A study of the effect of inter-team competition on team innovation behavior: the moderating role of transformational leadership

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Abstract. This study examines the effects and boundary conditions of inter-team competition on team innovation behavior based on the resource conservation theory. This study analyzed and tested the data from 375 teams with 8833 team members from Chinese companies with the leader-subordinate matching questionnaire, and the results showed that: Inter-team competition positively affects team innovation behavior and transformational leadership strengthened the relationship, specifically, when transformational leadership is high rather than low, the positive relationship between inter-team competition and team innovation behavior become more obviously.

Keywords: inter-team competition; team innovative behavior; transformational leadership; resource conservation theory.

1. Introduction

In the face of increasing global competition and a rapidly changing market environment, organizations are increasingly relying on innovation to gain a competitive advantage[24]. Consequently, enhancing and promoting innovative behavior and creativity within organizations has emerged as a central topic of academic interest. Additionally, as organizational tasks become more complex, team-based work patterns have become a defining characteristic of modern organizations[2]. Understanding the factors that influence team innovation behavior is crucial for organizations aiming to maintain their competitive edge and achieve continuous innovation[13]. Most existing literature primarily focuses on intra-team factors, such as the diversity of functional backgrounds[3], knowledge sharing and integration[16], and leadership style[15]. However, there are relatively few studies examining the impact of external factors, like inter-team competition, on team innovation performance. Many organizations leverage inter-team competition to stimulate group dynamics and improve performance. Therefore, this research aims to explore how inter-team competition affects team innovation behavior.

Teams rarely operate in isolation; organizations typically comprise multiple teams, making inter-team competition prevalent in contemporary workplaces. While prior research demonstrates that such competition positively influences team effectiveness, cohesion, and performance[9,20], its impact on team innovation behavior remains comparatively underexplored. A limited number of scholars have acknowledged this gap, examining the specific relationship between inter-team competition and team creativity. For instance, Baer (2010) experimentally demonstrated that this relationship varies by team stability. In groups with rotating membership, inter-team competition exhibits a U-shaped relationship with creativity. Conversely, in stable teams, low-to-moderate levels of competition significantly enhance creativity, while moderate-to-high levels show no significant effect. However, within actual enterprises, teams seldom exist at the extremes of perfect stability or constant flux. Furthermore, as the subjects in existing studies (e.g., Baer, 2010) are university students—not employees within real organizational teams—further investigation into the effect of inter-team competition on team innovation behavior in organizational practice is warranted. Departing from previous theoretical frameworks grounded in social interdependence theory or social identity theory, this study argues that resource conservation theory offers a more robust explanatory framework for understanding the link between inter-team competition and team innovation behavior.

According to Conservation of Resources (COR) Theory, individuals strive to retain, protect, and accumulate resources, with potential or actual resource loss constituting a significant threat[12]. Within organizational contexts, inter-team competition frequently centers on scarce critical resources. Failure in such competition jeopardizes team resources—both tangible and intangible. Consequently, inter-team competition inherently poses a resource threat to teams. Faced with this threat, teams mobilize to conserve, safeguard, and augment their resources. In dynamic competitive environments, teams recognize that establishing irreplaceability relative to competitors and enhancing their perceived value constitutes the most effective resource protection strategy. This often drives teams to develop novel products or implement innovative service processes, thereby strengthening their competitive advantage and resource preservation capacity. Teams comprise not only members but also leaders whose styles profoundly influence outcomes. COR theory suggests that the resource threat induced by inter-team competition triggers stress responses. While this pressure can stimulate deeper strategic thinking about achieving victory, it simultaneously evokes fear of failure. Both processes deplete finite cognitive and emotional resources. Excessive depletion risks dysfunctional team behaviors, cognitive fatigue, and emotional exhaustion—states detrimental to high-quality innovation.

Transformational leadership may mitigate these effects. Through intellectual stimulation, it can optimize cognitive resource utilization, while individualized consideration reduces emotional resource depletion by addressing members' affective needs[6]. Thus, transformational leadership is posited to shape the impact of inter-team competition on innovative behavior. This study examines transformational leadership as a critical boundary condition in the relationship between inter-team competition and team innovative behavior.

2. Theoretical Analysis and Hypothesis Development

2.1 Conservation of Resource Theory

Conservation of Resources (COR) theory, grounded in a resource gain-loss perspective, is widely applied in organizational behavior research. Its strength lies in explaining and predicting employee attitudes and behaviors within high-stress work environments. COR theory posits that individuals are fundamentally motivated to protect their existing resources and acquire new ones. Resources are defined broadly as objects, personal characteristics, conditions, or energies that hold value for an individual[11]. According to COR theory, individuals exhibit characteristic responses to stress in three scenarios: (1) the threat of resource loss, (2) actual resource loss, and (3) failure to gain anticipated resources despite investment. When confronting potential resource loss, individuals engage in resource investment strategies—deploying existing resources or acquiring new ones from their environment—to mitigate the threat. [12]. As inter-team competition within organizations frequently centers on scarce critical resources, it exemplifies the COR theory scenario of threatened resource loss. This threat motivates teams to engage in resource investment strategies—reconfiguring internal resources and proactively acquiring new ones from the environment. Consequently, this study applies COR theory to examine the impact of inter-team competition on team innovation behavior within organizational work teams.

2.2 Inter-Team Competition and Team Innovation Behavior

This paper proposes that inter-team competition exerts a positive influence on team innovation behavior. Such competition—whether for projects, funding, leadership recognition, or talent—creates a perceived threat to key resources currently held or targeted by the team. According to COR theory , psychological stress arises from the threat of net resource loss or actual net loss. Under this stress, individuals mobilize to minimize net loss primarily through two strategies: building resource reservoirs to protect against future depletion, and investing existing resources to acquire new ones[12]. This has two benefits for the team's innovation activities: on the one hand, the best way to protect existing resources is to win the team competition, which avoids the loss of

key resources due to competition failure, and even brings more resources to the team, so the team is more eager to win the competition, and the eagerness to win motivates to raise the team's goal from “completing the task” to “achieving the task”. The desire to win prompted the team to upgrade the goal from “completing the task” to “surpassing the opponent”, which is a more challenging and attractive transcendental goal, this goal is naturally with ‘difficulty’ and "sense of significance This kind of goal is naturally “difficult” and “meaningful”, which can effectively stimulate members' intrinsic motivation (e.g., the pursuit of achievement, competence, and self-evidence), and this kind of intrinsic motivation is a more lasting impetus for deeper thinking and creative exploration than external rewards[10]. On the other hand, teams facing inter-team competition's resource threat invest existing resources to acquire more valuable assets. Mirroring individual behavior where time and energy resources are strategically allocated toward higher-value targets like power and status , teams similarly engage in resource conversion strategies[12]. Teams correspondingly allocate internal resources to acquire new assets. Innovation represents a critical resource conversion pathway, requiring investments of time, energy, financial capital, and knowledge. COR theory stipulates that resource investments occur only when expected benefits outweigh costs, or when inaction would incur greater losses. Competition threats amplify the perception that innovation failure portends significant resource depletion. This calculus increases teams' risk tolerance for innovation attempts while prompting systematic evaluation of existing resources. Consequently, teams strategically reallocate finite resources from maintenance activities toward high-potential innovations to maximize returns. Hence, this study predicts:

H1. Inter-team competition positively influences team innovation behavior.

2.3 The Moderating Role of Transformational Leadership

Transformational leadership describes a process wherein leaders inspire followers to transcend self-interest through four core behaviors: (1) idealized influence (charisma), (2) inspirational motivation, (3) intellectual stimulation, and (4) individualized consideration. Such leaders fundamentally restructure existing systems while compelling organizational adoption of new visions. Effective transformational leaders leverage authority to build trust-based followership, modeling desired behaviors while establishing change processes that foster continuous organizational learning and growth[25]. This leadership approach elevates follower aspirations by emphasizing achievement, self-actualization, and collective well-being across organizational and societal spheres[7].

Transformational leadership may strengthen the relationship between inter-team competition and team innovation behavior. According to Conservation of Resources (COR) theory, individuals strive to retain, protect, and build resources, with psychological stress arising from potential or actual loss of valued resources. One resource preservation mechanism involves cognitively reframing threats as challenges[17,18]. This reappraisal redirects attention from potential losses toward potential gains in threatening situations. Transformational leadership facilitates this cognitive shift through compelling future visions that inspire passion, commitment, and effort beyond self-interest—a defining characteristic of such leaders [23]. This leadership approach stimulates motivation by redirecting members' focus toward competition-derived resources (e.g., growth, control, gains) rather than potential losses. By fostering challenge appraisals over threat perceptions, it activates higher-order needs. Consequently, members increasingly value rewards associated with competitive success—honor, resources, and influence—while pursuing intrinsic satisfaction through innovative problem-solving and proactively developing new competencies.

Within this challenge-oriented cognitive framework, competitive pressure transforms into intrinsic motivation. Substantial evidence confirms that intrinsically motivated individuals exhibit greater creativity than those driven by extrinsic incentives[1]. This motivational shift maximizes competition's positive effects, prompting teams to invest resources in novel, unconventional, and high-risk/high-reward solutions to achieve competitive differentiation and breakthroughs. Therefore, this study predicts:

H2. Transformational leadership positively moderates the relationship between inter-team competition and team innovation behavior, i.e., the higher the level of transformational leadership of the team leader, the stronger the positive relationship between inter-team competition and team innovation behavior.

3. Methods

3.1 Participants and Procedure

This study surveyed respondents from the financial, energy, real estate, and pharmaceutical industries in Henan and Hubei provinces. To enhance methodological rigor, a multi-stage, multi-source data collection strategy was employed. Specifically, a dyadic survey design was used to mitigate common method bias: team leaders completed questionnaires assessing their team members' innovative behaviors and providing their own demographic information (e.g., gender, age); concurrently, team members reported on inter-team competition and team transformational leadership. Prior to participation, confidentiality was assured, with participants informed that data would be used solely for academic purposes to alleviate potential concerns.

In the first stage (T1), A total of 596 paper questionnaires were distributed to 125 teams. Subsequently, 492 questionnaires from 99 teams were returned, yielding a response rate of 82.55%. The second stage (T2) distributed questionnaires to 99 teams based on the sample recovered in the first stage, and 400 questionnaires from 85 teams were recovered, with a recovery rate of 81.30%. Fifteen sets of questionnaires with inconsistent answers, inattentiveness, and incomplete completion were excluded, and finally 375 questionnaires from 83 teams were retained. Among these valid subjects, 44.78% were male, the average team size was 4.51, and the distribution of education, college and below accounted for 17.64%, bachelor's degree accounted for 71.65%, and master's and doctoral degrees accounted for 10.69%.

3.2 Measures

Inter-team competition. This variable was self-reported by employees using an authoritative scale developed by Campion et al. (1993) [8]with four question items, such as “Other teams always like to compete with my team for resources” Cronbach's α of 0.934

Transformational Leadership. This variable was self-reported by employees and consisted of six items, such as “My team leader makes me realize that we share common values, ideals, and aspirations” Cronbach's α of 0.943

Innovative behavior. The scale developed by Janssen (2000)[14] was used and assessed by the supervisor with 9 items such as “The subordinate often takes the initiative to search for new work methods, techniques, or tools” Cronbach's α was .897

Control variables. In accordance with the recommendations of previous related studies[22][5], the control variables in this study mainly include including gender (1=male, 0=female), education level (secondary school and below “1”, college “2”, Bachelor's degree “3”, Master's degree “4”, Doctor's degree ‘5’), length of service, industry (IT “1”, Real Estate “2”, finance 3“, chemical 4”, biotechnology 5", services "6, Machinery Manufacturing 7, New Materials “8”, Others “9”), nature of the enterprise (public “1”, private ‘2’, mixed “3”) “3”) and team size, etc.

4. Rusults

4.1 Preliminary Analysis

In this study, a validated factor analysis was conducted on inter-team competition, transformational leadership, and team innovation behavior to test the discriminant validity between the variables by comparing the fit of each model. The results are shown in Table 1, in which the fit of the three-factor model is significantly better than the other models

(χ^2/df=2.434,REMSEA=0.070,IFI=0.945,TLI=0.937,CFI=0.945), which indicates that there is a better discriminative validity among the three variables.

Table 1. Confirmatory Factor Analysis

Model	χ^2	df	χ^2/df	RMSEA	IFI	TLI	CFI
Three-factor model(TC, TL, TI)	362.720	149	2.434	0.070	0.945	0.937	0.945
Two-fator model(TC+TL, TI)	1351.083	151	8.948	0.164	0.692	0.649	0.690
One-factor model(TC+TL+TI)	2450.374	152	16.121	0.227	0.410	0.333	0.407

Note. TC=Team Competition, TL=Transformational Leadership, TI=Team Innovation Behavior(the same as below)

This study focuses on team-level analyses and therefore requires aggregation of observations from the individual level of team members to the team level. To test whether the individual data have sufficient within-group homogeneity and between-group variability to support the aggregation operation, the following metrics were used in this study: within-group interrater agreement (RWG) and intraclass correlation coefficients (ICC1 and ICC2). The calculation results show that the ICC1 values of inter-team competition, transformational leadership, and team innovative behavior are 0.252, 0.224, and 0.450, respectively, which are greater than 0.1; the ICC2 values are 0.604, 0.566, and 0.787, respectively; and the mean values of RWG are 0.725, 0.893, and 0.932, respectively, which satisfy the criterion of being greater than 0.7. The above results show that that the three variables of inter-team competition, transformational leadership, and team innovative behavior can be aggregated to the team level.

To control for common method bias, this study used a manager-employee paired design and evaluated it using the Harman's one-way test[21], which showed that the explained variance of the first principal factor was 31.22% less than the critical value of 40%, and that the three factors cumulatively explained 68.53% of the variance, and that the first factor of the unrotated variance explained is less than half of the total explained, so the common method bias is less influential and can be tested in the analysis.

4.2 Analytic Strategy

Table 2 shows the mean, standard deviation, and correlation coefficients between the variables, in which the correlation coefficient between inter-team competition and team innovation behavior is 0.225 ($p<0.05$), which indicates that suggests that there is a positive correlation between inter-team competition and the process of team action and team innovation behavior, which initially supports our hypothesis.

Table 2. Intercorrelations of Variables.N=375

Variables	Mean	Standard Deviation	1	2	3	4	5	6	7	8	9	10
1Gender	0.327	0.196	1									
2Age	0.432	0.193	0.129	1								
3 Education level	0.273	0.219	-0.028	0.295**	1							
4 Firm Nature	1.747	0.881	-0.120	0.044	0.019	1						
5 Industry	2.927	1.730	-0.083	-0.123	0.144	0.092	1					
6 Team seniority	4.559	3.331	0.112	0.083	-0.130	0.045	-0.132	1				
7 Team size	4.518	1.263	0.064	-0.029	-0.087	-0.023	-0.200	-0.109	1			
8 TC	2.985	0.699	0.211	-0.303**	0.066	-0.077	0.046	0.076	-0.082	1		
9 TL	3.943	0.566	-0.104	-0.112	-0.086	0.135	-0.065	-0.010	0.255*	0.195	1	
10 TI	3.289	0.604	-0.133	-0.175	-0.098	-0.034	0.143	0.036	0.199	0.228*	0.246*	1

Note .* denotes p<0.05,** denotes p<0.01, (two-tailed test), below.

This study used stratified regression to test the hypotheses and the results of the test are shown in Table 3, after controlling for the variables of team gender diversity, team age diversity, team education level diversity, nature of the firm, and industry, it can be seen from Model 2 that inter-team rivalry positively affects team innovation behavior ($\beta=0.233$, $p<0.05$) Hypothesis 1 is supported.

Table 3. Hierarchical Regression Results.

Category	Team Innovation Behavior		
	Model1	Model2	Model3
Constants	2.958***	2.163**	2.927***
Gender diversity of the team	-0.404	-0.612	-0.589
Age diversity of the team	-0.337	-0.037	-0.122
Educational level diversity of the team	-0.195	-0.229	-0.074
Nature of the business	-0.039	-0.032	0.003
Industry	0.065	0.064	0.053
Team seniority	0.006	0.002	-0.008
Team size	0.114*	0.126*	0.104
Inter-team competition		0.233*	0.098
Transformational leadership			0.082
Inter-team competition* Transformational leadership			0.163*
R^2	0.118	0.178	0.238
$\triangle R^2$	0.118	0.060	0.060
F	1.437	2.003	2.255
$\triangle F$	1.437	5.380	2.858

In order to test the moderating effect of transformational leadership on the relationship between inter-team competition and team innovation behavior, this study added a cross-multiplier term between inter-team competition and transformational leadership based on the main effect test, and the regression coefficient of the cross-multiplier term on the team innovation behavior can be seen in Model 3 as 0.163 ($p<0.05$), which indicates that transformational leadership has a positive moderating effect, so Hypothesis 2 is preliminarily verified. In order to present more intuitively the moderating form of performance appraisal orientation on the relationship between inter-team competition and team innovative behavior, this study took the inter-team competition, transformational leadership mean plus or minus one standard deviation and substituted them into the regression model, and drew the final moderating effect diagram, and the relevant results are shown in Figure 1. From the results of the simple slope test in Figure 1, it can be seen that when the team's transformational leadership level is low, the slope is -0.093, t = -0.530 (n.s.); when the level of team transformational leadership is high, the slope is 0.3519, $t=2.811$ ($p<0.01$), indicating that when the level of team transformational leadership is high, the more obvious the positive impact of inter-team competition on team innovation behavior. Combining the two results, hypothesis 2 is supported.

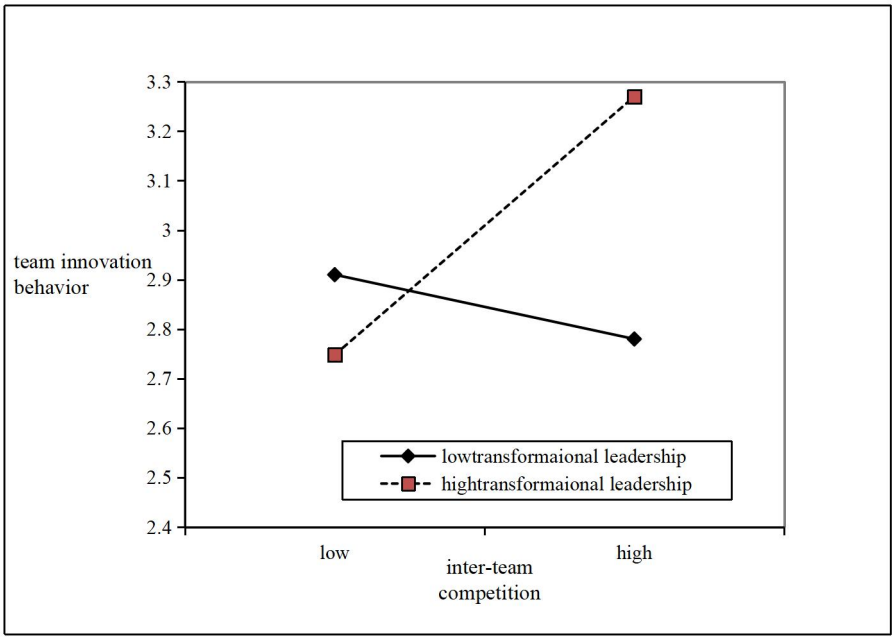

Figure1. The Moderating Role of Transformational Leadership in Inter-Team Competition and Team Innovation Behavior

5. discussion

5.1 Conclusions

This study explored the effects of inter-team competition on team innovation behavior based on COR theory. The results show that: (1) inter-team competition positively promotes team innovative behavior, and the competitive situation stimulates the team's motivation to acquire resources and the perception of challenging pressure, which drives the members to actively invest cognitive and affective resources, and then enhances innovative problem solving ability. (2) Transformational leadership positively moderates these relationships. When team leaders demonstrate high levels of transformational leadership behaviors (e.g., visionary motivation, personalized care, intellectual stimulation), competition between teams significantly enhances the facilitation of innovative behaviors. The mechanism of this is that leaders alleviate resource depletion anxiety caused by competition by building a sense of psychological security, optimizing resource allocation, and strengthening the sense of collective efficacy, which promotes the directional investment of resources into innovative activities.

5.2 Theoretical implications

This study has certain theoretical contributions, First, unlike previous studies based on social role theory and social interdependence theory[4][5], this study answers the question of whether inter-team competition affects team innovation behavior based on the COR theory, which provides a new perspective to explain the relationship between the two. This not only enriches the research on the relationship between inter-team competition and team innovation performance, but also expands the application of COR theory.

Second, it integrates the interactive effects of leadership and competitive situations. It confirms that transformational leadership is the key boundary condition for transforming competition into innovation effectiveness, reveals the dual paths of leaders buffering the risk of resource loss and amplifying the positive effects of competition through resource replenishment (providing emotional and cognitive support) and resource activation (shaping a learning-oriented goal), and enriches the application of situational leadership theory in dynamic competitive environments.

Third, it deepens the multilevel perspective of team innovation antecedents research. Incorporating the external environment (inter-team competition), team process (resource motivation and cognitive restructuring), and leadership context (transformational leadership) into the integrated model responds to the academic call for the theory of "cross-level interactions driving innovation"[19].

5.3 Practical Implications

The findings of this study provide the following practical guidance for team innovation in the competitive environment of organizational management.

First, optimize the design of the competition mechanism: managers can moderately introduce inter-team competition with clear goals and fair rules, such as innovation ring competitions and cross-departmental project bidding, as a structural tool to stimulate the team's resource acquisition and innovation vitality. It is necessary to avoid vicious competition, emphasize the possibility of collaboration in competition, and set challenging task goals to prevent resource defense behavior from inhibiting innovation.

Second, strengthen the development of transformational leadership: Organizations should enhance the transformational leadership of team leaders through training, so that they can effectively play the role of "resource regulator" in competitive situations, and establish a leader assessment mechanism, which will "promote the value-added of team resources" (such as the rate of innovative resource input, knowledge sharing, etc.).

Third, build a resource-supportive innovation ecosystem: set up an innovation resource pool (e.g., open databases, expert think tanks, experimental platforms) to support the competition mechanism, lower the barriers for teams to access resources, and design a fault-tolerant incentive mechanism to encourage the team to transform the competitive pressure into exploratory learning behaviors.

5.4 Research Shortcomings and Prospects

The following limitations exist in this study, First, although this study follows the conventional practice of evaluating team innovation behaviors by direct leaders to circumvent the social desirability bias that may be induced by employees' self-assessment, there are potential limitations in the evaluation method: leaders may deviate from the objective facts due to their personal preferences or leader-member exchange relationship differences. However, this evaluation method still has potential limitations: leaders may deviate from the objective facts due to personal preferences or differences in leadership-member exchange relationships. Future research can use multiple sources of evaluation (e.g., peer evaluation, expert review combined with quantitative indicators of innovation results) to construct a composite measurement system to improve the validity and accuracy of innovation behavior assessment.

Second, only the moderating role of transformational leadership was explored. Future research can expand the exploration of other moderating mechanisms (e.g., management style, organizational system, and organizational culture) to provide a richer theoretical basis for organizational management practice.

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