

## The Impact of Interactive Memory Systems on Team Creativity: The Mediating Role of Shared Mind Models and the Moderating Role of Team Reflection

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**Abstract.** In the process of modern economic development, an increasing number of companies rely on team creativity to enhance their innovation capabilities. Therefore, how to enhance team creativity has become an important issue of common concern in both theoretical and practical fields. This article aims to study how interactive memory systems influence team creativity, explore the roles of shared mind models and team reflection in this process, and clarify the underlying mechanisms of team knowledge processing on team creativity to improve organizational development capabilities. Research has found that interactive memory systems have a positive impact on team creativity. At the same time, team reflection plays a moderating role in the relationship between team interactive memory systems and team creativity, and the team shared mind model acts as a mediator between them. This article investigates the impact of interactive memory systems on team creativity, aiming to advance research on team creativity to a new level and achieve efficient utilization of knowledge.

**Keyword:** Interactive Memory System, Shared Cognition, Team Reflection, Team Creativity.

## **1. Introduction**

With the advent of globalization and the knowledge economy, the fast-changing and increasingly complex business environment has drawn unprecedented attention to team inefficiency. In traditional hierarchical organizational structures, only with smooth information flow, effective command, and alignment between superiors and subordinates, can the overall objectives of the organization be achieved. As a result, more and more enterprises are adopting team-based organizational forms to handle organizational needs beyond individual capabilities (Zou Tian, 2021). With intense industrial competition and people's expectations for social progress and material improvement, both public and private sectors actively seek innovation. However, innovation comes from creativity, and creativity requires organizational or team creation, ultimately transformed by organizations into tangible outcomes or products that generate new value for customers and ultimately gain market benefits. Therefore, the importance of team creativity in enhancing sustained competitive advantage for businesses is increasingly prominent (Weingart et al., 2008).

Simultaneously, enterprise management has transitioned from information management to knowledge management, and team knowledge management has been highly regarded by academia and the industry. Interactive memory systems, as knowledge processing platforms, are specialized collaborative systems that encode, store, and retrieve categorized knowledge in various fields (Wegner, 1987). They are themselves team knowledge management systems. By enabling team members to effectively access, learn, and utilize their expertise, these systems enhance the effectiveness of the entire collaboration process, thereby raising the level of team creativity (Lewis, 2004; Wang et al., 2018; Peltokorpi & Hasu, 2016), making it one of the current management issues.

Furthermore, a shared mind model within a team refers to a unified cognitive framework that reduces communication barriers and psychological distance within the team, deepens the level of cooperation among team members in collaborative innovation networks (Huang & Peng, 2015), facilitates efficient resource circulation, reduces friction caused by organizational boundaries, and thus enhances cooperative innovation. Therefore, most studies treat team shared mind model as a mediating variable in the field of creativity. However, few scholars have included interactive memory systems and shared mind models in the same analytical framework. Moreover, the external environment that teams currently face often exhibits uncertainty and ambiguity. This requires teams to closely monitor changes in the internal and external environment and make dynamic adjustments in a timely manner (Wang & Meng, 2019). Therefore, team reflection is particularly important in practice.

Based on the above research background, this study focuses on teams as the research subjects. Through questionnaire surveys, it examines the impact of team interactive memory systems on team creativity, explores the mediating role of shared mind models, and the moderating role of team reflection. The study aims to propose targeted and effective recommendations to improve team creativity, optimize the management of team human resources, and promote the long-term healthy development of enterprise teams.

## **2. Literature Review and Theoretical Analysis**

### **2.1. Fundament Theory**

The theories of collective intelligence and team cognition are fundament theories used in this study to explain the relationship between the interactive memory system and team creativity, as well as the underlying mechanisms and moderating effects. Collective intelligence theory brings together loosely connected individuals, modern enterprises, and organizations through networks, enabling collective members to rapidly, flexibly, and accurately comprehend and solve problems beyond individual capabilities. The core principle of collective intelligence is that "the whole is greater than the sum of its parts," illustrating that the synergistic aggregation of individual potentials generates results greater than the potentials of any individual or the sum of individual potentials (Schut, 2007). This theory explains

why some teams perform better than others by harnessing the power of social relationships. Scholars have shown through modeling studies that collective intelligence is associated with the process of seeking consensus among interacting group members and have investigated the impact of social relationship strength on group performance (De Vincenzo et al., 2017). Additionally, scholars such as Engel et al. (2014) and Kim et al. (2015) found that more equal communication and participation within a group lead to higher collective intelligence, both in face-to-face and online settings.

In addition to collective intelligence theory, this study also employs the theory of team cognition to explain the research model. Team cognition theory is developed based on social cognition theory, originally proposed by social psychologist Bandura (1986), which emphasizes the role of cognitive factors in behavioral change and reveals the mechanisms underlying the formation and maintenance of human behavior. Bandura believes that individuals, behavior, and the environment mutually influence, depend on, and determine each other. He also emphasizes that individual factors are the result of the interaction between external environment, other self-regulatory mechanisms, and personal abilities, experiences, and achievements, reflecting an individual's capacity judgment when they engage in specific organizational or individual tasks. Social cognition theory is widely accepted and has advantages in explaining knowledge sharing (Yuan Yi 2008). Team cognition theory extends this perspective to teams, proposing that individual self-cognition, personality traits, behavior characteristics, and temperament types play important roles within a team. Individuals interact with the team after judging the external environment and personal experiences and abilities in order to accomplish specific organizational or individual tasks. Team cognition theory describes the shared characteristics of individuals in a team and the significance of the team system to the team.

In summary, both collective intelligence theory and team cognition theory are important theories that focus on knowledge exchange among individuals within a team. Collective intelligence theory focuses on the emergence of new intelligence during the process of individual communication and interaction since decisions made by single individuals tend to be less accurate than decisions made by the majority. Collective intelligence is a shared or collective type of intelligence that emerges from the cooperation and competition among many teams. Team cognition theory focuses on the characteristics and mechanisms related to cognition and information processing within a team, emphasizing the interactive effects among individuals, behaviors, and the environment on team performance. Therefore, this study draws on both collective intelligence theory and team cognition theory to explain how the interactive memory system affects team creativity, particularly investigating the mediating role of shared mind as a key mechanism and the moderating role of team reflection, which has important theoretical implications.

## **2.2. Team Interaction Memory System and Team Creativity**

In a team, members contribute individual expertise through learning, memory, and communication, creating a system of division of labor and cooperation for the team to acquire, store, and utilize knowledge and information from different domains (Bachrach & Mullins, 2019). A well-developed interactive memory system in a group is characterized by high-level knowledge reserves, consensus, specialization, and accuracy, which supports and enhances team creativity (Moreland, 1999; Wang et al., 2018). This study proposes the following explanations regarding the impact of these three dimensions on team creativity:

Firstly, team expertise refers to the specialized and differentiated knowledge possessed by team members. For the team, relying on the specialized knowledge and skills of each member not only allows the team to leverage individual advantages but also enhances the understanding and cognition of knowledge from different domains. This facilitates maximum resource integration within the team, promoting innovative thinking and efficient achievement of team goals (Jenny et al., 2016). Huang et al. (2013) also demonstrated that rapid access to extensive expertise and its integration promotes team creativity.

Secondly, team trust represents the willingness of team members to share their own knowledge while trusting the knowledge provided by other members. It is a positive attitude of team members towards the team. The level of trust in the expertise of each other promotes information exchange and coordination within the team, resulting in the formation of a knowledge exchange network (Olabisi & Lewis, 2018). During the completion of team tasks, when knowledge from a specific domain in which a member lacks expertise is needed, the ability to quickly access experts familiar with that knowledge, coupled with a high level of trust, facilitates rapid knowledge acquisition. This not only reduces knowledge redundancy but also enables more professional problem-solving, thereby stimulating individual innovative thinking and wisdom formation, ultimately enhancing team creativity.

Lastly, teamwork in the interactive memory system refers to the effective integration and utilization of knowledge and expertise among team members. From the perspective of team operation, relying solely on an individual is difficult to achieve comprehensive coordination for task completion. It requires mobilizing experts from relevant domains related to the task and effectively coordinating their cooperation. Zhang et al. (2014) also pointed out that implicit coordination among team members significantly and positively affects team creativity. Team coordination ensures a harmonious atmosphere among members during team collaboration, enhancing their overall perception of the task and environment. This leads to the generation of innovative solutions.

The above evidence provides preliminary support for the separate influences of each dimension of the interactive memory system on team creativity. According to the research conclusions of Li Hao and Huang Jian (2018), the three dimensions of the interactive memory system are not equal but have a progressive relationship. Trust is based on expertise and is a dimension higher than expertise. Similarly, coordination is built upon expertise and trust; without expertise and trust, coordination is unlikely to occur. Therefore, the coordination dimension of the interactive memory system, unlike ordinary team coordination, emphasizes the integration of specialized and differentiated knowledge possessed by different members and must be based on the establishment of expertise and trust. It is evident that the relationship between the three dimensions and team creativity confirms the capacity of the interactive memory system to promote team creativity (Cao & Ahsan, 2018). Specialization of knowledge enhances team creativity by reducing knowledge search, trust among members enhances team creativity by minimizing the need for external assistance, and orderly cooperation among members enhances team creativity by reducing coordination errors (Rong et al., 2019; Ali et al., 2020). Consequently, based on the relationship between the three sub-dimensions (expertise, trust, and coordination) of the interactive memory system and team creativity, this study proposes the following hypotheses:

H1a: Team expertise has a significant positive impact on team creativity.

H1b: Team trust has a significant positive impact on team creativity.

H1c: Team coordination has a significant positive impact on team creativity.

### **2.3. Team Interactive Memory System and Team Shared Mind**

Shared mind models within a team refer to the collective knowledge structure and cognitive patterns that team members possess, enabling them to have accurate interpretations and expectations of team tasks, thus coordinating their behaviors to meet the requirements of team tasks and the needs of other team members. An interactive memory system, on the other hand, is a collaborative division of labor system formed among team members for knowledge encoding, storage, and retrieval across different domains. There are primarily two ways in which this system operates. Firstly, team members expand their knowledge reservoir through communication and sharing. Secondly, when some members of the team forget certain knowledge or information, they can seek help and retrieve the missing and forgotten information from other team members through communication (Wu & Deng, 2019). Many scholars view work teams as information processing units and attempt to understand how work teams effectively process the required information for problem-solving. For instance, Coman (2019) found that a group of people who have previously worked together, being familiar and knowledgeable about each other,

performs better compared to a team composed of unfamiliar individuals. Simeonova's study (2018) suggests that the interactive memory system allows team members from different knowledge domains to obtain information from each other based on their expertise, encode and store it, thereby relieving each individual's responsibility for the team's intellectual tasks aimed at achieving team goals.

Based on the aforementioned definitions, the interactive memory system and shared mind models are both core concepts related to knowledge sharing, but few scholars have explored the underlying relationship between them. Based on a review of the literature, this paper argues that the interactive memory system primarily influences shared mind models from three dimensions. First, the expertise within the interactive memory system can impact shared mind models within the team. Through continuous search and sharing of information, team members grasp each other's specialized domains, gradually establishing a collective understanding of "who knows what" and updating the directory of the interactive memory system. This overlap or similarity in cognition regarding team-related knowledge or skills is possible due to the prerequisite of team members possessing professional knowledge, forming the basis of shared mind models regarding teammates' knowledge and skills. Second, the trustworthiness within the interactive memory system can influence shared mind models within the team. The interactive memory system is essentially a trust-based sharing system, where integration of knowledge and information from different domains occurs based on trust relationships. This integration is followed by encoding, storage, and retrieval, facilitating team members' application of knowledge and achieving their shared mind models (Kwahk & Park, 2018). Additionally, when the trust between team members is high, it is easier to achieve high-quality communication, which, in turn, promotes members' recognition of their team's shared values, fostering their identification process and the formation of shared mind models (Zamani & Pouloudi, 2022). Third, the coordination within the interactive memory system can impact shared mind models within the team. The allocation of information through the interactive memory system leads to team members being responsible for handling and storing knowledge or information from different domains, thus lowering the similarity of task mind models among members. However, the coordination function of retrieval realizes the sharing and integration of distributed knowledge or information at the team level, to some extent, improving the similarity of task mind models among members. Therefore, when teams effectively coordinate their accumulated resources, they can optimize the parameters related to their shared mind models (Steiner et al., 2017; Dennehy & Conboy, 2019). In summary, the interactive memory system has a positive impact on the development of shared mind models within teams. Based on this, the following hypotheses are proposed:

H2a: Team expertise positively influences shared mind models within the team.

H2b: Trust within the team positively influences shared mind models within the team.

H2c: Inter-team collaboration positively influences shared mind models within the team.

#### **2.4. Team Shared Mind Model and Team Creativity**

Through the research on shared mind models, it can be seen that, unlike the focus on interactional memory systems, shared mind models emphasize the degree of knowledge sharing and the integration of team members' knowledge. From the perspective of knowledge management, differentiation and integration are two complementary processes. The differentiation of knowledge aims to enrich the knowledge resources within the team, while the integration aims to activate the existing knowledge resources in the team, forming a "shared understanding" in dynamic and complex environments, thereby enhancing the team's creativity. The positive effect of shared mind models on team creativity and productivity can be explained from the perspective of team learning. Firstly, shared mind models promote the learning of tacit knowledge within teams, thus influencing the level of creativity and productivity. Shared mind models act as the driving force behind organizational change and the support carrier for organizational knowledge innovation. They unconsciously influence the organization's knowledge strategy and long-term architecture. When the team's ability to learn tacit knowledge

improves gradually, the preparation for knowledge recombination becomes more sufficient, which is conducive to the modification of existing knowledge models, the generation of new knowledge concepts, and the construction of innovative methods. Secondly, collaborative shared mind models promote the construction of harmonious interpersonal relationships. By understanding each team member's knowledge, beliefs, attitudes, and behaviors, the explicitation of tacit knowledge is accelerated to a certain extent, thus improving the efficiency of team collaboration. In summary, the interaction between knowledge workers promotes the formation and development of shared mind models, which benefits team learning, enhances members' willingness to cooperate, and ultimately improves the overall team creativity level.

H3: Shared mind models within teams have a positive effect on team creativity.

## 2.5. As an intermediary, shared mind

Both the interactive memory system and the shared mind model are two core concepts of shared cognition, and they are closely related. However, after reviewing the literature, it is found that most of the existing research treats them as independent team cognitive systems, and only a few researchers consider both types of cognition existing within the team (Xue Huijuan, 2014; Zhang Gang and Lü Jie, 2012). Furthermore, no scholars have suggested that the interactive memory system may influence team creativity through the formation of a shared mind model as an intermediary.

Mathieu et al. (2000) divided the mind model into two types: task mind model and team mind model. The former emphasizes the overlapping, similar, or consistent cognition formed by team members regarding team goals, tasks, and operations, such as goals and subtasks, duration of subtasks, and resources required for task coordination (Mohammed et al., 2010). The latter emphasizes the overlap or similarity of team members in terms of role responsibilities, interaction patterns, and teammate characteristics (Zhang Jianwei et al., 2018). This paper will discuss the two-dimensional structure of the mind model.

Firstly, the distributed expertise of team members in the interactive memory system makes it easier for teams to identify the difficulties and key points in team tasks, accurately understand the specific content and direction of team tasks, and enables team members to form a consistent cognition of task-related knowledge, thereby promoting the formation of task mind models (Schmidtke & Cummings, 2017). Although scholars Ma Changlong and Yu Miao (2019) believe that the task mind model emphasizes the sharing and integration of task-related knowledge, which contradicts the concept of differentiation emphasized by the interactive memory system in task-related knowledge, this paper believes that the reason for this difference lies in the neglect of the distinction between team foundational knowledge and professional knowledge. The task mind model mainly refers to foundational knowledge, which is the knowledge that each team member must master and is not specialized. It is similar to the initial cognition of "1 + 1 = 2". Team members can only operate as a team when they have grasped the basic knowledge.

Furthermore, mutual collaboration among team members can facilitate the sharing and integration of distributed team knowledge or information at a team level, which can enhance the similarity of task mind models among team members and promote the formation of task mind models (Zamani & Pouloudi, 2022).

Secondly, the interactive memory system is a shared system established based on mutual trust among team members, and the level of trust within the team can directly influence the quality of communication among team members (Pavez et al., 2021; Costa et al., 2018). Therefore, in teams with high trust, a good internal interaction pattern can be formed, promoting mutual recognition among team members, enhancing team identification, and forming team mind models.

Shared cognition provides a common platform for team members to achieve effective collaboration in complex, dynamic, and ambiguous situations (Mohammed & Dumville, 2001), enabling team members to accurately anticipate each other's actions, better integrate distributed knowledge, optimize

coordination with each other, and stimulate team creativity. Wang Liying (2010) confirmed in her doctoral dissertation that both types of shared mind models have a positive impact on team creativity: the task-based shared mind model based on “overlap or consistency” enables team members to have consistent expectations of team goals, tasks, and operations, promoting the acquisition and sharing of team knowledge and innovative information, and thereby stimulating team creativity (Gardner et al., 2017). The collaboration-based shared mind model based on “distribution or complementarity” can not only enhance core competencies but also weaken core rigidity, enabling team members to form distributed or complementary cognition of knowledge, attitudes, and beliefs, facilitating division of labor and cooperation among team members, promoting the complementary sharing of different knowledge structures, and thereby stimulating team creativity (Wu Tong & Zhang Yijing, 2023). In summary:

H4a: Team shared mind models have a mediating effect on team expertise and team creativity.

H4b: Team shared mind models have a mediating effect on team trust and team creativity.

H4c: Team shared mind models have a mediating effect on team collaboration and team creativity.

## **2.6. Reflective Teamwork as a form of regulation**

Effective team empowerment is crucial for the sustained development of enterprises to cope with the challenges of the ever-changing external environment. The present study focuses on team reflection, which refers to the dynamic process of team members’ attention to and response to environment changes. It enhances team members’ reflection, creates a favorable team reflection atmosphere, and mitigates the negative impact of environment changes or seizes development opportunities. Research results from scholars have confirmed that team reflection is a key factor influencing team innovation and performance, as it enables team members to continuously examine internal and external environment changes and respond promptly (Otte et al., 2018; Li et al., 2021).

Team reflection emphasizes the iterative process of reflection, planning, and action (Konradt et al., 2016), playing a role in team functioning. Through reflective activities, team members can re-examine and recognize their responsibilities (Konradt & Eckardt, 2016), identify problems arising from past team interactions, and explore the root causes of these problems. During the process of reflection, team members can openly share their opinions about the internal and external team situations, which not only promotes information sharing within the team (Lang & Cao, 2007) and facilitates the utilization of expert knowledge distributed within the team (Lewis et al., 2007), but also helps the team overcome the inertia effect of the interaction memory system, promptly calibrate or reconfigure members’ professional skills (Marques-Quinteiro et al., 2019), and gain a clearer understanding of the expertise of other team members (Wang et al., 2021). Furthermore, reflection requires team members to pay attention to details, plan progress, raise reasonable questions, and solve complex problems (Schepers & Wetzels, 2007). Previous studies have indicated that team reflection positively affects key outcomes, and the excellent team performance continually brings satisfaction to team members in cooperation, explicit recognition, or implicit affirmation, which positively stimulates the level of mutual trust among members (McNeese et al., 2021). Moreover, team reflection can also enhance positive interactions within the team (Shu & Ye, 2017), improve the quality of team communication, enhance mutual understanding of members’ expertise and skills, facilitate a common understanding of roles, responsibilities, interaction patterns, and information flow, thus helping to break the cognitive barriers among members and promoting the effective integration and utilization of knowledge and expertise in their work tasks (Lyubovnikova et al., 2017).

In general, highly reflexive team members tend to respond positively to environment factors, while low reflexive team members tend to respond defensively to environment changes. Lyu et al. (2022) argued that team members who frequently engage in reflexive activities are more likely to grasp and familiarize themselves with each other’s expertise, clearly position members’ expertise and advantages, understand the reputation and reference rights of members with specialized knowledge, and jointly

interpret, explore, and plan innovative ideas and proposals, thereby optimizing the interactive memory system. Somech (2006) also proposed that team reflection brings together members with heterogeneous skills, promotes coordination and cooperation among them, improves the functionality of the interactive memory system, and enables the trusting and coordinated utilization of members' expertise. Thus, it can be seen that high levels of team reflection can effectively enhance the role of the team's interactive memory system in team creativity. Therefore, we hypothesize:

H5a: Team reflection has a positive moderating effect on the relationship between team members' expertise and team creativity.

H5b: Team reflection has a positive moderating effect on the relationship between trust among team members and team creativity.

H5c: Team reflection has a positive moderating effect on the relationship between collaboration among team members and team creativity.

## **2.7. Research Hypothesis & Conceptual Framework**

Based on the literature and theory, the following hypothesis and conceptual research framework are proposed:

(1) The relationship between the three sub-dimensions (expertise, trust, and coordination) of the interactive memory system and team creativity, this study proposes the following hypotheses:

H1a: Team expertise has a significant positive impact on team creativity.

H1b: Team trust has a significant positive impact on team creativity.

H1c: Team coordination has a significant positive impact on team creativity.

(2) The interactive memory system has a positive impact on the development of shared mind models within teams. the following hypotheses are proposed:

H2a: Team expertise positively influences shared mind models within the team.

H2b: Trust within the team positively influences shared mind models within the team.

H2c: Inter-team collaboration positively influences shared mind models within the team.

(3) The interaction between knowledge workers promotes the formation and development of shared mind models, which benefits team learning, enhances members' willingness to cooperate, and ultimately improves the overall team creativity level.

H3: Shared mind models within teams have a positive effect on team creativity.

(4) The collaboration-based shared mind model based on "distribution or complementarity" can not only enhance core competencies but also weaken core rigidity, enabling team members to form distributed or complementary cognition of knowledge, attitudes, and beliefs, facilitating division of labor and cooperation among team members, promoting the complementary sharing of different knowledge structures, and thereby stimulating team creativity (Wu Tong & Zhang Yijing, 2023).In summary:

H4a: Team shared mind models have a mediating effect on team expertise and team creativity.

H4b: Team shared mind models have a mediating effect on team trust and team creativity.

H4c: Team shared mind models have a mediating effect on team collaboration and team creativity

(5) It can be seen that high levels of team reflection can effectively enhance the role of the team's interactive memory system in team creativity. Therefore, we hypothesize:

H5a: Team reflection has a positive moderating effect on the relationship between team members' expertise and team creativity.

H5b: Team reflection has a positive moderating effect on the relationship between trust among team members and team creativity.

H5c: Team reflection has a positive moderating effect on the relationship between collaboration among team members and team creativity.

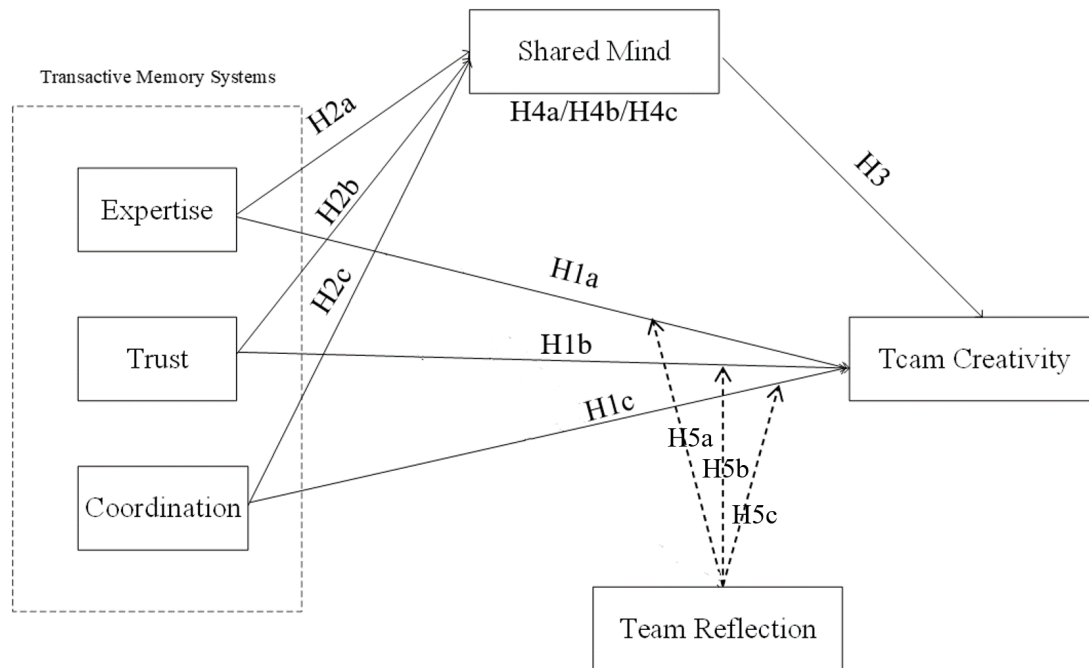


Fig. 1: Conceptual Framework

### 3. Research on Design

#### 4.1. Samples and data

The reasons for choosing Shenzhen are as follows:

Shenzhen is located in southern China, adjacent to Hong Kong, with a superior geographical position. It is a frontier city of China's reform and opening-up. Shenzhen has a modern transportation network and convenient international shipping ports, providing favorable conditions for business development. Shenzhen has abundant human resources and attracts a large number of highly skilled talents. It is home to several high-level universities and research institutions, such as Shenzhen University and Harbin Institute of Technology (Shenzhen), providing strong talent support for the high-tech industry. Shenzhen is an important economic center and innovation hub in China, with a solid foundation in high-tech industries such as electronics, biomedicine, and new energy. It has numerous high-tech enterprises and science and technology parks, creating a favorable industrial ecosystem for business development. The Shenzhen government attaches great importance to the development of high-tech industries and has implemented a series of supportive policies and measures, such as the Science and Technology Innovation Fund and high-tech enterprise incubators, providing a favorable policy environment and financial support for high-tech enterprises. Shenzhen is one of the most open cities in China, actively promoting open cooperation. It maintains close cooperation with well-known domestic and international high-tech enterprises and research institutions, attracting a large amount of foreign investment and talent, and promoting the integration of industry, academia, and research in the high-tech industry.

Moreover, the author himself has work experience in the high-tech industry in Shenzhen, which will facilitate the collection of relevant materials and information. Therefore, choosing Shenzhen for research is reasonable and will provide substantial evidence and in-depth research content for your paper.

The sample of research and development teams selected for this study primarily comes from the research and development departments of high-tech enterprises in Shenzhen, China. The research process consists of three parts: preliminary research, formal research, and questionnaire compilation.

(1) In the preliminary research stage, this study first conducted preliminary research on 13 enterprise research and development teams in Shenzhen to test the initial questionnaire design for its rationality and reliability, the discriminatory power of variable questionnaire items, and to make necessary revisions to the pilot questionnaire. The final formal questionnaire for this study was derived from this process. (2) In the formal research stage, to ensure the standardization of the formal research process and the accuracy of the research data, this study provided unified training to the surveyors. The research targets were mainly the research and development teams of the selected enterprises. Each team was assigned a unique number, and the number of team members participating in the questionnaire survey was recorded. Each team had at least 3 participants, and the completed questionnaires were collected upon completion. (3) In the questionnaire compilation stage, as this study employed a method of data collection using different sources and matched tracking, the researchers carefully organized and statistically analyzed the collected questionnaires, and established a database. The data entry was conducted in groups to ensure accuracy and reliability of the entered data.

To avoid social desirability bias, the questionnaires were distributed in paper format on-site and were anonymously filled out. The research involved a total of 43 research and development teams, with a total of 495 members. To effectively reduce common method bias, this study adopted a two-stage longitudinal research design, with data collection conducted at two time points: May 2023 and July 2023. The questionnaires were distributed and collected on-site during the research. At Time 1 (May 2023), the research subjects were invited to evaluate interactive memory systems, shared mind models, and team reflection, and to report demographic variables. A total of 495 questionnaires were distributed, and after eliminating samples with missing information and incomplete responses, 463 valid questionnaires were collected, resulting in an effective response rate of 93.54%. Two months later, at Time 2 (July 2023), in order to obtain data on team creativity from the surveyed teams, a questionnaire containing items on team creativity was distributed to the supervisors of the research teams who had completed the first questionnaire. Finally, 446 questionnaires were collected, and after eliminating the following types of invalid samples: 1. 6 samples that did not select the required options, and 2. 7 samples with missing questionnaire contents. In the end, 433 valid questionnaires were obtained, resulting in a questionnaire validity rate of 97.08%. Overall, the valid response rate for the two surveys was 87.47%, as shown in Table 1.

Table 1: Basic information of the sample

Title	option	frequency	proportion	subject	option	frequency	Proportion	
Gender	male	246	56.81%	marriage	unmarried	216	49.88%	
	female	187	43.19%		married	209	48.27%	
	25 years old and under	158	36.49%		other	8	1.85%	
Age	26-30 years old	91	21.02%	Enterprise size	Less than 50 people	81	18.71%	
	31-35 years old	51	11.78%		50-100 people	91	21.02%	
	36-40 years old	43	9.93%		101-150 people	175	40.42%	
	41-45 years old	44	10.16%		More than 150 people	86	19.86%	
	46-50 years old	40	9.24%		Years of establishment	1-10 years	147	33.95%
	51 years old and above	6	1.39%			11-20 years	181	41.80%
Education	high school	43	9.93%	21-30 years		91	21.02%	
	university	278	64.20%	Over 30 years	14	3.23%		
	Master's degree students	73	16.86%	Information integration services	59	13.63%		
	Doctoral students	39	9.01%	Basic software development	69	15.94%		
	Within 1 year	48	11.09%	Other technology promotion services	60	13.86%		
Years of Work Experience	1-5 years	255	58.89%	National standard industry	Engineering and Technical Research and Experiment Development	73	16.86%	
	6-10 years	70	16.17%		Industrial and professional design and other professional technical services	50	11.55%	
	11-15 years	36	8.31%		Other unspecified professional technical service industries	66	15.24%	
	Over 15 years	24	5.54%		Other software development	56	12.93%	

## 4.2. Variable measurement

The measurement of research structure in this study is based on existing measures. All projects were scored and measured using a seven-point Likert scale, ranging from “strongly disagree” (1) to “strongly agree” (7).

Team creativity: This study refers to the 4-item scale developed by Farmer (2003) and others, with typical items such as “Team members are willing to try new ideas or methods.” The internal consistency coefficient of this scale is 0.874.

Team interaction memory system: This study adopted and referenced the 15-item scale developed by Lewis (2003), with typical items such as “The team possesses the professional knowledge required to complete the project.” The internal consistency coefficient of this scale is 0.925.

Team shared mind models: This study refers to the 8-item scale developed by Mathieu et al. (2000), with typical items such as “The team reaches a consensus on critical tasks (key technologies) of the project.” The internal consistency coefficient of this scale is 0.945.

Team reflection: This study refers to the 7-item scale developed by Swift & West (1998), with typical items such as “The team frequently reexamines whether the initially set goals are appropriate.” The internal consistency coefficient of this scale is 0.961.

## 4.3. aggregate testing

The subsequent data aggregation test was conducted to verify the data aggregation rationality of individual data. Three indicators, Rwg, ICC (1), and ICC (2), were used for measurement. The results showed that the internal consistency of the six variables was high. The Rwg values were 0.845, 0.871, 0.833, 0.819, 0.874, and 0.710, all exceeding the criteria of 0.7. The ICC (1) values were 0.647, 0.640, 0.584, 0.514, 0.704, and 0.345, which satisfied the criteria of being greater than 0.05. The ICC (2) values were 0.949, 0.947, 0.934, 0.914, 0.960, and 0.841, all meeting the empirical criteria of being greater than 0.5. The data aggregation effect was good.

## 4.4. Reliability and validity testing

The reliability, composite reliability (CR), and Cronbach's alpha coefficient of all constructs in our study exhibit values greater than 0.70, signifying statistical significance at the 5% confidence level (Al-Sa'di et al., 2017). Furthermore, it is recommended that the outer factor loading threshold value for each latent variable should be at least 0.40, with any outer loading below 0.4 being removed, while 0.70 can be taken into account (Al-Sa'di et al., 2017).

To validate the measurements and evaluate the model fit, confirmatory factor analysis (CFA) was performed using AMOS 26. Several general indexes were employed:  $\chi^2/df$ , TLI, CFL, GFI, RMSEA, and SRMRA. Acceptable cutoff values for these indexes are as follows:  $\chi^2 < 2.00$ , TLI, GFI, and CFL  $> 0.90$ , and RMSEA, SRMR  $< 0.08$  (Hooper et al., 2008). In addition, Fornell and Larcker (1981) recommend that the average variance extracted (AVE) value for each construct exceed 0.50, validating their measurements (Ab Hamid et al., 2017; Hair et al., 2011; Hair et al., 2012).

The results of the confirmatory factor analysis support both the validity and reliability of our measures. The fit indexes indicate a good fit for our hypothesized model, with  $\chi^2/df = 1.658$ , CFI = .973, TLI = .970, GFI = .902, RMSEA = .039, and SRMR = .034;  $p < .05$ . All measurements' validity and reliability are acceptable, and the recommended threshold values are presented in Table 1. Additionally, the outer factor loadings of the measurement mode align with the recommended threshold values, as shown in Table 2. Based on the quality fit indices, the results of the CFA analysis confirm the appropriateness of the data, allowing for subsequent structural equation modeling analysis. Furthermore, Table 1 also presents the means, standard deviations, and inter-variable correlations.

Table 2: Means, Standard Deviations, Correlations, and Variance Extracted Testing

	M	SD	1	2	3	4	5	6	AVE	CR
Recommended Threshold									0.500	0.700
1.MZC	4.814	1.320	1.000						0.730	0.931
2.MKX	4.868	1.195	.600**	1.000					0.552	0.860
3.MXT	4.794	1.260	.517**	.492**	1.000				0.628	0.894
4.MGX	4.232	1.213	.479**	.469**	.438**	1.000			0.701	0.949
5.MCZ	4.982	1.299	.633**	.644**	.599**	.539**	1.000		0.636	0.875
6.MFS	4.699	1.541	.314**	.375**	.295**	.208**	.248**	1.000	0.781	0.962

Note: \*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .,  $n = 433$ , MZC = Specialization, MKX = Credibility, MXT = Coordination, MGX = Shared Mind Models, MCZ = Team Creativity, MFS = Team Reflection.

Table 3: Outer Factor Loadings of the Measurement Model (CFA)

Indicators	Factor Loading	Standard Error	C. R.
ZC5	0.944		
ZC4	0.873	0.024	29.644***
ZC3	0.802	0.029	24.111***
ZC2	0.803	0.029	24.193***
ZC1	0.843	0.028	27.113***
KX5	0.7		
KX4	0.712	0.077	13.541***
KX3	0.714	0.076	13.582***
KX2	0.792	0.074	14.923***
KX1	0.79	0.078	14.888***
XT5	0.776		
XT4	0.859	0.054	19.038***
XT3	0.819	0.055	18.006***
XT2	0.814	0.057	17.878***
XT1	0.684	0.063	14.59***
GX1	0.912		
GX2	0.913	0.031	31.911***
GX3	0.922	0.031	32.903***
GX4	0.929	0.031	33.661***
GX5	0.706	0.045	18.517***
GX6	0.772	0.042	21.697***
GX7	0.803	0.04	23.47***
GX8	0.703	0.045	18.425***
CZ1	0.734		
CZ2	0.812	0.066	16.478***
CZ3	0.857	0.066	17.374***
CZ4	0.783	0.068	15.89***
FS1	0.875		
FS2	0.887	0.039	26.662***
FS3	0.903	0.038	27.691***
FS4	0.906	0.039	27.904***
FS5	0.859	0.039	24.922***
FS6	0.872	0.038	25.673***
FS7	0.884	0.036	26.478***

Note: \*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .,  $n = 433$ , MZC = expertise, MKX = credibility, MXT = coordination, MGX = team shared mind models, MCZ = team creativity, MFS = team reflection.

#### 4.5. Ethical Review

This study has been reviewed by the Ethics Committee of the School of Finance, Lanzhou University of Finance and Economics, and obtained the IRB approval certificate (Reference Number: LCJ-2023-25) on September 6, 2023.

#### 4.6. Empirical verification

The study employed structural equation modeling (SEM) technique and Bootstrap method to test the research hypotheses. Path analysis was conducted to examine the hypothetical relationships between exogenous and endogenous variables used in the study (refer to Table 3 and Figure 2).

Table 4: Regression Results for Multiple Mediation Analyses

Model	R2	Path Coefficient	t	se	Bias corrected bootstrap 95% confidence interval		Hypothesis Result	
					Lower	Upper		
Model1	MZC→MGX	0.229	0.440***	11.323	0.039	0.364	0.516	H2a: Supported
	MZC→MCZ	0.479	0.479***	11.767	0.041	0.399	0.560	H1a: Supported
	MGX→MCZ		0.320***	7.491	0.043	0.236	0.404	H3: Supported
	MFS→MCZ		0.042	1.320	0.032	-0.020	0.104	
	MZC×MFS→MCZ		0.046*	2.023	0.023	0.001	0.090	H5a: Supported
	Indirect effects		0.141		0.025	0.093	0.192	H4a: Supported
Model2	MKX→MGX	0.220	0.476***	11.028	0.043	0.391	0.561	H2b: Supported
	MKX→MCZ	0.493	0.582***	12.263	0.047	0.488	0.675	H1b: Supported
	MGX→MCZ		0.314***	7.458	0.042	0.232	0.397	H3: Supported
	MFS→MCZ		0.010	0.317	0.032	-0.053	0.073	
	MKX×MFS→MCZ		0.052*	2.251	0.023	0.007	0.098	H5b: Supported
	Indirect effects		0.150		0.027	0.099	0.203	H4b: Supported
Model3	MXT→MGX	0.192	0.422***	10.116	0.042	0.340	0.503	H2c: Supported
	MXT→MCZ	0.462	0.471***	10.988	0.043	0.387	0.555	H1c: Supported
	MGX→MCZ		0.354***	8.295	0.043	0.270	0.437	H3: Supported
	MFS→MCZ		0.051	1.618	0.032	-0.011	0.114	
	MXT×MFS→MCZ		0.051*	2.269	0.023	0.007	0.096	H5c: Supported
	Indirect effects		0.149		0.025	0.101	0.200	H4c: Supported

In Model 1, expertise significantly positively predicts team shared mind models ( $\beta=0.44$ ,  $t=11.323$ ,  $p<0.001$ ), supporting hypothesis H2a; expertise significantly positively predicts team creativity ( $\beta=0.479$ ,  $t=11.767$ ,  $p<0.001$ ), supporting hypothesis H1a; team shared mind models significantly positively predict team creativity ( $\beta=0.32$ ,  $t=7.491$ ,  $p<0.001$ ), supporting hypothesis H3. In Model 2, trust significantly positively predicts team shared mind models ( $\beta=0.476$ ,  $t=11.028$ ,  $p<0.001$ ), supporting hypothesis H2b; trust significantly positively predicts team creativity ( $\beta=0.582$ ,  $t=12.263$ ,  $p<0.001$ ), supporting hypothesis H1b; team shared mind models significantly positively predict team creativity ( $\beta=0.314$ ,  $t=7.458$ ,  $p<0.001$ ), supporting hypothesis H3. In Model 3, coordination significantly positively predicts team shared mind models ( $\beta=0.422$ ,  $t=10.116$ ,  $p<0.001$ ), supporting hypothesis H2c; coordination significantly positively predicts team creativity ( $\beta=0.471$ ,  $t=10.988$ ,  $p<0.001$ ), supporting hypothesis H1c; team shared mind models significantly positively predict team creativity ( $\beta=0.354$ ,  $t=8.295$ ,  $p<0.001$ ), supporting hypothesis H3.

The results of the mediation analysis show that team shared mind models play a significant mediating role between expertise and team creativity, with an effect value of 0.141,  $p<0.05$ , and a 95%

confidence interval of [0.025, 0.093], which does not contain 0, supporting hypothesis H4a. Team shared mind models also play a significant mediating role between trust and team creativity, with an effect value of 0.150,  $p < 0.05$ , and a 95% confidence interval of [0.027, 0.099], which does not contain 0, supporting hypothesis H4b. Similarly, team shared mind models play a significant mediating role between coordination and team creativity, with an effect value of 0.149,  $p < 0.05$ , and a 95% confidence interval of [0.025, 0.101], which does not contain 0, supporting hypothesis H4b.

The results of the moderation analysis show that the interaction between expertise and team reflection significantly and positively predicts team creativity ( $\beta = 0.046$ ,  $t = 2.023$ ,  $p < 0.05$ ), supporting hypothesis H5a. High and low groups were created by adding or subtracting one standard deviation from the mean, and simple slope tests were conducted and simple effect analysis graphs (Figure 1) were plotted. The results demonstrate that for the low group, specifically employees with low team reflection, expertise significantly and positively predicts team creativity ( $B_{\text{simple}} = 0.402$ ,  $t = 7.701$ ,  $p < 0.001$ ); for the high group, specifically employees with high team reflection, expertise not only significantly but also increases the positive prediction of team creativity ( $B_{\text{simple}} = 0.539$ ,  $t = 10.131$ ,  $p < 0.001$ ).

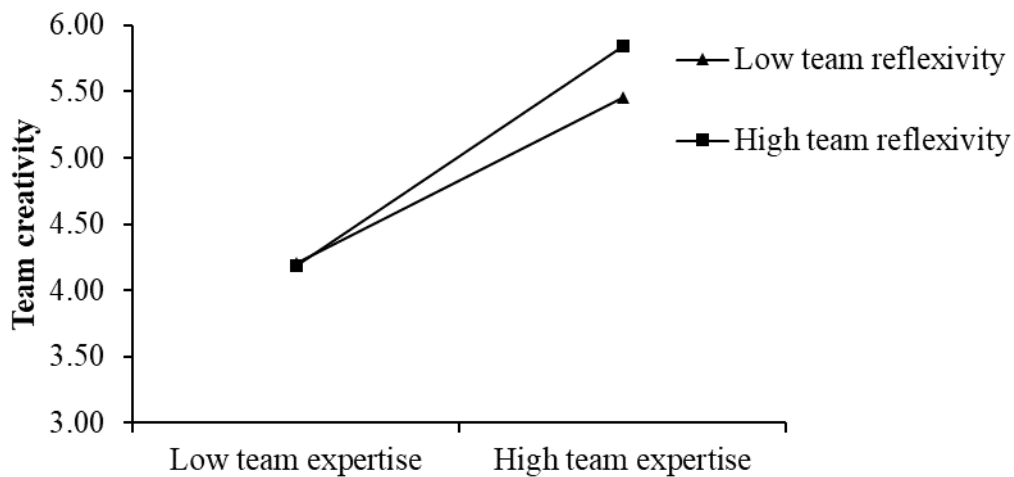


Fig. 2: The moderating effect of team creativity on team expertise and team reflection

The interaction term between credibility and team reflection significantly and positively predicted team creativity ( $\beta = 0.052$ ,  $t = 2.251$ ,  $p < .05$ ), supporting hypothesis H5b. The high and low groups were created based on one standard deviation above and below the mean, and a simple slope test was conducted and a simple effect analysis plot (Figure 2) was plotted. The results indicated that for the low group, which consisted of employees with low team reflection, credibility had a significant positive prediction effect on team creativity ( $B_{\text{simple}} = 0.493$ ,  $t = 9.738$ ,  $p < 0.001$ ). For the high group, which consisted of employees with high team reflection, credibility had a significant and increased positive prediction effect on team creativity ( $B_{\text{simple}} = 0.649$ ,  $t = 10.144$ ,  $p < 0.001$ ).

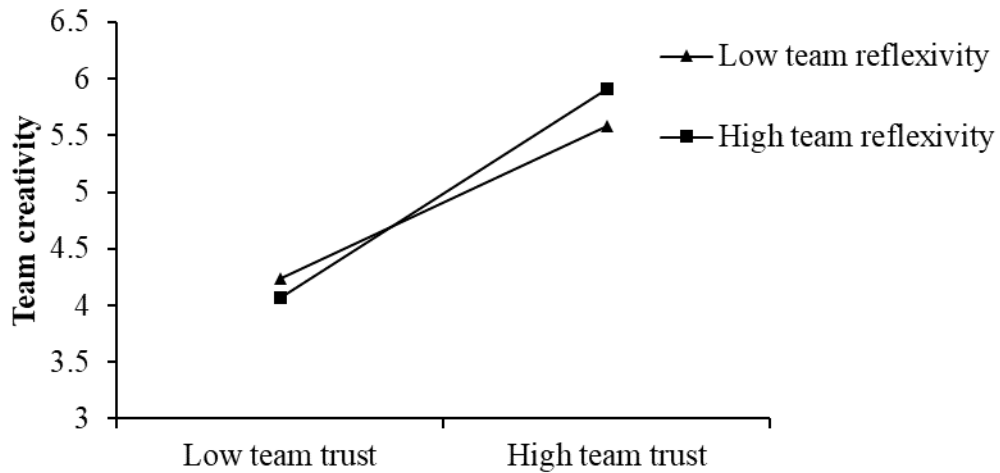


Fig. 3: The moderating effect of team creativity on team trust and team reflection

The interaction term between coordination and team reflection significantly and positively predicts team creativity ( $\beta = 0.051$ ,  $t = 2.269$ ,  $p < .05$ ), supporting Hypothesis H5c. Simple slope tests were conducted by dividing the sample into high and low groups based on one standard deviation above and below the mean, and a simple effects analysis plot (Figure 3) was generated. The results indicate that for employees in the low reflection group, coordination significantly and positively predicts team creativity ( $B_{\text{simple}} = 0.384$ ,  $t = 7.536$ ,  $p < 0.001$ ). For employees in the high reflection group, coordination not only significantly predicts team creativity, but also shows an increasing effect ( $B_{\text{simple}} = 0.538$ ,  $t = 9.426$ ,  $p < 0.001$ ).

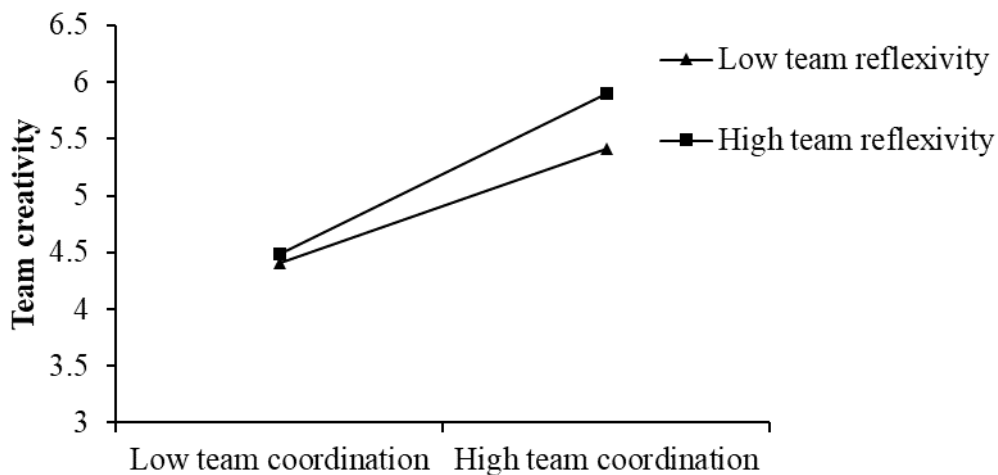


Fig. 4: The moderating effect of team creativity on team coordination and team reflection

## 4. Discussion and Conclusion

### 4.1. Main research findings

This study aims to investigate the relationship between team interaction memory systems and team creativity, as well as the mediating role of team shared mind models and the moderating role of team reflection. The results of this study confirmed that the three dimensions of team interaction memory systems, namely expertise, credibility, and coordination, have a positive impact on team shared mind models and team creativity. Additionally, team shared mind models have a positive effect on team

creativity. Mediation analysis revealed a significant mediating role of team shared mind models between interaction memory systems and team creativity. Moderation analysis indicated that the influence of team interaction memory systems on team creativity varies significantly under different levels of team reflection, with significant moderating effects.

(1) Team interactive memory systems can effectively enhance team creativity. This finding supports the view that team interactive memory systems play a crucial role in improving team creativity. Previous studies have shown that in a team environment, interactive memory systems provide a platform for task allocation and collaborative work based on individual expertise, facilitating knowledge acquisition, storage, and sharing. When a team possesses a high-level interactive memory system, its performance often surpasses that of other teams (Martin & Bachrach, 2018; Qu Xiaoxian & Liu Xinmei, 2016; Ali & Khan, 2019). This study also confirms the effectiveness of interactive memory systems in enhancing team creativity.

(2) Team interactive memory systems enhance team creativity by promoting team shared mind models. In the knowledge economy era, strengthening team knowledge exploration and utilization activities to achieve knowledge creation has become a major challenge for modern corporate teams. Team shared mind models, as important mechanisms for team interaction and learning, represent the shared knowledge of team critical elements among team members (Mohammed & Dumville, 2001). Shared mind models provide team members with a similar cognitive foundation, facilitating the description, interpretation, and prediction of team tasks and teammate behaviors, and actively adjusting their own behaviors to achieve team coordination, thereby improving team performance (Converse, 1993; Gardner et al., 2017). This study found that the internal expertise, mutual trust, and coordination ability within the team can promote team shared mind models and enhance team creativity. By establishing team shared mind models, team members can use a unified cognitive approach within the team to guide the team to build knowledge linkage mechanisms, help integrate knowledge, and achieve knowledge innovation, thereby enhancing creativity.

(3) The level of team reflection influences the impact of team interactive memory systems on team creativity. For teams with a high level of reflection, the effect of team interactive memory systems on enhancing team creativity is more significant. This study found that team reflection is crucial for teams to pay attention to the environment and respond to environment changes. In an environment with high-level team reflection, team members actively think, exert their subjective initiative, and constantly engage in thought collisions. Various opinions and ideas within the team receive full consideration and are summarized and organized. The thoughts of individual team members also become more innovative, divergent, and critical in this process, providing a guarantee for team knowledge creation, ultimately leading to increased team creativity and improved team cohesion (Shin et al., 2017; Leblanc et al., 2022; Breugst et al., 2018).

#### **4.2. Insufficient**

This study has certain limitations. Firstly, the data in this study were collected through paired tracking and multi-source methods to reduce common method bias. However, the data were all based on subjective reports from the sample, and future research could incorporate objective data to further enhance the accuracy of the research findings. Secondly, the sampling and survey in this study were mainly focused on high-tech enterprises. Whether the research findings apply to other regions needs further examination. Future research should expand the sample sources and sizes by conducting surveys in other types of organizations to strengthen the generalizability of the research conclusions. Lastly, this study confirmed the mediating role of team contribution mindset and the moderating role of team reflection. In the future, it is necessary to explore other behavioral factors as potential mediating variables and external contextual factors to comprehensively reveal the mediating mechanisms and boundary conditions of the impact of team interaction memory systems on team creativity.

### 4.3. The Impact on Behavioral Science

This research demonstrates the relevance and applicability of collective intelligence theory and team cognition theory to team creativity. Both collective intelligence theory and team cognition theory posit that the interaction of individual behaviors, communication among members, mutual observation, learning, and cooperation can facilitate the flow of information and knowledge sharing among different members, thereby influencing the team's information processing and decision-making strategies. These theories provide theoretical support for exploring how team members break down communication barriers and share and integrate their knowledge within the team (Yang, 2021; Woolley et al., 2015; Qi et al., 2013). By examining the role of team shared mind models and team reflection in the relationship between team interaction memory systems and team creativity, this study contributes to the literature on behavioral science. The results of the study indicate that interaction memory systems are important predictors of creative behavior in high-tech enterprise teams. Team leaders should effectively leverage the knowledge and skills of each member to collaborate and solve problems in order to enhance creative ability. Overall, this research has important implications for team management practices, emphasizing the significance of interaction memory systems, shared mind models, and team reflection in driving team creativity.

### 4.4. Conclusion

This study investigates the impact of team interaction memory systems on team creativity, as well as the moderating effect of team reflection, based on the theories of collective wisdom and team cognition in high-tech research and development teams. The empirical results verify all hypotheses. In the fiercely competitive market, enhancing creativity is key to achieving innovation-driven development. Therefore, teams aiming to improve their creative capabilities need to focus on enhancing their interaction memory systems and team reflection levels. This is crucial for ensuring the sustainable development of national high-tech enterprises, as it guarantees their vitality.

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