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Research on the Impact of Shared Mental Model on the Team Innovation Performance: Considering the Moderating Effect of Emotional Infection

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Abstract: *The purpose of this paper is to study the influence of the shared mental model (SMM) on team innovation performance (TIP) by exploring the moderating effect of emotional infection (EI).The Credamo platform was used to conduct a questionnaire survey on Chinese teams participating in collaborative innovation projects, and 198 valid samples were collected for the research. The authors apply confirmatory factor analysis to test the reliability and validity of the constructs, structural ordinary least squares hierarchical regression model to verify the hypothesis. The results show that both the collaborative shared mind model and the task-based shared mind model have significant positive effects on team innovation performance. Positive emotion infection can regulate the relationship between the collaborative shared mind model and team innovation performance, but has no significant moderating effect on the relationship between the task-based shared mind model and team innovation performance. Negative emotional contagion not only negatively moderates the relationship between the collaborative shared mental model and team innovation performance, but also negatively moderates the relationship between the task-based shared mental model and team innovation performance.*

Keywords: *Shared Mental Model; Team Innovation; Innovation Performance; Emotional Contagion*

1. Introduction

Cannon et al. (1990)[1]believe that the shared mental model refers to the knowledge structure shared by organization members, enabling them to form correct answers and expectations for team tasks and various events, to coordinate their behaviors to adapt to enterprise development. When individuals in a team communicate with each other, their mental models will collide at the same time and merge through sharing their views on relevant situations within the project, thus transforming the unique mental model into the shared mental model of the team (Yang et al., 2008)[2]. In the process of team innovation cooperation, team members have different role positioning, professional background, and cognitive structure, so it is necessary to form a consistent working pace and method as well as a standard mental culture as soon as possible, to reduce internal friction and improve scientific research efficiency, and break the barriers of knowledge circulation caused by organizational boundaries. Sharing a mental model provides a direct channel for this. It can effectively improve the appropriateness, collectivity, knowledge sharing, resource sharing, and interpersonal relationships of members. Team innovation activities are mainly task-oriented (Hekkert et al., 2020)[3]. For members of the innovation team studied in this paper, they need to understand the specific specifications of tasks, technologies, and equipment, as well as the knowledge distribution of other members, which plays a crucial role in collaborative innovation. Therefore, this paper chooses to refer to the research of Mathieu et al. (2000)[4] to study from two dimensions: the collaborative shared mental model and the task-based shared mental model. Therefore, starting from the real dilemma of how to break organizational boundaries and improve team innovation performance, this paper takes shared mental model as the antecedent variable to explore the specific mechanism between the shared mental model and team innovation performance.

The high-performance innovation team is often inseparable from the positive working attitude and behavior of team members (Lavy and Littman, 2017)[5]. Among the many factors that affect team members' working mood and behavior, the innovation team pays more and more attention to the influence on team members' psychology and emotion （Decanio, 1993)[6]. Emotional infection, as a factor affecting team members' work behavior similar to the shared mental models, has attracted more and more attention from teams and scholars (Holman and Niven, 2019[7]. Emotional infection is considered to be a vital

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driving force related to team members' behavior and innovation performance, and it strongly affects employees' working attitude and behavior (Harter J K et al., 2002)[8]. On the other hand, The formation of a shared mental model is accompanied by the continuous interaction between teams (Liu and An, 2016)[9], both team cognitive trust and team emotional trust are beneficial to the formation of a shared mental model (Zhang et al., 2008)[10], and it can improve the innovation performance by influencing employee behavior and improving the cooperation efficiency of team members(Paul and Peter, 2007)[11]. Therefore, there may be a specific relationship between shared mental model, emotional infection, and team innovation performance. That is, emotional infection plays a moderating role between shared mental model and team innovation performance. Scholars have studied the moderating effect of emotional infection (Yu et al., 2017)[12], but there are few studies on the relationship between shared mental model, emotional infection, and team innovation performance. To fill this research gap, we use emotional infection as a moderating variable to study the relationship between shared mental models and team innovation performance.

2. Literature review and hypothesis development

2.1 Shared mental model and team innovation performance

Among the shared mental model, the collaborative shared mental model pays more attention to the optimization of organizational resource allocation (Wang, 2010)[13]. The cooperative innovation theory points out that the collaborative relationship and complementary effect among members are the cornerstones of cooperation development, and it is necessary to constantly improve the coordination ability of members in sharing resources (Marks, 2002)[14]. A Shared mental model is a common understanding that adjusts the process in time according to the needs of goals. It can reduce the communication barriers and thought among members and enhance the embeddedness of members in the cross-organizational network (Sun et al., 2015)[15]. Team members with a high degree of the collaborative shared mental model have a good understanding of each other's tasks, including the technical mechanism, working mode, and process. Their work functions and structure are closely arranged, with frequent interaction. They often communicate and coordinate to deal with the plan of the same innovative task, which will improve the staff's mastery of the familiar task field. And then promote the improvement of team innovation efficiency. However, when the roles of team members are not evenly distributed, the internal communication of the team will not be smooth, and the interaction between team members will be reduced (Levesque, 2001)[16], which negatively affecting the team innovation performance. The formation of an excellent cooperative atmosphere is conducive to improving the cooperation efficiency among project members, reducing the friction between them, enabling the collaborative team to form a consistent cognition of emergencies, and to rely on consensus and an excellent suitable atmosphere to complete subsequent collaborative innovation tasks, which is a potential mechanism for coordinating teamwork (Walter, 2003)[17]. It plays the role of lubricant in organization cooperation innovation. At the same time, a collaborative shared mental model can create sparks of thinking by strengthening communication among team members, which is conducive to stimulating the creativity and imagination of team members and promoting orderly and effective innovation activities, to improve team innovation performance. Based on the above discussion, this paper proposes the following hypotheses:

H1. A Collaborative shared mental model has a positive effect on team innovation performance.

The task-based shared mental model focuses on team members' consensus about technology and the use of the equipment, and the sharing of resources (Wang, 2010)[18]. The absorption theory states that homogeneous knowledge partners are more likely to absorb each other's knowledge to improve their self-cognitive system and enhance mutual trust, thus further speeding up the knowledge exchange process (Monks, 2016)[19]. At the same time, the clarity of team tasks helps team members to create more working methods, thus improving project operation efficiency (Kimberly and Smith, 2005) [20]and enhancing team innovation performance. As the internal motivation of the team increases, the team will be more interested in innovative tasks and show more substantial curiosity and cognitive flexibility (Zhou and Shalley, 2003)[21], to actively seek solutions for completing creative goals and functions. Task-based shared mental models can promote the acquisition and sharing of team knowledge and creative information.On the one hand, the high similarity of task-sharing mental models in R&D teams indicates that team members have an ordinary cognition of task objectives and team operation, which is conducive to forming a common expectation of knowledge sharing, promoting team information sharing, reducing the risk of knowledge transfer, improving the success rate of R&D, and improving team innovation performance (Richard and Susan, 1994)[22]. That is to say, the more mature the task-based shared mental

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model is, the more it helps the team to have a consistent understanding of situational response, problem definition, and future expectations (Lv, 2009)[23]. These overlapping or similar mental models can improve the efficiency of internal communication, realize the rapid dissemination and positive interaction of information and knowledge, and thus improve the team's innovation performance (Ayoko and Chua, 2014)[24]. On the other hand, the high similarity of the collaborative shared mental model indicates that the team has a high cognition degree of distributed or complementary knowledge structure, which is conducive to the common expectation of knowledge integration and transfer, and promotes the efficiency of information exchange among team members, thus improving the team's innovation performance (Wu and Wu, 2006)[25]. Based on the above discussion, this paper proposes the following hypotheses:

H2 Task-based shared mental model has a positive effect on team innovation performance.

2.2 Moderating role of emotional infection

In previous studies on how to improve team innovation performance, mainly focused on the individual characteristics of team members (Goncalo et al., 2010)[26], team characteristics (Wuyts et al., 2005)[27],and less attention is paid to the role of team leaders and team members' emotions in innovation. In fact, as one of the basic psychological processes of individuals, emotion, accompanied by the whole working process of innovative activities, will affect the behavior of members (Lee and Wong, 2019)[28]. Emotional interaction in team innovation activities is an essential means to study team performance (Barsade et al., 2003)[29], and emotional infection is mainly accomplished through the imitation-feedback mechanism (Falkenberg et al., 2008)[30].According to the Theory of Planned Behavior, the actions taken by individuals are affected by their positive or negative attitudes.

Regarding the regulation of positive emotion infection, positive emotion experience not only helps individuals perceive positive information suggestions, but also helps organizations create a positive emotional atmosphere (Rhee, 2007)[31],thus generating stronger behavioral intention. Positive emotional condition in a team can affect the mentality of employees, promote active collaboration, reduce conflicts (Barsade, 2002)[32]. In addition, frequent communication and internal interaction, overall work efficiency will also be improved (Walter and Bruch, 2008)[33].Furthermore , according to the social exchange theory, after employees are infected with positive emotions, they will feel respected and have a sense of ownership, thus stimulating their identification with the organization, generating a sense of rewarding the organization and improving their work enthusiasm, which is conducive to the improvement of team innovation performance. Based on the above discussion, this paper proposes the following hypotheses:

H3a Positive emotional contagion positively moderates the relationship between collaborative shared mental model and team innovation performance.

H3b Positive emotional contagion positively moderates the relationship between task-based shared mental model and team innovation performance.

In terms of the regulation of negative emotion infection, Affective Events Theory believes that negative emotions in the project team will first affect their negative expressions, language, actions, etc., thus affecting the working attitude and behavior of other individuals within the project. A hostile project team will negate project tasks and project members. Moreover, it holds a negative attitude towards the events that have not happened, which is not conducive to the effective interaction of the project team (Glomb et al., 2011)[34]. It ultimately leads to the decline of innovation performance. In addition, adverse events tend to trigger ssolid and rapid cognitive responses. On the one hand, the infection of negative emotions will cause organization members to negatively evaluate the goals, motivations, and feelings of innovative activities, which will further hinder the interaction and communication among members, leading to low team effectiveness (Van and Kleef, 2016)[35], and affect individuals' subsequent behavioral tendencies. The negative emotion within the team will lead to the reduction of enthusiasm of the team members, and the loss of confidence and enthusiasm will lead to poor performance of the team members, thus affecting the innovation performance. On the other hand, team members in a negative mood are less willing to support and help each other, and interpersonal relationship is not harmonious enough, which hurts the pioneering interaction and collision of new ideas among team members (Peng et al., 2011)[36], which is not conducive to the improvement of team innovation performance. Based on the above discussion, this paper proposes the following hypotheses:

H4a Negative emotional contagion negatively moderates the relationship between collaborative shared mental model and team innovation project performance.

H4b Negative emotional contagion negatively moderates the relationship between task-based shared

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mental model and team innovation project performance.

3. Research methodology

3.1 Sample and data collection

This study adopts questionnaire survey method to collect data due to the subjective nature of the constructs. And distributed 250 questionnaires to 50 tested groups and 250 people involved in the collaborative innovation project. After two months of distribution, collection, and sorting, 213 questionnaires were collected in this study, with a recovery rate of 85.2%. Excluding 15 blank questionnaires and incomplete questionnaires, 198 valid questionnaires were collected, with an effective rate of 79.2%.The characteristics of the samples are shown in Table 1

Table 1: The characteristics of the samples

Characteristic		Frequency (%)		Characteristic		Frequency (%)	
Nature	State-owned (1)	84	42.4%	Industry	IT industry (1)	111	56.1%
					New energy industry (2)	51	25.8%
	Private (2)	55	27.8%		Biomedical/Chemical industry (3)	12	6.1%
	Others (3)	59	29.8%		Others (4)	24	12.1%
Years	≦2 (1)	96	48.5%	Period	≦1 (1)	110	55.6%
	3-5 (2)	40	20.2%		2-3 (2)	70	35.4%
	6-8 (3)	38	19.2%		4-5 (3)	12	6.1%
	≧9 (4)	24	12.1%		≧6 (4)	6	3.0%
Quantity	1 (1)	128	64.6%	Number	≦10 (1)	108	54.5%
	2 (2)	36	18.2%		11-50 (2)	9	4.5%
	3 (3)	17	8.6%		51-100 (3)	69	34.8%
	≧4 (4)	17	8.6%		≧101 (4)	12	6.1%

3.2 Measures of constructs

To ensure the reliability and validity of the scale, mature scales were selected for the measurement of relevant variables in this paper, and unreasonable items were improved several times. Except for control variables, items of other variables were measured using a five-point Likert scale. Specific items were shown in Table A1 in the appendix.

Shared mental model: The explanatory variable in this paper is the shared mental model, which includes a collaborative shared mental model (represented by CM) and a task-based shared mental model (represented by TM) according to the measurement method of Michael et al. (2010)[37].

Team innovation performance: The explained variable of this paper is team innovation performance. Referring to the measurement method of Sun (2017)[38], explicit version (represented by TP) is used to measure team innovation performance.

Emotional infection: The moderating variable in this paper is emotional infection. Refer to the measurement method of Kimura (2008)[39].

Control variables: In view of the potential impact of variables such as unit Nature, working years, number of cooperative innovation activities participated,cycle of collaborative innovation activities, and industry belonging to the project on team innovation performance, this paper refers to the coding method of Yu et al. (2017)[40].

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3.3 Data analysis methods

First, we used Mplus 8.3 to conduct confirmatory factor analysis (CFA) to verify the reliability and validity of the scales. The Cronbach's alpha was tested by SPSS 24.0. Then, we used the pearson correlation coefficient matrix to verify the hypothesis preliminarily. Next, we refer to the hypothesis testing process of Sun et al. (2021)[41] and use SPSS 24.0 to conduct hierarchical regression analysis on each variable, to test the direct effect of the two dimensions of shared mental model on team innovation performance and the moderating effect of the two dimensions of emotional infection. Finally, we refer to the study of Yang et al. (2021)[42]and use implicit indicators in team innovation performance to replace explicit indicators for the robustness tests.

4. Analysis and results

4.1 Confirmatory factor analyses

To test the discriminative validity of the shared mental model, team innovation performance, and emotional infection, the paper used SPSS 24.0 analysis function to conduct a confirmatory factor analysis of the variables. The results showed that the AVE square root of the cooperative shared mind model and task-based shared mind model were 0.855 and 0.780, respectively. AVE square root of dominant performance was 0.820; The AVE square root of positive emotion infection and negative emotion infection were 0.873 and 0.783, respectively, both greater than the maximum 0.749 correlation coefficient among factors. According to the discriminative validity criterion of Wetzels et al., (2009), the three variables designed in this paper have good discriminative validity.

Table 2: Correlation analysis between variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	-														
2	-0.200**	-													
3	-0.149*	0.055	-												
4	0.176*	-0.234**	0.110	-											
5	-0.267**	0.277**	0.330**	0.147*	-										
6	-0.092	0.058	0.106	0.042	0.373**	-									
7	0.085	0.277**	0.077	-0.017	0.120	0.176*	0.873								
8	0.198**	0.093	-0.055	0.051	-0.075	0.046	0.577**	0.783							
9	-0.002	0.269**	-0.028	-0.040	-0.050	-0.013	0.407**	0.447**	0.780						
10	-0.038	0.277**	0.075	-0.105	-0.004	-0.174*	0.359**	0.339**	0.711**	0.855					
11	0.102	0.314**	0.050	0.021	0.059	0.137	0.580**	0.640**	0.645**	0.605**	-				
12	0.078	0.320**	0.116	-0.017	0.080	0.026	0.729**	0.593**	0.633**	0.707**	0.536**	-			
13	0.152*	0.207**	-0.017	0.062	-0.054	0.063	0.608**	0.697**	0.749**	0.576**	0.530**	0.722**	-		
14	0.149*	0.207**	0.039	0.028	-0.036	-0.045	0.614**	0.579**	0.665**	0.692**	0.730**	0.718**	0.543***	-	
15	-0.054	0.112	-0.107	-0.054	0.046	-0.084	0.218**	-0.371**	0.511**	0.566**	0.468**	0.495**	-0.516***	-0.553***	0.673

Notes: *=p<0.05, **=p<0.01, ***=p<0.001 (1=Nature 2=Years 3=Quantity 4=Industry 5=Period 6=Number 7=PI 8=NI 9=TM 10=CM 11=PI*TM 12=PI*CM 13=NI*TM 14=NI*CM 15=TP).

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Table 2 shows the Pearson correlation coefficient matrix among variables. The results show that both the task-based shared mind model and the collaborative shared mind model are significantly correlated with team innovation performance, preliminarily verifying H1 and H2. The cross-terms of positive emotion infection, task-based shared mind model, and collaborative shared mind model were significantly positively correlated with team innovation performance, which preliminarily verified H3a and H3b. The correlation between negative emotion infection, shared mental model, collaborative shared mental model, and team innovation performance was significantly negative, which preliminarily verified H4a and H4b.

4.2 Hypothesis testing

According to the regression results, under the premise of controlling variables such as team nature, working years, and a number of cooperative innovation projects, the collaborative shared mind model has a significant positive impact on team innovation performance. So the H1 is validated. To verify H3a, positive emotion infection was added to Model 2 to build Model 3. The regression results are shown in Table 3. As can be seen from the results in the table, the collaborative shared mind model has a positive impact on team innovation performance, and the relationship between positive emotion infection and team innovation performance also shows a positive correlation. On this basis, the cross-terms of the two are introduced into the model to build Model 4. The regression results of Model 4 showed that the model was still significant, and the cooperative shared mental model and positive emotional infection and their cross-terms were also substantial, so H3a was verified. To verify H4a, negative emotion infection was introduced to construct Model 5 based on model 2. The test results are shown in Table 3. The collaborative shared mind model still has a significant positive effect on team innovation performance, but negative emotion infection shows a negative impact on team innovation performance. Then, the two variables of the cooperative shared mental model and negative emotion infection were processed centrally, and the two were cross-processed to construct a cross term. The cross term was introduced into model 5 to build model 6. The regression analysis results showed that the cooperative shared mental model and negative emotion infection were both significant, and the interaction coefficients of both were significant, so H4a was verified.

Table 3: Test results of relationship model of CM, PI/NI, and TP

Argument	Dependent variable					
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
CM		0.737***	0.706***	0.720***	0.630***	0.612***
PI			0.141**	0.153**		
NI					-0.217***	-0.229***
CM*PI				0.110*		
CM*NI						-0.169**
R2	0.057	0.381	0.382	0.383	0.427	0.430
R2 (Adjusted)	0.027	0.358	0.356	0.353	0.403	0.402
F	1.928***	16.685***	14.631***	12.945***	17.632***	15.730***
VIF	1.368	1.651	1.783	1.595	1.508	1.549
D-W	1.362	1.759	1.797	1.876	1.767	1.801
Control variable						
Nature	-0.148**	-0.161**	-0.170**	-0.168**	-0.210**	-0.203**
Years	0.066	-0.085	-0.094	-0.093	-0.100	-0.094
Quantity	-0.123	-0.171	-0.173	-0.171	-0.161	-0.153
Industry	-0.002	0.015	0.014	0.016	0.002	0.006
Period	0.086	0.109	0.109	0.108	0.135	0.136
Number	-0.112	-0.011	-0.022	-0.023	-0.048	-0.049

Notes: *=p<0.05, **=p<0.01, ***=p<0.001.

The regression model between task-based shared mental model, emotional infection, and team innovation project performance is shown in Table 4.Based on model 1, the task-based shared mental model is introduced into the model, and model 7 is built. According to the regression results in the table, the influence of the task-based shared mental model on team innovation performance presents a significant positive effect under the premise of controlling variables such as the nature of the unit, working years, and the number of cooperative innovation activities participated. So H2 is verified.

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Table 4: Test results of the relationship model of TM, PI/NI, and TP

Argument	Dependent variable				
	Model 7	Model 8	Model 9	Model 10	Model 11
TM	0.590***	0.564***	0.566***	0.477***	0.473***
PI		0.156**	0.156**		
NI				-0.221**	-0.201***
TM*PI			0.104		
TM*NI					-0.178***
R2	0.319	0.323	0.323	0.360	0.360
R2 (Adjusted)	0.294	0.294	0.290	0.333	0.330
F	12.742***	11.261***	9.958***	13.307***	11.771***
VIF	1.621	1.332	1.528	1.652	1.608
D-W	1.832	1.772	1.841	1.852	1.736
Control variable					
Nature	-0.157**	-0.169**	-0.170**	-0.204**	-0.284**
Years	-0.082	-0.093	-0.093	-0.089	-0.203
Quantity	-0.123	-0.127	-0.127	-0.119	-0.087
Industry	-0.018	-0.018	-0.019	-0.026	-0.118
Period	0.173	0.169	0.170	0.185	-0.024
Number	-0.118	-0.129	-0.129	-0.138	0.184

Notes: *=p<0.05, **=p<0.01, ***=p<0.001.

Hierarchical regression was used to analyze the moderating effect of emotional infection. First, positive emotional infection was introduced to construct Model 8 based on model 7, and the test results are shown in Table 4. Task-based shared mental model still had a significant positive impact on team innovation performance. Then, the two variables of the task-based shared mental model and positive emotional infection were processed centrally, and the two were cross-processed to construct a cross-term. The cross term was introduced into Model 8 to build Model 9. The relationship between task-based shared mental model, negative emotion infection, and team innovation performance is analyzed by regression. The regression results are shown in Table 4. On the basis of model 7, negative emotion infection was added to construct Model 10. As can be seen from the results in the table, the task-based shared mind model has a significant positive impact on team innovation performance, but negative emotion infection is negatively correlated with team innovation performance. On this basis, this study centralized negative emotion infection and task-based shared mental model. Then, the two cross terms were introduced into the model to build model 11. The regression results of model 4 showed that the model was still significant, and the task-based shared mental model, and negative emotion infection and their cross-terms were also substantial, so H4b was verified.

4.3 Robustness test

To ensure the robustness of the research conclusions, this study will test the robustness of the empirical analysis results above. Therefore, this study uses implicit performance indicators to replace explicit indicators of team innovation performance to conduct a robustness test. The implicit performance sub-measurement scale focuses on the evaluation of the R&D ability and management level of the R&D team, from “through cooperation, the team R&D speed has been significantly improved”, “through cooperation, the team management level has been significantly improved”, “through cooperation, the success rate of the team technology innovation has been significantly improved”, “through cooperation, The existing technology of the team has been significantly improved and upgraded”. A total of 4 questions were measured. According to the test, Cronbach's α coefficient, KMO value, AVE, and CR value were 0.849, 0.645, 0.675, and 0.892, respectively, indicating that the scale had good reliability and validity. The empirical regression results are shown in Table 5.

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Table 5: Test results of the relationship model

Argument	Dependent variable										
	Model 12	Model 13	Model 14	Model15	Model 16	Model 17	Model 18	Model 19	Model 20	Model 21	Model 22
CM		0.726***	0.645***	0.571***	0.638***	0.589***					
TM							0.582***	0.500***	0.435***	0.491***	0.439***
PI			0.157***	0.178***				0.174***	0.179***		
NI					-0.170***	-0.175***				-0.161***	-0.167***
CM*PI				0.111**							
CM*NI						-0.178**					
TM*PI									0.106		
TM*NI											-0.165**
R2	0.057	0.518	0.551	0.577	0.558	0.578	0.444	0.484	0.507	0.477	0.497
R2(Adjusted)	0.027	0.501	0.532	0.557	0.539	0.558	0.424	0.462	0.484	0.455	0.473
F	1.928***	29.228***	29.013***	28.474***	29.798***	28.635***	21.700***	22.141***	21.511***	21.555***	20.640***
VIF	1.520	1.635	1.523	1.834	1.580	1.387	1.683	1.332	1.528	1.732	1.789
D-W	1.487	1.763	1.813	1.785	1.794	1.837	1.817	1.832	1.876	1.864	1.786
Control variable											
Nature	-0.148**	-0.265**	-0.297**	-0.275**	-0.305**	-0.286**	-0.260**	-0.297**	-0.266**	-0.298**	-0.286**
Years	0.066**	0.026**	-0.006**	0.004**	0.014**	0.030**	0.030**	-0.003**	0.011**	0.024**	0.048**
Quantity	-0.123	-0.049	-0.054	-0.037	-0.040	-0.018	-0.001	-0.013	-0.006	0.002	0.018
Industry	-0.002	0.030	0.027	0.043	0.019	0.032	-0.003	-0.002	0.019	-0.009	0.011
Period	0.086	-0.089	-0.090	-0.096	-0.067	-0.065	-0.025	-0.036	-0.049	-0.016	-0.029
Number	-0.112	0.056	0.013	0.001	0.025	0.022	-0.050	-0.083	-0.065	-0.066	-0.044

Notes: *=p<0.05, **=p<0.01, ***=p<0.001.

According to the robustness test results in Table 5, compared with the previous empirical analysis results, the regression results of the relationship between variables only changed the numerical values of each variable and the model coefficient, and the signs and significance did not change significantly. The robustness test results were consistent with the empirical analysis results in the previous paper, so the robustness test results of this study were good, and the empirical analysis results were reliable.

6. Conclusions

The results show that the two dimensions of the shared mental model, the collaborative shared mental model and the task-based shared mental model, have positive effects on the improvement of team innovation performance. They are not only an essential driving force for coordination and communication within the team, but also an important resource for organizational development. Previous studies rarely involved the impact of emotional infection on team innovation performance, but emotional infection, as an essential factor in changing team members' behaviors, also has an effect on team innovation performance. We innovatively added emotional infection as a moderating variable into the empirical model. We found that negative emotional infection had a significant negative moderating effect on the relationship between the task-based shared mental model, the collaborative shared mental model, and team innovation performance. In contrast, positive emotional infection could positively regulate the

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relationship between the collaborative shared mental model and team innovation performance. However, there is no significant moderating effect between the task-based shared mental model and team innovation performance. Managers should attach importance to emotion management to promote the formation of positive emotions while reducing the spread of negative emotions within the team. We emphasize the importance of emotion in team management, so managers can better understand employee behavior, and promote the research of team knowledge sharing and cooperative behavior.

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Appendix

Table A1 The measurement item of the variable

Variable	Dimension	Number	Measurement item	Reliability coefficient after deleting the item
Shared mental model (Mathieu et al., 2000)	CM	C1	Team members know each other's personalities and styles	0.861
		C2	Team members know each other's responsibilities	0.843
		C3	Team members know each other what to do and what not to do	0.854
		C4	Team members have each other's expertise for the task	0.847
		C5	Team members are willing to share ideas with each other	0.851
		C6	Team members rely on each other for their knowledge of the project	0.854
		C7	Team members know different ways and channels to work together	0.851
		C8	Team members trust each other with the information provided during the discussion	0.855
	TM	T1	Team members understand how the team's goals relate to the company's overall goals	0.873
		T2	Team members are aware of the significance and usefulness of having external support	0.865
		T3	Team members consider internal support to be important for teamwork innovation	0.865
		T4	Team members agree on the key points of the project	0.865
		T5	Team members agree on the specifications for how the project will operate	0.858
		T6	Team members have a consensus on equipment use procedures, etc	0.883
		T7	Team members understand the skills relevant to the task	0.887
Team innovation performance (Sun, 2017)	TP	TP1	Product sales of new/improved products increased significantly	0.841
		TP2	The new product/improved product has increased the profit margin	0.800
		TP3	Increase in the number of new/improved products	0.861
		TP4	The results of the joint research and development have reached the set goals	0.867
Emotional infection (Kimura, 2008)	NI	N1	When there is sadness in the team, the team as a whole is also sad	0.816
		N2	When there is anger within the team, the team as a whole becomes angry	0.820
		N3	When there is conflict within the team, the whole team will be tense	0.814
		N4	When there is a lot of pressure within the team, the team as a whole will feel nervous	0.840
	PI	P1	Being with a happy team makes our team feel better even when it's down	0.898
		P2	With a passionate team, our team will be passionate	0.911
		P3	With a confident team, our team will also be confident in themselves	0.901
		P4	Getting along with an optimistic team will make our team not impatient, calm and calm	0.922