
| RESEARCH ARTICLE

Team Members' Value Heterogeneity and Innovation Performance: Research Based on Behavioral Science

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| ABSTRACT

In order to cope with the increasingly diverse and severe challenges, more and more enterprises adopt the strategy of building efficient and responsive teams to cope with the challenges, and the team gradually becomes the basic unit to carry out various social activities, including innovation, rather than individuals. From the perspective of implicit cognition of team heterogeneity, this study uses behavioral coding and analysis methods to integrate online innovation into the context of post-epidemic and Internet era to study the role of innovation behavior in the innovation process from a micro level. Based on the summary of previous research in the field of behavior observation, this paper proposes and improves the online team innovation experiment, and supplements and validates the coding scheme of "Analyzing Idea Finding Interactions (AIFI)". Furthermore, empirical research and experimental research are combined to analyze the relationship between team heterogeneity and innovation performance and the role of innovation behavior in the process of innovation. The results of the empirical study found that: value heterogeneity of online innovation team members negatively affects team innovation performance. idea facilitation behavior and idea inhibition behavior weaken the negative correlation between team members' value heterogeneity and team innovation performance; team spirit facilitation behavior and process organization behavior strengthen the relationship between team members' value heterogeneity and team innovation performance. Theoretically, this study deepens the research of the team innovation process and expands the research methods. In practice, it provides decision-making reference for innovation process control of enterprise innovation team.

| KEYWORDS

Team members' value heterogeneity; behavioral observation and coding analysis; team innovation performance

| ARTICLE INFORMATION

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1. Introduction

In order to cope with the increasingly diverse and severe market competition, more and more enterprises take the formation of efficient and fast-response teams as the main unit to meet the challenges of users' growing individual needs. The team has gradually surpassed the individual to become the basic unit for carrying out various social activities including innovation. Teams are often composed of employees with different backgrounds (Ma et al, 2020), Heterogeneity is the conceptualization of differences among individuals (Jackson et al, 2003). Among them, team members' value heterogeneity refers to the fact that members of a team have different views on the team's tasks, goals or missions (Jehn et al, 1999). Deep heterogeneity such as personality, attitude, and value heterogeneity can lead to conflict in team processes, impairing team performance and task processes (Niu et al, 2011). Therefore, understanding the mechanism of the influence of value heterogeneity on team innovation and how to weaken the negative impact of value heterogeneity on team innovation provides valuable theoretical and practical significance for the innovation practice of teams in enterprises.

Scholars have conducted research on team heterogeneity. Yang et al. (2020) found in their research that in the top management team, the heterogeneity of the social attributes of the top management team will affect the heterogeneity of the final enterprise in terms of business model innovation. The business model has an important impact on the analysis of enterprise performance. Zeng et al. (2022) found that when building an entrepreneurial team, the diversity and complementarity of knowledge, skills, and professional experience among members should be considered to maximize the heterogeneous human capital required for entrepreneurship. Zhang (2014) explored the heterogeneity of values by studying the internal relationship of team conflicts. Through the research, he found that the heterogeneity of values of entrepreneurial teams has a strong negative correlation with team cohesion, and team cohesion will affect the final result impact on business performance. To sum up, at present, many scholars pay attention to the impact of explicit differences within the team, and the difference in implicit cognitive perspective is also a key factor affecting team innovation, but the current research on this perspective has not been fully discussed.

Behavioral observation and coding analysis, as a new method to study team behavior, will play an important role in the study of innovative teams. In the 21st century, mathematical methods or approaches to examine team interaction processes and behavioral patterns on a dynamic level have been improved (Allen et al, 2018). Behavioral observation and coding analysis are emerging as quantitative methods for studying the interaction process within teams. Furthermore, unlike the empirical analysis and qualitative analysis employed in traditional innovation team research, behavioral observation and coding analysis can uniformly code continuous interaction behaviors (Brauner et al, 2018). Therefore, using the research methods of behavior observation and coding analysis, we can conduct a more detailed analysis of team innovation behavior. And explore the moderating role of innovation behavior in the innovation process.

To sum up, this paper mainly conducts research from the following aspects. First, from the perspective of members' implicit personal attributes, explore the mechanism of the influence of team members' value heterogeneity on the overall team innovation performance within the innovation team; secondly, through behavioral observation and coding analysis, the moderating effect of team members' micro-innovative behaviors on the relationship between team members' value heterogeneity and team innovation performance is deeply studied to explain how different behaviors of team members regulate the influence of team members' value heterogeneity on team innovation in the process of innovation; finally, it broadens new research perspectives in the field of innovation research and enriches the application of behavioral observation and coding analysis in innovation management research.

2. Theory and Hypotheses

2.1 Team members' value heterogeneity and team innovation performance

The existing research points of view are mainly two aspects. On the one hand, it is believed that the diverse viewpoints and opinions brought about by the heterogeneity of values will cause team members to argue about task goals, which will lead to an increase in task conflicts (Jehn et al, 1993). In addition, task conflict will reduce members' satisfaction and sense of identity with the organization, which will have a negative impact on the overall performance of the team (Jehn et al, 1997). On the other hand, some scholars have found that as the difference in values increases, the diversified cognition brought about by the heterogeneity of values can improve the quality of decision-making, thus having a positive impact on team performance (Milliken et al, 1996). Different angles of analysis of task goals can generate more ideas, thereby improving team innovation performance.

To sum up, based on the relationship between team members' value heterogeneity and team innovation performance, this paper believes that there is an inverted U-shaped relationship between team member value heterogeneity and team innovation performance. The team members' value heterogeneity can bring diverse views and viewpoints to the team during the innovation process, but excessively high value heterogeneity of team members will lead to increased conflicts. With a moderate level of heterogeneity in team members' value, the team can not only use the high quality of decision-making brought about by heterogeneity, but also avoid the decline of work attitude caused by conflict. Therefore, this paper puts forward the following hypotheses:

H1: There is an inverted U-shaped relationship between team members' value heterogeneity and team innovation performance in online innovation teams.

2.2 The role of innovation behavior in the relationship between team member value heterogeneity and team innovation performance in the innovation process

The process of team interaction refers to the conflicts, collaboration and concerns among team members (Susan et al, 1997). Some domestic scholars pointed out that the process of team interaction is a process in which the team processes information and makes decisions (Wu et al, 2012). At present, the concept of innovation is more recognized as the "three-stage theory" (Li et al, 2011). Its connotation is the suggestion stage, the generation of new ideas and the implementation stage. Suggestions and the generation of new ideas are the main stages of team innovation, and the implementation stage is more of an important criterion

from innovation to creation. Therefore, this paper defines the team innovation process as: the process of proposing suggestions and new ideas within the team to achieve the innovation goal.

In 2019, a relatively complete "analysis Idea Finding Interactions (AIFI)" was proposed regarding the innovation process of the team, and the effectiveness of its program was verified through the designed innovation experiments (Endrejat et al, 2019). AIFI divides team innovation interaction behaviors into "Idea Facilitation", "Team Spirit Facilitation", which indicates that the team is currently moving towards the direction of generating and developing ideas, "Process Organization", which neither promotes nor affects the development of ideas, and team members Deviating from "Idea Inhibition" and "Team Spirit Inhibition" in finding new creative directions.

Idea facilitation behavior includes the behavior of sharing and integrating knowledge required by the test members for innovative products. Studies have shown that in enterprises, team knowledge integration capabilities can often improve overall performance (Knippenberg, 2017). Team spirit facilitation behavior is the positive response of team members to other members in the process of team innovation. In a team, the more positive responses members get, the more members will increase their recognition and trust in the team. Previous studies have found that the improvement of team identity can positively affect team performance (Liao et al, 2021). Although process organization behavior is defined as the inability to influence the proposal of ideas and the implementation of ideas (Endrejat et al, 2019). However, it has been found in actual research that a sense of time urgency may be generated, which promotes the burst of ideas and the process of innovation, but it may also cause the team to rush to complete the task and rush to propose the final innovative solution (Zhao et al, 2014). Idea inhibition behaviors mostly occur when negating a certain idea or questioning a creative flaw. When the member who put forward the idea can't answer it well, the team's idea stagnates. The essence of team spirit inhibition behavior is the conflict among team members. Relationship conflict will affect team members' processing of work information, and there is a negative correlation between relationship conflict and team performance through this path (Zhao et al, 2022). Based on the above analysis of various behaviors, the following hypotheses are put forward.

H2a: Idea facilitation behavior has a positive moderating effect on the relationship between team member value heterogeneity and team innovation performance.

H2b: Team spirit facilitation behavior has a positive moderating effect on the relationship between team member value heterogeneity and team innovation performance.

H2c: Process organization behavior negatively moderates the relationship between team member value heterogeneity and team innovation performance.

H2d: Idea inhibition behavior negatively moderates the relationship between team member value heterogeneity and team innovation performance.

H2e: team spirit inhibition behavior negatively moderates the relationship between team member value heterogeneity and team innovation performance. Therefore, the theoretical model of this paper is shown in Figure 1.

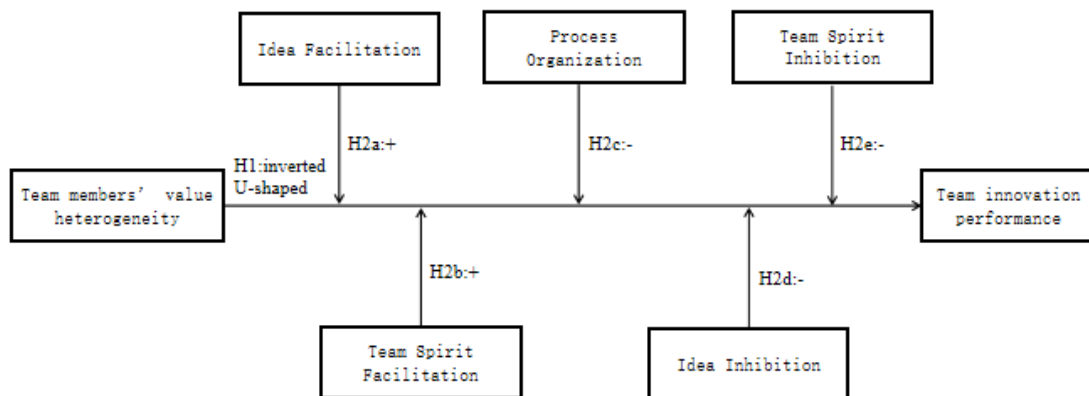


Figure 1 Theoretical model.

3. Research Methods

3.1 Experimental Design: Online Team Innovation Experiment

The subjects of the experimental research were undergraduate students. The subjects were required to conduct discussions according to the experimental requirements. They used the online meeting to record the internal discussion process of the team, and collected the team discussion process and innovative product results. Afterwards, conduct behavioral observation analysis and coding on the recorded video, and finally obtain the data required for the research based on the coding results, innovative products and questionnaire results.

A total of 2 college students' classes were arranged in the study. A total of 96 college students were tested, and 32 temporary teams were established in groups of 3 to participate in innovative experiments. Before the start of the online team innovation experiment, all experiment participants were clearly informed that the collected video data would strictly abide by privacy and confidentiality regulations, and would only be used for relevant academic research, and the consent of all participants had been obtained.

3.2 Online team innovation experiment

Scholars have proposed a "team innovation experiment paradigm"(Zhao et al, 2022). Based on this scheme, in order to explore the influence of online team innovation behavior, this research organizes each participant to conduct a pre-experiment in an independent space through an online meeting. And designed the relevant pre-experiment program. The experimental content of the program is: "Team members use 5 cylindrical materials with a diameter of 1 cm and a length of 50 cm: wooden rods, iron rods, plastic rods (only one can be selected), and use them when there is no Under the constraints, immediate availability of required tools, unlimited links or connection methods, conduct full discussions and exchanges, and build an 'innovative product' model within 20 minutes. The innovative product meets 'novelty', 'usefulness' and 'Achievability'. After 20 minutes or after the discussion and exchange, the team members upload the model diagram of the 'innovative product' and fill in the text description of product innovation." After that, a pre-experiment was conducted for an innovative experimental class at a university to verify the scheme feasibility.

The pre-experimental results show that the online team innovation pre-experimental scheme has been well verified, and there are differences in the behavior of the teams, and different teams can come up with different innovative schemes. But at the same time, it was also found that due to the small amount of materials available to each team, the final product type was less differentiated. And because there is no standardized guidance on time, the team's innovation process is not obvious in the final result. Therefore, the final design of the online team innovation experiment scheme is shown in Figure 2, and the research focus of this study is the team innovation process in the first 5 minutes.

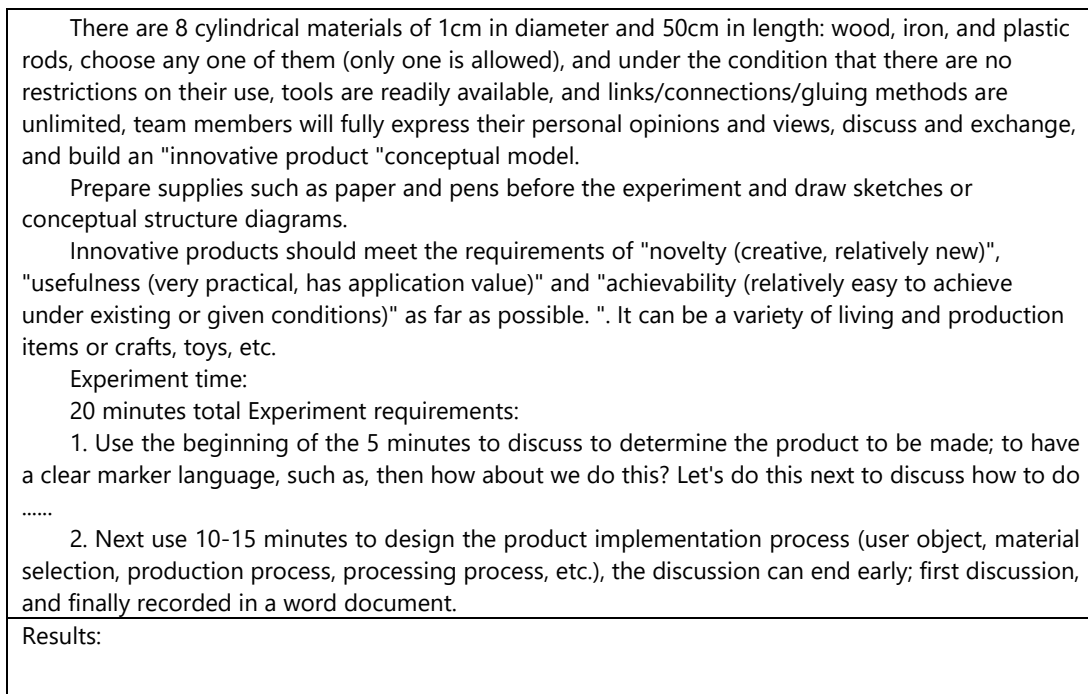


Figure 2

3.3 Coding and Analysis of Innovation Behavior

3.3.1 Coding Scheme

This study draws on the "Analyzing Idea Finding Interactions (AIFI)" coding scheme (ENdrejat et al, 2019). Although there is an essential difference between creativity and innovation, the interactive process of team innovation, including discussions on the feasibility of innovative products and the implementation of ideas, is still a process of interactive discussions on different ideas or viewpoints. AIFI divides "Idea Facilitation " into four secondary codes: "Idea Expression", "Idea Explanation", "Idea Development" and "Knowledge"; "Team Spirit Facilitationn" is divided into two types of secondary codes: "Support" and "Humor; "Neutral" is divided into three secondary codings: "Process Organization", "Simultaneous Talk" and "Others"; "Idea Inhibition" is divided into four types of secondary codes: "Blocking", "Loss in detail and repetition ", "Loss in detail and repetition" and "Silence"; "Team Spirit Inhibition" is divided into three secondary codings: "Relationship Conflict", "Complaining"

3.3.2 Encoding Scheme Improvements

The AIFI coding scheme classifies "others" as "neutral", but "others" is coded in various other coding schemes, and is usually used to record behaviors that cannot be generalized to existing coding schemes, so as to ensure that each behavior can be encoded, ensuring the comprehensiveness of the encoding scheme (Kou et al, 2018). And in order to make the coding scheme conform to the actual situation of this paper, the following improvements are made:

This article divides the behavior of "others" into the first-level coding and supplements it. In the offline team experiment, there will be some objective environmental factors that will affect the members of the subjects. For example, someone suddenly opened the door and entered the experimental space, or there was a loud construction sound, which affected the conversation of the subjects. These objective environmental influences cannot be ruled out in online experiments. such as: during the discussion process, someone enters the independent space of a subject and interrupts the subject's conversation or thinking. In addition to the influence of objective factors such as the original external environment in the coding scheme, there is also a special behavior only in online experiments, that is, "network lag". Due to network lag, other subjects could not hear the suggestions immediately, resulting in an increase in the number of repeated speeches for no reason. Therefore, "network lag" and "statements triggered by objective factors such as the environment" are divided into secondary coding under "Others" behaviors. In the offline experimental team, the behavior of "simultaneous talk" occurs more frequently, and it is unavoidable in the communication process. However, in the process of online team innovation experiments, the behavior of "simultaneous talk" rarely occurs. Therefore, when designing the coding scheme for online team innovation experiments, the secondary coding of "simultaneous talk" was removed. After excluding "simultaneous talk", only "process organization" was included in "neutral", so "process organization" was upgraded to the first level of coding and re-classified. According to the actual experimental process, it can be found that the subjects have three kinds of "process control" behaviors: "time Control", "read the task description", and "task inquiry behavior". The specific definitions of the codes of each innovative behavior in the coding scheme used in this study and the corresponding cases in this study are shown in Table 1.

Table 1. AIFI coding scheme and cases.

Category	Subcategory	Definition	Case
Idea Facilitation	Idea Expression	Come up with a new idea without further elaboration	"It can be a phone holder."
	Idea Explanation	Explain or describe an idea	"The kind of hanger that combines 2 hangers into 1, and the middle part is supported by a wooden stick."
		Display product model drawings	"Like this (show product picture), this style of phone holder."
	Idea Development	Suggestions for further development of existing ideas;	"Let's add a holder to the pen barrel to support the phone"
		Require an explanation of an idea;	"What kind of fitness equipment? "
Knowledge	Asking others for advice	"What do we do?"	
	Contribute knowledge in a specific area or refer to personal experiences	"Did you know about sundials?"	

Team Spirit Facilitation	Support	Expressing agreement or appreciation for an idea, member or process	"I think it's OK."
	Humor	Say something humorously, joke. or laugh	"Hahaha..."
	Time Control	Inquiries about the overall process of the experiment	"When did we start?"
Process Organization	Read the task description	Read the contents of the Team Innovation Experiment Instruction Manual	"Cylindrical material 1cm in diameter and 50cm in length..."
	Task inquiry behavior	Referring to the overall task or the related query	"Is the requirement to choose only one material?"
	Blocking	Disagree with other team members or express negative feelings	"The creative nature of this is not a bit insufficient."
Idea Inhibition	Loss in detail and repetition	Repeated explanations that do not provide new information	"Just this one, easy, how easy"
	Off-topic Conversation	Other statements that do not help advance the innovation mission or reflect a lack of interest	"Where are you now?"
	Silence	No one speaks for more than six seconds Sarcastic jokes that attempt to belittle other team members	Prolonged absence of speech or behavior
	Relationship Conflict		"This is a little too childish, right?"
Team Spirit Inhibition	Complaining	Disinterested or pessimistic, sighing trying to find a scapegoat trying to end the discussion as soon as possible	"That's it, time is almost up, let's do this"
Others	Statements triggered by objective factors such as the environment	Artificial Influence	The door of the room suddenly opens, a family member speaks
	Network lag	Incomplete speech due to network lag	"I...think...let's... make...a...."

3.3.3 Behavioral Observation and Coding

Referring to previous scholars' observation and coding work on innovative interactive behaviors (Endrejat et al, 2019), this paper uses two coders who have been trained in advance to carry out the coding work. Both coders are graduate students in the field of innovation management. In this study, the open-source BORIS software developed based on Python was used as the program used in behavior observation and coding.

In this study, the coders judged the behaviors of team members in the innovation process according to the improved AIFI coding scheme. For example, when member a in a certain team starts to make a speech of "how about we make a stool", mark the time point when the speech starts as "propose an idea". In this study, the innovation process mentioned in the experimental program is the first 5 minutes, that is, the time from receiving the task to proposing an idea.

Finally, it is also necessary to analyze the reliability of the coding results of the two coders. Three groups of videos with a total video duration of 15 minutes (about 10%) are randomly selected. After coder A finishes encoding, the behavior type is deleted and its time node is retained. Then another coder encodes the time point twice, and finally calculates the inter-rater reliability (IRR) between the two, and determines it by the Cohen's κ value output by BORIS (Zhao et al, 2019). The final Cohen's κ values were 0.971, 0.950 and 0.966, respectively, indicating a high consistency between the two encoders.

3.4 variable measure

(1) Dependent variable: team innovation performance.

In experimental research, the evaluation criteria of innovation are reflected in three aspects: "novelty", "usefulness" and "realizability". Innovative products need to reflect novelty and usefulness, and the designed innovative products should be realizable. These three aspects are used to evaluate the product innovation performance of online team innovation experiments. In experimental research, the expert evaluation method is usually used to evaluate the performance of the tested team (Zhao et al, 2019). In this research, 10 experts in the field of innovation evaluate the final innovative products of 32 test teams. 10 experts independently scored the innovative products of 32 teams, focusing on "novelty", "usefulness" and "realizability", and each feature scored a maximum of 10 points.

Due to certain contradictions among these features, for example, some teams focus more on the "realizability" attribute of the final product, and some of the "novelty" features are discarded. Therefore, the importance of the three needs to be weighed. To this end, this study further consulted experts in the field of innovation, and the experts evaluated the weight of the three characteristics according to the experimental requirements, content and results. Since the focus of this experiment is to analyze the behavior of the innovation team when they propose an innovative product, experts believe that the "novelty" attribute of the final product is the focus, and there is a clear focus on the "practicability" attribute of the product in the experimental design. Combined with the above logic, the weight given by experts to the three attributes of "novelty", "usefulness" and "realizability" is 0.5, 0.3, and 0.2 in sequence.

Finally, the average scores of the attributes of each team's innovative products were multiplied by the corresponding weights, and the sum was taken as the team innovation performance.

(2) Independent variable: team members' value heterogeneity.

Regarding the measurement of the team members' value heterogeneity, the existing research is relatively mature, among which Jehn's research is the most common (Jehn et al, 2003). When Zhang(2014) analyzed the team members' value heterogeneity entrepreneurial team members, he adopted a scale based on his development, with a total of 4 items. The scale adopts the form of Likert 5-point scale, 1 means totally disagree and 5 means completely agree. Since the item is to ask whether members have the same views on tasks and goals from the perspective of the team, the average value is used as the value heterogeneity of team members, and the final reverse scoring process is performed. The larger the value, the greater the value heterogeneity.

(3) Moderator variable: innovation behavior.

The team innovation behavior is divided into 6 first-level codes and 17 second-level codes. Finally, the innovative behavior of each online innovation team is judged according to the results of behavior observation and coding in 3.3.3. And according to the frequency of each type of behavior in each group, its relative frequency in the group is calculated, and the sum of the relative frequencies of the secondary codes belonging to a certain type of primary code is used as the relative frequency of the primary code. In order to ensure that innovative behavior is relatively effective, when analyzing the moderating effect of innovative behavior, this paper only uses behaviors that appear in more than half of the groups for analysis. Finally, four first-level coding behaviors were screened out. Idea facilitation behavior, team spirit facilitation behavior, process organization behavior and idea inhibition behavior were used as the final moderating variables.

4. Data Analysis and Results

4.1 Reliability and validity testing

The survey object of this study is the undergraduate students in University, and after the students have completed the online team innovation experiment, they will distribute the questionnaires to the students. Finally, 96 valid questionnaires were obtained. The reliability and validity of the team members' value heterogeneity in the questionnaire items were tested, among which the KMO value was 0.802 and the Cronbach's α coefficient was 0.971, both passed the reliability and validity test; For the qualitative questionnaire items, the factor loadings of the four items are all greater than 0.9, and the questionnaire data are all valid and available.

Table 2. Factor analysis results

Variables	Questions	Factor loading
Team members' value heterogeneity	The group's goals are aligned.	0.946
	Members have a strong belief in achieving mission goals.	0.938
	Team members have similar work attitudes and values.	0.959
	Team members have a common view of the importance of the task.	0.939

4.2 internal consistency check

The team innovation performance was evaluated twice, with an interval of 2 days. This is to prevent deviation due to the different order of evaluation. Therefore, the average of two ratings from the same expert is used as the expert's final rating of the same product attribute. The intragroup consistency results of the test scores use the Kendall-W coordination coefficient, $p < 0.05$, so the final expert scores are valid and available.

4.3 Descriptive Statistics and Correlation Analysis

According to Table 3 of descriptive statistics and correlation coefficients among variables, it can be seen that there is a significant correlation between the team members' value heterogeneity and team innovation performance, and the correlation coefficients among all variables are less than 0.7. Therefore, the data in this paper are suitable for further regression model testing

Table 3. Descriptive statistics

	MEAN	SD	1	2	3	4	5
1	1.80	0.59	1				
3	47.49	13.03	0.018	1			
4	19.23	9.26	0.111	-0.205	1		
5	15.40	8.66	-0.282	-0.431*	0.024	1	
6	12.80	6.44	-0.191	0.029	0.057	-0.040	1

Note: 1-Team members' value heterogeneity, 2-Creativity enhancing behaviors, 3-Team spirit promoting behaviors, 4-Process controlling behaviors, 5-Creativity inhibiting behaviors, respectively;** for $p < 0.01$, * for $p < 0.05$;

4.4 Hypothetical test

Through the analysis of the relationship between team members' value heterogeneitys and team innovation performance, and the moderating effect of different innovative behaviors between team members' value heterogeneity and the team innovation performance of the team, the final results are shown in Table 4 and Table 5. Table 4 shows the regression results of the relationship between team members' value heterogeneity of the independent variable and the team innovation performance of the dependent variable team. The results show that the first-order correlation coefficient between team members' value heterogeneity and team innovation performance in an innovation team is $\beta = -0.350$. Significant at the 0.1% level, the quadratic correlation coefficient between team members' value heterogeneity and team innovation performance in an innovation team is $\beta = 0.046$, which is not significant. It shows that team members' value heterogeneity in the innovation team has a significant negative impact on the team innovation performance, and there is no inverted U-shaped relationship. H1 is not supported.

Table 4. Results of hierarchical regression analysis (main effects).

	Regression coefficient	95% CI	VIF
Constant	5.370***	5.277 ~ 5.464	-
Team members' value heterogeneity	-0.350***	-0.428 ~ -0.272	1.275
Team members' value heterogeneity ²	0.046	-0.021 ~ 0.113	1.275
N		32	
R ²		0.765	
AdjR ²		0.749	
F		F(2,29)=47.216,p=0.000	

Dependent variable : team innovation performance
D-W : 2.032

Note: * for $p < 0.05$, ** for $p < 0.01$, *** for $p < 0.001$

Table 5 shows the regression results of the moderating effect of innovation behavior (Idea facilitation behavior, team spirit facilitation behavior, process organization behavior and idea inhibition behavior) on the relationship between independent variable team members' value heterogeneity and dependent variable team innovation performance. The results of Model 1 and Model 4 show that idea facilitation behavior and idea inhibition behavior have a negative regulatory effect on the relationship between team members' value heterogeneity and team innovation performance ($\beta=0.131$, $p < 0.01$; $\beta=0.080$, $p < 0.05$). Therefore, H2a has not been verified, but H2d has been verified; the results of Model 2 and Model 3 show that team spirit facilitation behavior and process organization behavior have a positive moderating effect on the relationship between team members' value heterogeneity and team innovation performance ($\beta=-0.085$, $p < 0.01$; $\beta=-0.096$, $p < 0.01$). Therefore, H2b is not verified and H2c is not verified. In order to verify the validity of the results, multicollinearity was subsequently verified. The results show that the VIF values among the variables in the model are all less than 10, so there is no multicollinearity problem in this regression model.

Table 5. Results of hierarchical regression analysis (moderating effect).

	Model 1	Model 2	Model 3	Model 4
Team members' value heterogeneity	-0.315***	-0.321***	-0.359***	-0.314***
Idea Facilitation	-0.013			
Team members' value heterogeneity×Idea Facilitation	0.131**			
Team members' value heterogeneity		-0.039		
Team members' value heterogeneity×Team Spirit Facilitation		-0.085**		
Process Organization			-0.021	
Team members' value heterogeneity×Process Organization			-0.096**	
Idea Inhibition				0.047

Team members' value heterogeneity×Idea Inhibition				0.080*
R^2	0.837	0.812	0.807	0.789
F	47.777, $p=0.000$	45.567, $p=0.000$	39.071, $p=0.000$	34.904, $p=0.000$
Adj R^2	0.087	0.042	0.050	0.034

Note:* for $p < 0.05$, ** for $p < 0.01$, *** for $p < 0.001$

In order to verify the specific moderating effects of various behaviors, the corresponding moderating effect diagrams were drawn. It can be seen from Figure 3 that under the adjustment of high idea facilitation behavior, the negative correlation curve between team members' value heterogeneity and team innovation performance becomes smoother, This shows that the idea facilitation behavior weakens its negative impact in the negative impact path of team members' information heterogeneity on team innovation performance.

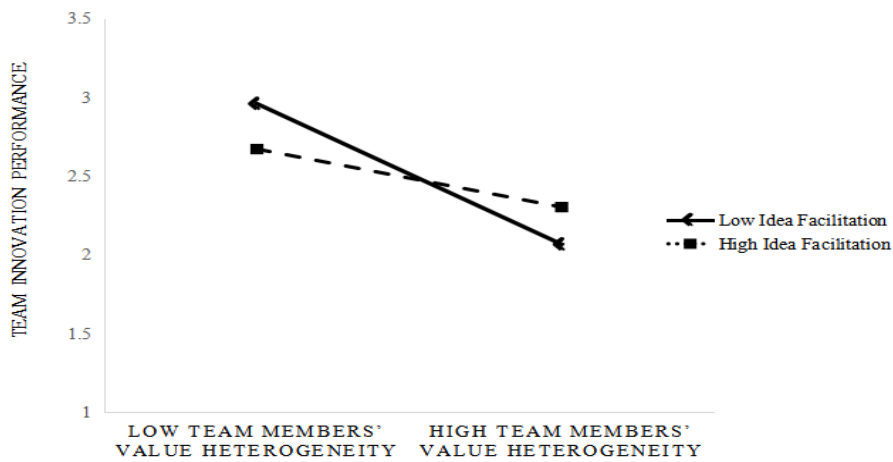


FIGURE 3. The moderating effect of idea facilitation on the relationship between team members' value heterogeneity and team innovation performance.

It can be seen from Figure 4 that under the adjustment of high team spirit facilitation behavior, the negative correlation curve between team members' value heterogeneity and team innovation performance becomes steeper, This shows that the team spirit facilitation behavior strength its negative impact in the negative impact path of team members' information heterogeneity on team innovation performance.

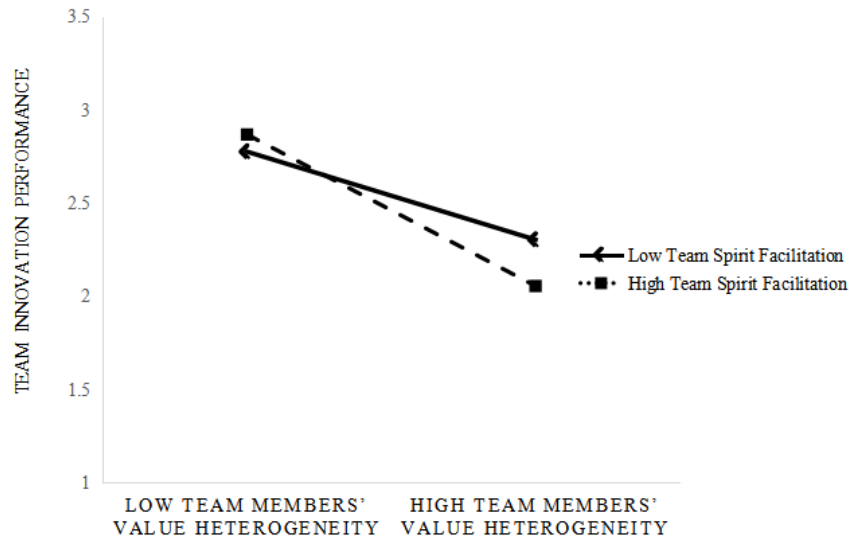


FIGURE 4. The moderating effect of team spirit facilitation on the relationship between team members' value heterogeneity and team innovation performance.

It can be seen from Figure 5 that under the adjustment of high process organization behavior, the negative correlation curve between team members' value heterogeneity and team innovation performance becomes steeper, This shows that the process organization behavior strength its negative impact in the negative impact path of team members' information heterogeneity on team innovation performance.

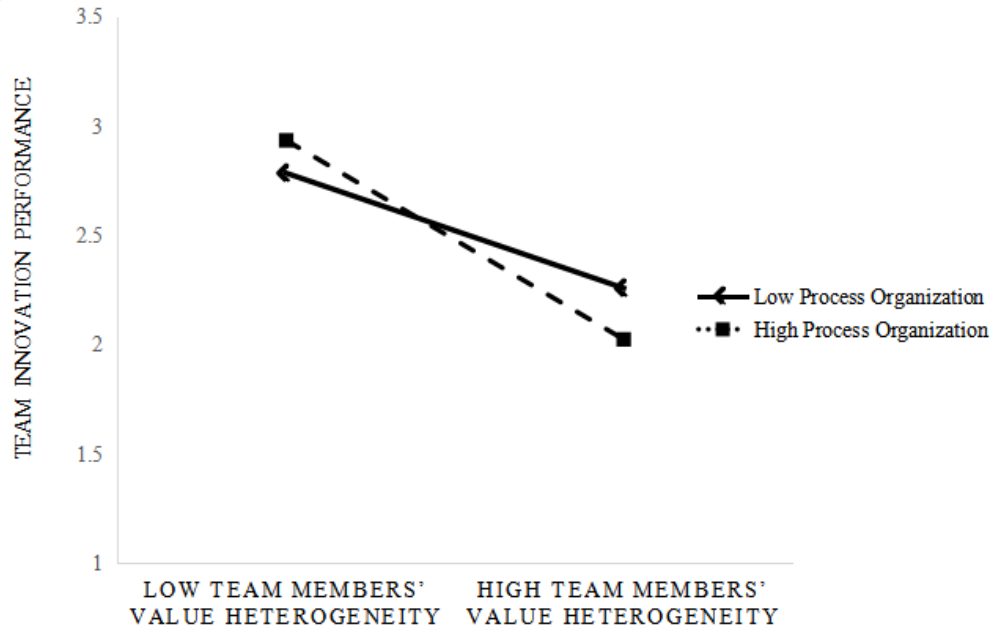


FIGURE 5. The moderating effect of process organization on the relationship between team members' value heterogeneity and team innovation performance.

It can be seen from Figure 6 that under the adjustment of high idea inhibition behavior, the negative correlation curve between team members' value heterogeneity and team innovation performance becomes smoother, This shows that the idea inhibition behavior weakens its negative impact in the negative impact path of team members' information heterogeneity on team innovation performance.

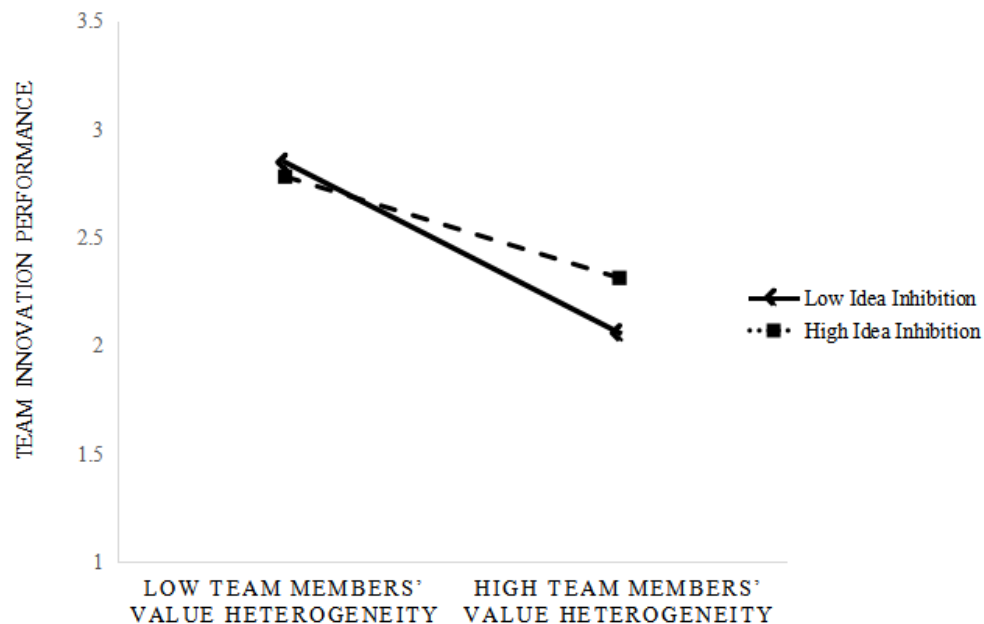


FIGURE 6. The moderating effect of idea inhibition on the relationship between team members' value heterogeneity and team innovation performance.

Between team members' value heterogeneity and team innovation performance, the greater team members' value heterogeneity, the smaller team innovation performance of the team's final innovative works; idea facilitation behavior weakens the negative correlation between team members' value heterogeneity and team innovation performance; team spirit facilitation behavior

strengthens the negative correlation between team members' value heterogeneity and team innovation performance; process organization behavior strengthens the relationship between team members' value heterogeneity and team innovation performance; idea inhibition behavior weakens the negative correlation between team members' value heterogeneity and team innovation performance. The research conclusion model is shown in Figure 7.

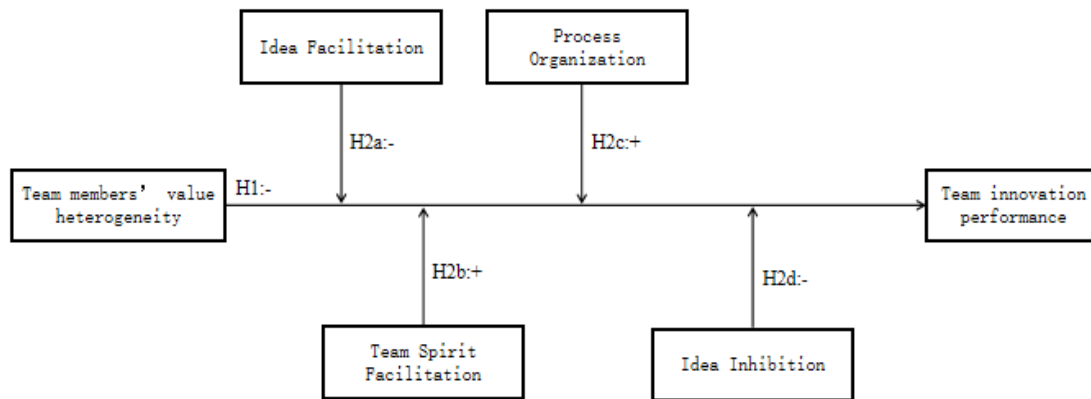


图7

5. Research findings and outlook

5.1 Research findings

This paper focuses on the issue of how multicultural innovation teams can use team heterogeneity to enhance team innovation performance in the online innovation process. Based on the perspective of implicit personal attributes and dynamic process, this paper studies the moderating effect of innovation behavior on the relationship between team members' value heterogeneity and team innovation performance, and draws the following conclusions:

(1) In online multicultural innovation teams, team members' value heterogeneity has a negative effect on the innovation performance of the team. This is somewhat different from the perception of heterogeneity in most previous studies, where heterogeneity attributes can be used to increase innovation performance when team heterogeneity is at a moderate level. However, in an online innovation team, the interaction between team members is built upon the organization publishing a task for the team and the team exploring the task. Therefore, the stronger the belief of the online innovation team to achieve the same innovation goal, the higher the consistency of the team members to achieve the final goal, and the team members' dedication to the innovation process will ultimately improve the team innovation performance.

(2) In online multicultural innovation teams, idea facilitation behaviors weakened the negative relationship between team members' value heterogeneity and innovation performance. Team members' value heterogeneity indicates that there is ambiguity among members regarding task goals. The idea facilitation behaviors of idea explanation, idea development, and knowledge behavior can help team members unify and refine their ideas. In this process, the interactive communication among members will reduce the team members' value heterogeneity and eventually weaken the negative effect of team members' value heterogeneity on team innovation performance. Idea inhibition behavior weakens the negative relationship between team members' value heterogeneity and team innovation performance. Idea inhibition type of behavior includes blocking behavior, certain members may put forward the opposite view to the existing idea, and in the process of solving such problems in the innovation team, they can make better refinement and improvement of the idea, form better ideas, and finally improve the team innovation performance.

(3) In online multicultural innovation teams, team spirit facilitation behaviors reinforce the negative relationship between team members' value heterogeneity and team innovation performance. Team spirit facilitation behaviors can create a positive, supportive, and fun working atmosphere for the team, but such behaviors, do not enhance the consistency of task goals. Moreover, in a good atmosphere, team members may not be able to provide counterproductive suggestions, reducing the generation of new ideas, inhibiting the team from refining or optimizing the final idea, and reducing the possibility of broadening the range of ideas. This ultimately inhibits the generation of better ideas and thus reduces team innovation performance. Process organization behavior reinforces the negative relationship between team members' value heterogeneity and team innovation performance. The nature of process organization behavior, belongs to the discussion of task content, and appropriate task discussion can help team members understand. However, due to the ambiguity in the understanding of the task goals among team members, there is a possibility that the discussion of the task may go off-topic. For example, a member's understanding of the task is accurate, but after communication with the members, the task goal becomes ambiguous, which will inhibit the ultimate innovation performance.

5.2 Research Contribution

(1) Most previous studies have focused on the impact of team member heterogeneity on performance under the explicit perspective of team members. By introducing the implicit variable of team members' value heterogeneity, this paper investigates the relationship between innovation team members' value heterogeneity and team innovation performance from the implicit cognitive perspective and analyzes under what circumstances team members' value heterogeneity helps to improve team innovation performance, which enriches the research on the implicit perspective of individual team members.

(2) From the perspective of behavioral science, this paper introduces innovation behaviors as moderating variables to further explore the mechanism of the influence of different behaviors of team members on team innovation in the process of idea generation from a microscopic perspective. The research on the innovation process is enriched by further exploring the moderating effects of different innovation behaviors. The study reveals the role of team innovation behaviors in the team innovation process. And the feasibility of introducing behavioral science theory in team research is explored. Through behavioral science theory, the dynamic process of innovation can be explored more intuitively and the internal mechanism in the innovation process can be analyzed.

(3) The article adopts behavioral science coding analysis method, which not only provides new research ideas for innovation team process research, but also broadens the research field of behavioral science coding analysis method. The research on team innovation is well known at this stage, but its research dimension is often through static questionnaires to analyze the dynamic innovation process. This paper expands the research methodology in the field of innovation teams by combining the behavioral science coding analysis method with the empirical research method. The research in this paper also complements and refines the coding scheme of innovative behavior and lays a certain foundation for the subsequent research.

5.3 Management Implications

The findings of this study can provide decision-making references for the adjustment of corporate innovation decisions and the control of the innovation process of corporate innovation teams.

(1) When constructing teams, enterprises need to pay attention to the existence of heterogeneity of values among team members. In order to reduce the value heterogeneity among team members, the following management recommendations are proposed. First, the company should provide uniform training to the team at the early stage of team building to reduce the team members' value heterogeneity. Second, when assigning tasks to the team, the company should make it clear that the team members have a unified understanding of the objectives of the task. Within the team in the innovation process, only clear goals can effectively reduce team members' value heterogeneity. The more consistent team members' perceptions of the group's task, goals or mission, the more positive impact it will have on the final performance. Conversely, team members' value heterogeneity will hinder the overall innovation process and ultimately affect the team's innovation performance.

(2) Both positive and negative reactions of team members in the innovation process unfolding in the team need to be taken into account. Agreement, disagreement and conflict behaviors exist objectively in the process of innovation, and there are differences in teams with different levels of value heterogeneity. Therefore, companies or team managers need to strengthen team innovation capacity by providing appropriate behavioral guidance or team restructuring and other measures for different innovation teams.

(3) When team leaders organize or guide the process of online innovation activities, the team leaders themselves need to have a clear perception of the overall innovation goals. Through our research, we found that members' process control behavior is a process of identifying tasks and goals, and when team members have the same perception of the overall task, it can effectively improve the overall innovation performance. Therefore, it is especially important for innovation teams to have a clear task goal when it comes to innovation activities.

5.4 Limitations and Prospects

This paper investigates the mechanism of the influence of team members' value heterogeneity on team innovation performance through the method of behavioral science coding analysis. The main limitations are as follows: this study finally obtained the experimental data conducted by 32 temporary online innovation teams composed of students and may not accurately reflect the real situations in corporate life due to the differences between experimental limitations and real situations. The data needs to be expanded for further validation at a later stage. This study explored the online context and lacked comparison with the offline context, and future experiments could be conducted both online and offline to achieve scenario comparison.

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