisfaction and job performance increase (Wiley, 2000; Schneider et al., 2002). As a moderator, team climate may influence the relationship between team composition and team performance.

Charisma and team climate

By using their unique and inspirational influences, charismatic transformational leaders can create a convergent tendency for followers to understand team climate (Struckman & Yammarino, 2003). Because charismatic leaders have a clear understanding of team development, they communicate with subordinates and they try to set examples, therefore helping their followers to work consistently and influencing team climate (Zaccaro, Rittman, & Mark, 2001). By keeping their followers up to date with relevant information, leaders can enhance their team members' relationships and team climate (Amabile, Schatzel, Moneta, & Kramer, 2004). Followers can enhance their team inner cohesion because while they are affected differently by both individual and social team goals, they can accept charismatic values from their leader (Shamir, House, & Arthur, 1993). In addition, transformational leadership can convey team goals and visions to subordinates through communication, and promote the recognition of both team visions and team climate through good relationships (Maurer & Tarulli, 1994). Therefore:

Hypothesis 5 Charisma of NPD team transformational leadership is positively related to team climate.

Inspirational motivation and team climate

When developing a new product, uncertainty can make it harder to achieve group goals (Ford, Quinones, Sego, & Sorra, 1992). In order to overcome uncertainty, inspiring a new vision and encouraging subordinates to realize organizational goals is necessary (Kirkpatrick & Locke, 1996). Inspirational motivation can consolidate followers' understanding and recognition of the overall group goals and improve team climate. Both encouragement and motivation have effects on group members (e.g., information sharing, goals achievement, team cognition), which can cause a convergent trend for team mental patterns and form a better team climate (Zaccaro et al., 2001).

Transformational leaders inspire their subordinates by setting high standards, exerting ideal influences, and assigning meaningful but challenging work. They encourage subordinates to keep a positive and enthusiastic team spirit. To further improve team climate, leaders communicate and share expectations and future visions

with subordinates (Ostroff et al., 2003). Because transformational leaders make it possible for followers to feel the importance of and satisfaction for their work, a task-oriented team climate will be formed. Therefore:

Hypothesis 6 Inspirational motivation of NPD team transformational leadership is positively related to team climate.

Intellectual stimulation and team climate

Followers support innovation because of intellectual stimulation. By embracing impressive visions, team members may feel stimulated, challenged, and pay more attention to innovation (Gumusluoglu & Iisev, 2009). Leaders in favor of intellectual stimulation can create a work atmosphere which encourages innovative thoughts and behaviors, consequently, affecting followers' recognition of the innovative team climate (Amabile, Conti, Coon, Lazenby, & Heron, 1996). They can also create a team climate which leads members to regard the innovative process as a basic constructive principle (Zohar, 1996). Transformational leadership involves enlightening activities (Sarin & McDermott, 2003), encouragement of new technical methods (Ford & Seers, 2006), learning from one's mistakes, and construction of a feedback system to improve quality. In addition, leaders will put these practices into effect by their own example (Fairhurst, 1993). Such a leadership style makes members feel that they are important, and a learning team climate will be formed (Zohar, 2000).

Innovative team climate is described as the psychological perception which includes new skills, new approaches to achieving work, and meeting requirements in the external environment (Gray, 2001). It may affect the NPD team positively. When making decisions, transformational leaders enlighten and encourage followers to construct work processes so as to create innovative team climate (Choi, Price, & Vinokur, 2003). Leaders advise followers to review work processes with new visions. All these are helpful to build innovative team climate (Perry, LeMay, Rodway, Tracy, & Galer, 2005). Therefore:

Hypothesis 7 Intellectual stimulation of NPD team transformational leadership is positively related to team climate.

Individualized consideration and team climate

In their research on traits of leaders in NPD teams, Sarin and McDermott (2003) pointed out that democratic leaders can focus on the needs of different followers. Communication between leaders and followers influence team climate positively (Ford & Seers, 2006). While in NPD teams, transformational leaders advocate and create an innovative team climate. They pay attention to subordinates' work ability and needs, make cooperation efforts, and create a fair and free work atmosphere. All these are related to individualized consideration.

An enclosed, high quality relationship within the team could prompt individualized consideration (Fairhurst, 1993). Fairhurst's (1993) conclusion supported Bass (1985). Hofmann and Morgeson (1999) and Zohar (2000) provided us with a regulation model of team climate. They thought that quality of communication

between leaders and followers influences individualized consideration. Consequently, perception of team climate and behaviors will be influenced too. Therefore:

Hypothesis 8 Individualized consideration of NPD team transformational leaderships is positively related to team performance.

NPD team climate and team performance

Team climate is considered as the performance driver of many work environments. It can be used to forecast team performance effectively (Rajnandini, Schreisheim, & Williams, 1999). Although economic situation and competitive power are also significant to performance, team climate is found to be the third driver (Guzzo, Yost, Campbell, & Shea, 1993). As a variable, team climate is affected by many organizational factors and individual behaviors. Hence, a large number of scholars regard team climate as an antecedent variable of team performance and job satisfaction (Mumford, Scott, Gaddis, & Strange, 2002).

The existing research suggests that, when it comes to NPD, perception of team climate will improve innovation performance (Gumusluoglu & Iisev, 2009). Most managers admit that the inner climate of an organization would influence team performance (Edmondson, 1999). Team climate shows the importance of innovation to the organization (Milliman, Taylor, & Czaplewski, 2002). When all the followers have a clear understanding of each other, work efficiency will be improved (Laschinger, Finegan, & Shamian, 2001). Followers are also willing to learn because of psychological security (Byrne, Stoner, Thompson, & Hochwarter, 2005). At the same time, team participation and support will also prompt the overall upgrade of group effectiveness and process improvement (Kivimaki & Elovainio, 1999).

Team climate may also affect employees' extra effort, organizational citizenship behavior, and customer satisfaction (Scott, 1998). A well-structured team climate encourages members to regard their work as a precious contribution, helps members find their own values, and satisfies members' social needs. Therefore, team members will be confident about themselves and their team (Anderson & West, 1998).

Accordingly, team climate influences team performance. It helps determine the innovative activities in the group (Scott, 1998) and affects the creativity of team members (Mumford et al., 2002). Gray (2001) believed that the climate of a project team is significantly correlated with its success. It is believed that team climate can improve job satisfaction too (Howard et al., 2005). Therefore:

Hypothesis 9 Team climate of NPD team is positively related to team performance.

Methods

The data were obtained through an interview survey instrument. We chose high-tech firms in the telecommunications, electronics, computer, and pharmacy and medicine industries. In addition, these firms are from five regions: Beijing, Guangdong, Henan, Shaanxi, and Shanghai. By drawing samples from a diverse geographical base, we minimize the bias caused by characteristics specific to a particular region.

The data were gathered in three phases. First, we developed a questionnaire following previous studies (Anderson & West, 1998; Bass & Avolio, 2000; Kivimaki & Lovainio, 1999; Oh, Chung, & Labianca, 2004), and then modified it by consulting with four executives to make it more appropriate to the conditions that Chinese firms faced. A pilot test was conducted with 14 firms, whose responses were excluded from the final study. The questionnaire was revised using the feedback from the pilot study.

The questionnaire was first prepared in English and then translated into Chinese. The Chinese version was subsequently back-translated by a third party to ensure accuracy (Chan, 1998). The two translations indicated no substantial differences in the meanings of the scales.

Second, we randomly selected 800 firms from a list of firms provided by local governments and business research firms. The pre-commitment technique was undertaken to increase response rate. Specifically, a telephone inquiry was performed before the formal survey, and 320 firms agreed to participate in the survey.

Finally, we adopted the direct interview method to gather the data. Although it was resource intensive, we chose it over mail survey for the purpose of clarifying respondents' queries on the spot, avoiding the situation whereby a busy executive or senior manager delegates the task of filling out the survey to his/her secretary, and ensuring that the responses collected were complete and usable for data analysis. All the interviewers received training before embarking on the interview process. The training covered background knowledge of the survey, interview skills, and the exact meaning of every question in the questionnaire.

To reduce common method bias, our questionnaires on each firm were completed by two top managers (Zhou & Wu, 2010). At the beginning, the interviewer showed the interviewee a letter that explained the intent of the survey and stated our promise to keep the responses confidential. Then, two interviewers interviewed two executives separately. The final score of each item was the average of those from the two top managers from the same firm. We started the survey of 640 questionnaires in the early spring of 2010 and obtained 402 questionnaires by May 2010. After deleting the responses with missing data, such as the firms with only one answer, and the firms whose answers from two top managers were distinctly different, and then combining two suitable questionnaires in the same firm, we finally have 184 valid questionnaires and the effective response rate is about 57.5 %.

One issue commonly raised concerning survey methodology is non-response bias. To check it, we compared the responding and non-responding firms along major attributes such as firm age and ownership status using the *t*-tests. All *t*-statistics were insignificant. Moreover, there are no significant differences between 184 usable firms and 136 deleted firms. Additionally, we further divided the total sample into two groups based on the time when they agreed to be interviewed—an early respondent and a late respondent group (Armstrong & Overton, 1977). A comparison of the two groups revealed no significant differences, supporting the assumption that respondents were not different from non-respondents.

We measured transformational leadership in NPD teams using the 6S version of Multifactor Leadership Questionnaire (MLQ; Bass & Avolio, 2000), which covers

the four dimensions of transformational leadership—(1) charisma, (2) inspirational motivation, (3) intellectual stimulation, and (4) individualized consideration. Each dimension contained three items, with a combined total of 12 items. The questionnaire can be seen in the [Appendix](#).

To measure NPD team climate we used Kivimaki and Elovainio's (1999) Team Climate Inventory (TCI), which is a revised version of Anderson and West (1998). The TCI includes four dimensions—(1) target identity, (2) task orientation, (3) participant guarantee, and (4) innovative support. Target identity and participant guarantee included four questions each and task orientation and innovation support had three questions each, which totaled 14 NPD team climate items. We measured NPD team performance from a scale designed by Oh et al. (2004), which included seven questions. All items were based on a 7-point Likert scale (1 = "Strongly disagree" to 7 = "Strongly agree"). We chose industry and size as control variables.

Results

Reliability and validity analysis

Table 1 shows the reliability and validity of team transformational leadership. The Cronbach's α coefficients of the four relevant dimensions are all above .7. The overall Cronbach's α of transformational leadership is .94. In addition, factor loadings of all items are more than .7. As seen in Table 2, the Cronbach's α of team climate is .956, and factor loadings of all items are more than .7. The reliability and validity of team performance are shown in Table 3. The

Table 1 All dimensions' Cronbach's α and factor loading of transformational leadership

Items	Factor Loading	CR ^a	α coefficient	Cronbach's α
Charisma				
q111	.941	17.427***	.905	.940
q112	.929	17.199***		
q113	.882	— ^b		
Inspirational motivation				
q121	.829	14.308***	.851	
q122	.924	17.702***		
q123	.880	—		
Intellectual stimulation				
q131	.896	15.109***	.863	
q132	.894	14.492***		
q133	.870	—		
Individualized consideration				
q141	.835	11.807***	.786	
q142	.851	10.607***		
q143	.825	—		

^aCritical ratio (CR) is used to test the significance of coefficients; CR is the same as Z-score of standardized normal distribution. It is significant when $CR > 1.96$. ^bCoefficient of leading indicator for each construct was set to 1.0 to establish scale. *** $p < .001$

Table 2 Cronbach's α of team climate and factor loading

Items	Factor loading	CR	Cronbach's α
q211	.797	14.336***	.956
q212	.804	14.527***	
q213	.719	12.418***	
q214	.762	13.522***	
q215	.844	15.919***	
q216	.806	14.82***	
q217	.768	13.852***	
q218	.828	15.523***	
q219	.829	15.485***	
q220	.817	15.184***	
q221	.808	14.948***	
q222	.821	15.269***	
q223	.759	13.674***	
q224	.812	–	

Cronbach's α of team performance is .956, and factor loadings of all items are above .7, again showing that the reliability and validity are quite high.

Correlation analysis

Table 4 presents the average value, variance, and correlation coefficients of the three latent variables.

Structural equation model (SEM)

We used AMOS 7.0 to analyze the fitness of the SEM. Based on our conceptual model, the overall relationship of the latent variables was also tested. The research objective of this article was the relationship among NPD transformational leadership, team climate, and team performance.

Table 3 Cronbach's α of team performance and factor loading

Items	Factor loading	CR	Cronbach's α
q311	.872	19.111***	.935
q312	.843	17.574***	
q313	.832	17.256***	
q314	.818	16.390***	
q315	.816	16.257***	
q316	.868	19.058***	
q317	.894	–	

*** $p < .001$

Table 4 Average value, variance, and correlation coefficients

	Average value	Variance	Transformational leadership	Team climate	Team performance
Transformational leadership	5.03	1.10	1.00		
Team climate	5.21	1.07	.79**	1.00	
Team performance	5.28	1.03	.81**	.85**	1.00

$n = 184$

** $p < .01$

Following our research hypotheses, the path analysis of the SEM is shown in Fig. 1.

According to Li's (2004) definition, we used the critical ratio (CR) of the AMOS outcome to test the significance of all paths' coefficients. Namely, a hypothesis was significant and accepted when $CR > 1.96$ ($p < .05$); otherwise the hypothesis would be rejected. The results of hypotheses testing are shown in

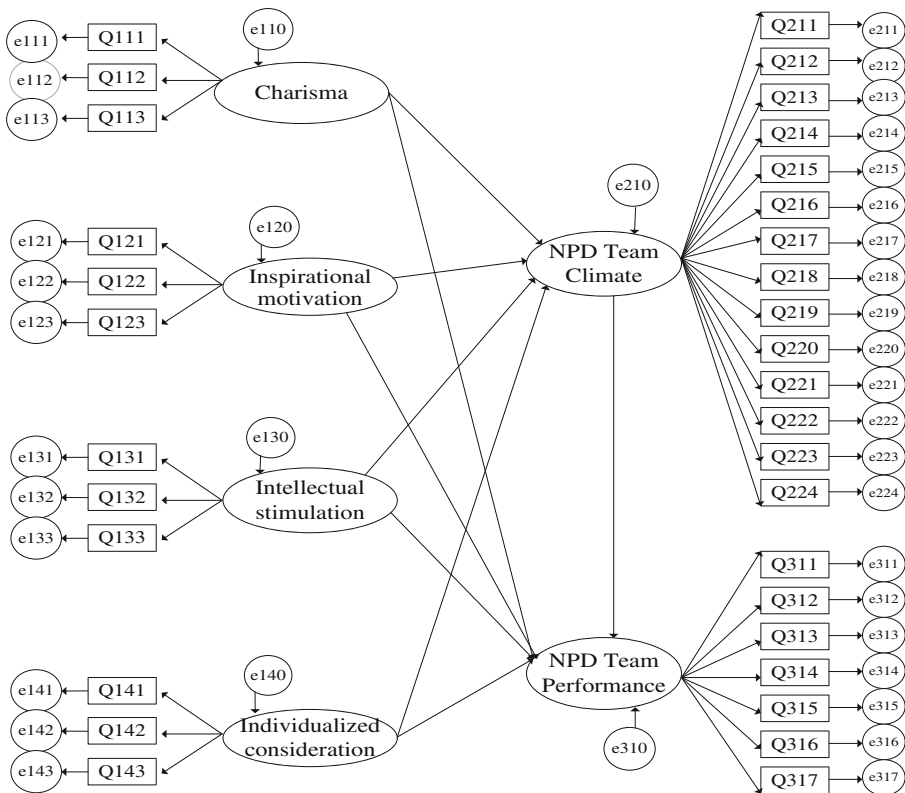


Fig. 1 Structural equation path * $p < .05$, ** $p < .01$, *** $p < .001$

Table 5. Based on our data, all of the hypotheses, except Hypothesis 3, are approved.

According to the AMOS analysis of the variable residuals and revised indices, we removed the rejected hypothesis and then modified the SEM for further analysis. In order to evaluate the overall goodness of fit of the modified model, we used seven indices, namely, (1) χ^2/df , (2) root mean square error of approximation (RMSEA), (3) normed fit index (NFI), (4) relative fit index (RFI), (5) incremental fit index (IFI), (6) Tucker-Lewis index (TLI), and (7) comparative fit index (CFI). The evaluation data for the modified model are presented in Table 6, which shows a high level of goodness fit (see Fig. 2).

According to the empirical analysis, the following conclusions can be reached. Based on our data, the three dimensions of transformational leadership (charisma, inspirational motivation, and individualized consideration) have positive influences on NPD team performance both directly and indirectly (through team climate). However, we did not find support for Hypothesis 3, which stated that intellectual stimulation of transformational leadership affects team performance directly. Intellectual stimulation is only positively related to team performance indirectly through team climate. In summary, for NPD teams, team climate plays an intermediary role between transformational leadership and team performance.

Table 5 Results of hypotheses testing

Hypotheses	CR	<i>p</i>	Results
NPD team transformational leadership and team performance			
H1: Charisma influence is positively and significantly related to team performance	2.398	.016	Supported
H2: Inspirational motivation is positively and significantly related to team performance	2.505	.012	Supported
H3: Intellectual stimulation is positively and significantly related to team performance	-1.904	.057	Rejected
H4: Individualized consideration is positively and significantly related to team performance NPD team transformational leadership and team climate	2.776	.005	Supported
H5: Charisma influence is positively and significantly related to team climate	3.878	.000	Supported
H6: Inspirational motivation is positively and significantly related to team climate	2.053	.040	Supported
H7: Intellectual stimulation is positively and significantly related to team climate	2.175	.030	Supported
H8: Individualized consideration is positively and significantly related to team climate NPD team climate and team performance	2.579	.010	Supported
H9: Team climate is positively and significantly related to team performance	9.466	.000	Supported

Table 6 Fit index of the modified model

Fit index	χ^2/df	RMSEA	NFI	RFI	IFI	TLI	CFI
Fit result	1.767	.053	.924	.903	.965	.950	.907

Discussion

Direct effects of NPD team transformational leadership on team performance

Following recent research into the specific features of NPD teams, the present paper divided transformational leadership style into four dimensions: charisma, inspirational motivation, intellectual stimulation, and individualized consideration. The SEM

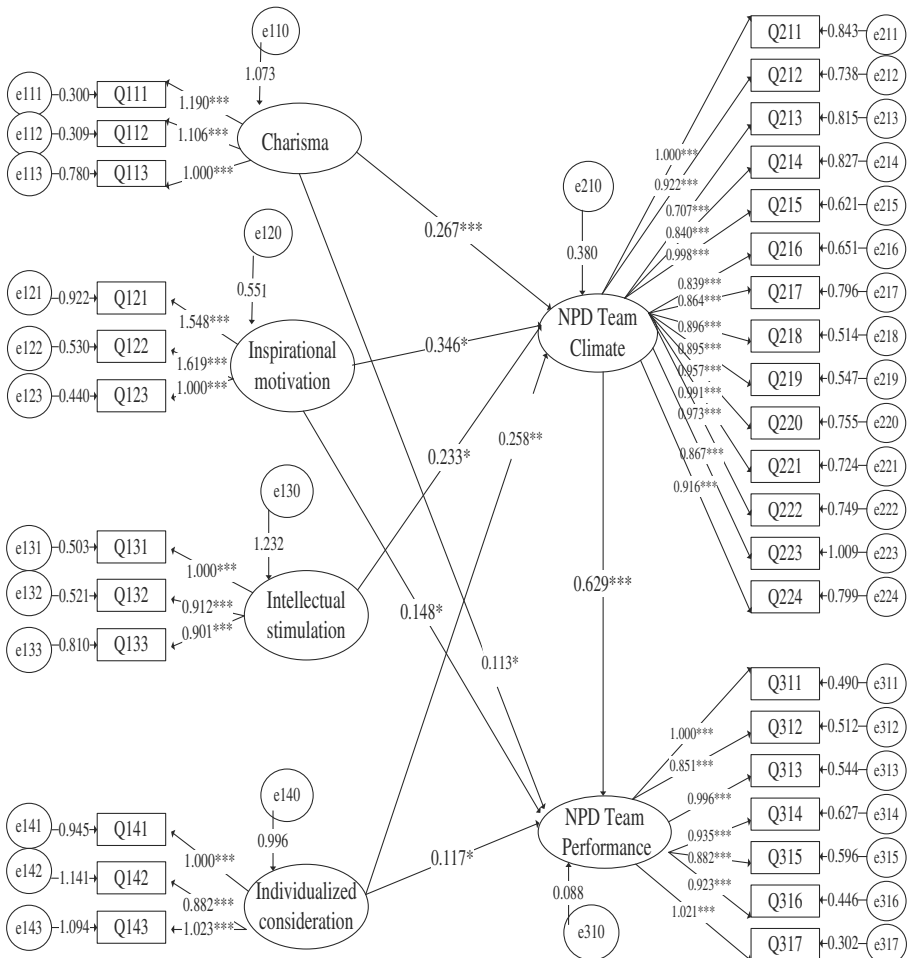


Fig. 2 Fitting result of conceptual model * $p < .05$, ** $p < .01$, *** $p < .001$

showed that charisma, inspirational motivation, and individualized consideration affect team performance positively ($p < .05$), but intellectual stimulation does not directly affect team performance.

This paper used team climate theory to explore the relationship between transformational leadership and team performance comprehensively. Results of Hypotheses 1, 2, and 4 suggest that charisma, inspirational motivation, and individualized dimensions of NPD team transformational leadership will promote team performance. These findings are consistent with previous studies (Jung et al., 2003; Rafferty & Griffin, 2004). Jung et al. (2003) paid more attention to the influences on team performance produced by transformational leadership on psychological empowerment. Rafferty and Griffin (2004) tested the dimension structure of transformational leadership but looked at leaders' and members' performance separately, which better showed the relationship between intellectual stimulation and performance. The intellectual stimulation of transformational leadership enhances team members' feelings of belonging as well as enhances negative psychological effects (Rafferty & Griffin, 2004). Similar to our rejected Hypothesis 3, intellectual stimulation has both positive and negative effects but does not directly affect performance.

The rejection of Hypothesis 3 deviates from some research conclusions both in China and abroad. According to sample data and specific situations of NPD teams in China, there may be three reasons—in addition to the psychological effects (Rafferty & Griffin, 2004). First, the NPD teams in our sample included relatively young, highly educated members; and in adaptation and norming situations knowledge conflicts are unavoidable. After adaptation, team members will have convergent psychological cognition which is good for the establishment of team climate. Second, our sample was mostly from state-owned enterprises, which are still influenced by the traditional economic system. Thus, team members will more likely take a skeptical and expectant attitude toward innovation. Third, our samples originated in the spring of 2010, at which time the effects of the global financial crisis were serious. As a result, in order to overcome the difficult situation, team members would more readily fall back on conservative ideas rather than try new methods.

Indirect effects of team climate of transformational leadership on team performance

According to our SEM analysis, NPD team climate is significantly and positively ($p < .001$) related to team performance. Specifically, Hypothesis 9 is supported by our data. This is consistent with the research conducted by Gray (2001), Kim and Lee (1995), and other scholars. In this paper a positive association exists between team climate and team performance. Kim and Lee's (1995) research conducted in Korea also reached similar conclusions. In his research, team climate was mainly used for comparative analysis with other variables but not as an intermediate path. Based on project management, Gray (2001) pointed out that team climate was closely related to project success. He summarized the relationship between team climate and team performance only by theoretical analysis but not empirical analysis of large samples.

Charisma, inspirational motivation, intellectual stimulation, and individualized consideration are all significantly and positively related to team climate, therefore Hypotheses 5 through 8 are supported by our data. Charisma ($p < .001$) has the most

significant effect on team climate, followed by individualized consideration ($p < .01$), and inspirational motivation and intellectual stimulation ($p < .05$). Therefore, the general proposition we put forward in this article, namely, transformational leadership affects team performance indirectly through team climate, is supported by our data. Hypotheses 5 through 8 support the view that NPD transformational leadership promotes team climate. This is in consistent with Dragoni (2005) and Nemanich and Keller (2007). However, Dragoni (2005) focused on why transformational leadership influences team climate rather than how it occurs. Nemanich and Keller (2007) did not discuss specific dimensions of transformational leadership.

In order to test the intermediate role of team climate, we also inspected the impacts which team climate has between transformational leadership and performance by multiple regression analysis. The result shows that, as a medium, team climate accounts for more than 50 % of the total effect that charisma, inspirational motivation, and individualized consideration of transformational leadership have on team performance. Compared with previous research, we used multiple tools comprehensively in terms of research methods. Basically, we empirically documented that team climate works as a medium between team performance and transformational leadership.

Practical implications

According to the results for NPD team, the following suggestions are proposed for how to build the appropriate leadership style and how to promote team performance directly by improving team climate.

First, leaders should endeavor to be their followers' role models. Therefore, when it comes to progress of projects and cooperation, followers will have a strong sense of identity. In NPD teams, work capacity and technical level of team members are always high. As a result, once the leader's charisma is not enough or he/she cannot guide followers effectively, conflicts may erupt within the team. Besides, a similar cognitive climate will not be built and the NPD project will not succeed.

Second, leaders should be good at identifying values of work and motivating followers' working passion. The aims of NPD teams involve breaking down technical barriers, having accurate market position, and offering new products which can bring rich cash flow to targeted customers. Unique properties of leaders determine the difficulties that teams face and the level of challenge compared to that of other teams. Therefore, leaders should try to make followers work with great enthusiasm.

Third, leaders should pay enough attention to followers' job needs and career development. They should also help followers to cultivate professional quality when developing new products. Knowledge-intensity is one of the important attributes which differ from other organizations. Knowledge-based team members pay attention to long-term career development and opportunities for personal growth. They hope that others would appreciate and respect their work and themselves. Individualized consideration of transformational leadership meets knowledge-based team members' special needs exactly. Hence, followers will have better working conditions, unified recognition, and accept NPD objectives more easily. As a result, satisfied team performance will be reached.

Fourth, leaders should pay enough attention to building the team climate. They should try to have positive effects on followers through convergent recognition. The

introduction of new and high-tech industry in China is relatively recent, so experiences of how to build and manage NPD teams are not sufficient. For example, 58.4 % of our sample teams were not stable enough. Compared with advanced foreign enterprises, it will take more time to build a mature team in China. While the process is improving gradually, it is very important that followers have a convergent recognition of team aims, operation procedures, organization structure, and other specific situations. Better team climate will promote both the adjustment process and positive influences of team leaders, therefore, high quality product development tasks will be achieved.

Limitations and future research directions

First, based on relevant research in China and abroad, this paper identifies style dimensions of transformational leadership further and explores the mechanisms of specific leadership styles in terms of NPD teams in China. Transformational leadership style is an important research point, especially the study on team climate in recent years. However, in addition to this, an exploratory direction for future research should look at what affects other leadership styles of modern leadership theory in a similar, NDP background.

Second, because of limited time, we had to gather some data through indirect means, such as second-hand information. In future studies, researchers should make further efforts to get a better understanding of NPD projects so as to improve the combination between theoretical research and business practices.

Third, our samples were mainly from relatively advanced, high-tech industries such as telecommunications, computer, pharmacy, and medicine. Some traditional industries such as chemical and machinery also have varying degrees of NPD activity, and they are indispensable and important components of the industrial economic chain in China. Therefore, whether our findings can be generalized beyond high-tech industries remains to be seen.

Conclusions

Positioned as part of the next generation of research on leadership in an Asia Pacific context (Lam, Huang, & Lau, 2012; Liden, 2012), this paper theoretically has expanded research on team climate theory. Previous studies on team climate have been mainly limited to fields such as medicine, education, finance, military, and administration. This paper has introduced team climate theory to the field of NPD teams. Specifically, the present paper puts forward a new research path, establishes a conceptual model among NPD team transformational leadership, team climate, and team performance, and discusses the mechanisms of these three elements. Overall, this paper reveals that, as a medium between transformational leadership and team performance, team climate produces significant influences.

Appendix

Charisma

q111 Leaders are admired, respected

q112 Leaders are trusted

q113 Followers identify with and want to emulate their leaders

Inspirational motivation

q121 Leaders can tell members what and how they should do in simple words

q122 Leaders can describe the project objectives in the contagious mode

q123 Leaders can help members to find out the significant to carry out NDP

Intellectual stimulation

q131 Challenges members to think about old problems in new ways

q132 Examines new perspectives for solving problems and completing tasks

q133 forces members to rethink some things that they have never questioned before

Individualized consideration

q141 Leaders can help members to improve the NDP professionalism

q142 Leaders can tell own evaluations and viewpoints towards members' job

q143 Leaders can provide more concerns on members in special difficulties

NPD team climate

q211 Agreement with the objectives

q212 Team's objectives clearly understood

q213 Team's objectives achievable

q214 Worth of the objectives to the organization

q215 'We are together' attitude

q216 People keep each other informed

q217 People feel understood and accepted

q218 Real attempts to share information

q219 Preparedness to basic questions

q220 Critical appraisal of weaknesses

q221 Building on each other's ideas

q222 Search for new ways of looking at problems

q223 Time taken to develop ideas

q224 Cooperation in developing and applying ideas

NPD team performance

q311 Quality of work

q312 Quantity of work

q313 Initiative

q314 Cooperation with other groups

q315 Ability to complete work on time

q316 Ability to respond quickly to problems

q317 Its overall performance

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