

Modeling team learning and team performance: The moderating effects of authoritarian leadership and benevolent leadership

建構團隊學習和團隊績效：權威領導和仁慈領導的調節效果

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Abstract: Drawing upon the social learning theory and knowledge-based theory, this research proposes a model that illustrates how collective knowledge is coordinated to improve team performance. In the model the study hypothesizes that three learning approaches (exploitative learning, explorative learning, and reflective learning) influence team performance indirectly through the mediation of knowledge coordination. At the same time, it hypothesizes that authoritarian leadership and benevolent leadership moderate the effects of the learning approaches on knowledge coordination. We perform empirical tests based on survey data from work teams in a large high-tech industry zone in northern Taiwan and offer research implications and future research directions.

Keywords: Exploitative learning, explorative learning, reflective learning, knowledge coordination, leadership, team performance.

摘要：鑒於社會學習理論和知識基礎理論之觀點，本研究提出一個模型，該模型顯示了團隊如何通過一起協調知識來提升團隊績效。本研究提出以下三種學習方法：開發性學習、探索性學習和反思性學習，並通過知識協調的中

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介作用進而影響團隊績效。同時，本研究假設權威領導和仁慈領導會調節學習方法對知識協調的影響。針對臺灣北部大型高科技園區公司的工作團隊進行調查來驗證模型和假說，最後提出管理意涵並給予未來研究的建議。

關鍵詞：開發性學習、探索性學習、反思性學習、知識協調、領導、團隊績效

1. Introduction

With the rise of knowledge-intensive competition in the modern business world, knowledge coordination that represents important endeavors to facilitate team performance has become critical for work teams (Cooke *et al.*, 2003; Reagans *et al.*, 2016). Knowledge coordination denotes the act of compiling and integrating team workers' different knowledge to ensure proper collective processes and efforts for teamwork. When dealing with complex problems, team workers can make good use of exchanging, sharing, and modifying one another's knowledge to coordinately tackle various problems (Kozlowski and Bell, 2013), suggesting the substantial influence of knowledge coordination on team performance (Tsai, 2002). As more and more work teams focus on innovation-oriented projects, knowledge coordination based on interdisciplinary knowledge and cross-function integration (i.e., multiple sources of knowledge) is needed to achieve team performance. With better knowledge coordination, teams are more likely to apply diverse knowledge to accomplish collective goals, consequently leading to better team performance (Chou *et al.*, 2016; Kanawattanachai and Yoo, 2007).

Knowledge coordination counts heavily on team learning, which represents the cognitive compilation of team workers to facilitate the continuous process of shared reflection and action (Gabelica *et al.*, 2016). Team learning refers to the process that facilitates collective knowledge through gaining diverse experiences, novel information, and expertise (Chen *et al.*, 2017; Huang *et al.*, 2015; Van der Vegt and Bunderson, 2005). Research has discussed the influence of team learning

on knowledge coordination (Edmondson, 1999; Espinosa *et al.*, 2007). Specifically, team learning inspires team workers to search for unknown issues, absorb novel ideas, polish professional skills, and generate useful alternatives. As a result, the management of knowledge interdependencies within the team (i.e., knowledge coordination) is effectively achieved by team learning, consequently improving team performance.

Despite the importance of team learning, the literature has relatively understudied whether there exist different kinds of team learning and how they influence knowledge coordination, leading to the first research gap to be filled by this study. Studies have examined team learning from two simultaneous approaches: exploitative learning through a team familiarizing itself with current knowledge and explorative learning through a team applying new methods to tackle tasks (Kostopoulos and Bozionelos, 2011; Matsuo, 2018; Schippers *et al.*, 2015; Schippers *et al.*, 2018). This study proposes reflective learning as a third approach that forms an important learning cycle of inquiry for a team. Specifically, reflective learning complements exploitative learning and explorative learning by making useful meaning or finding alternative solutions for troubling situations or questions (Huang and Mativo, 2015; Konradt *et al.*, 2016; Somech, 2006). Collectively, understanding how these three learning approaches influence knowledge coordination and team performance provides useful implications for teams to achieve their goals.

The second gap in the literature to be filled by this study relates to how potential moderators may intervene the influence of team learning. Drawing upon the social learning theory, this study proposes leadership as a key moderator influencing the process of team learning (Brown and Treviño, 2014). According to this theory (Bandura and Jeffrey, 1973), team workers' learning is likely affected by observing and learning the behavior of their leader. Different leadership styles substantially facilitate or hamper specific approaches of team learning. Other works have called for further research on authoritarian leadership and benevolent leadership (e.g., Chou, 2012; Shaw *et al.*, 2020; Xia *et al.*, 2021), because they both reveal the double-edged nature of control or care in the development of team

learning (Chen *et al.*, 2018; Retna and Jones, 2013). For that reason, this study justifies the moderating roles of authoritarian leadership and benevolent leadership in the development of three team learning approaches.

To sum up, the purpose of this research is to examine how knowledge coordination and team learning drive team performance by simultaneously verifying the potential moderation of authoritarian leadership and benevolent leadership. Without examining different team learning approaches and leadership styles in depth, our understanding of leadership influences is likely limited. Moreover, any learning initiatives taken by team workers to enhance knowledge coordination and team performance will be unjustifiable based on misconceptions and blind faith.

2. Research model and hypotheses

This paper proposes a model (see Figure 1) to explain the formation of team performance from the perspective of team learning. In the model, three types of team learning (i.e., exploitative learning, explorative learning, and reflective learning) influence team performance via the mediation of knowledge coordination. The effects of team learning on knowledge coordination are moderated by authoritarian leadership and benevolent leadership. The knowledge based theory explains the mediating role of knowledge coordination (Grant, 1996), indicating knowledge as one of the most valuable resources for the team (Nickerson and Zenger, 2004). Coordinating different types of knowledge or expertise helps smooth the working process and improve team performance (Rico *et al.*, 2008).

Studies have applied knowledge coordination concepts to surgical teams, consultant teams, software development teams, and top management teams (Edmondson, 2003; Strode, *et al.*, 2012). Knowledge coordination is an effective way for team members to synchronize knowledge or skills (Wittenbaum *et al.*, 2002). Knowledge coordination depicts joint efforts by team members to effectively make the best use of collective intelligence (Espinosa *et al.*, 2004), because it reflects the process in which the team organizes knowledge exchanging

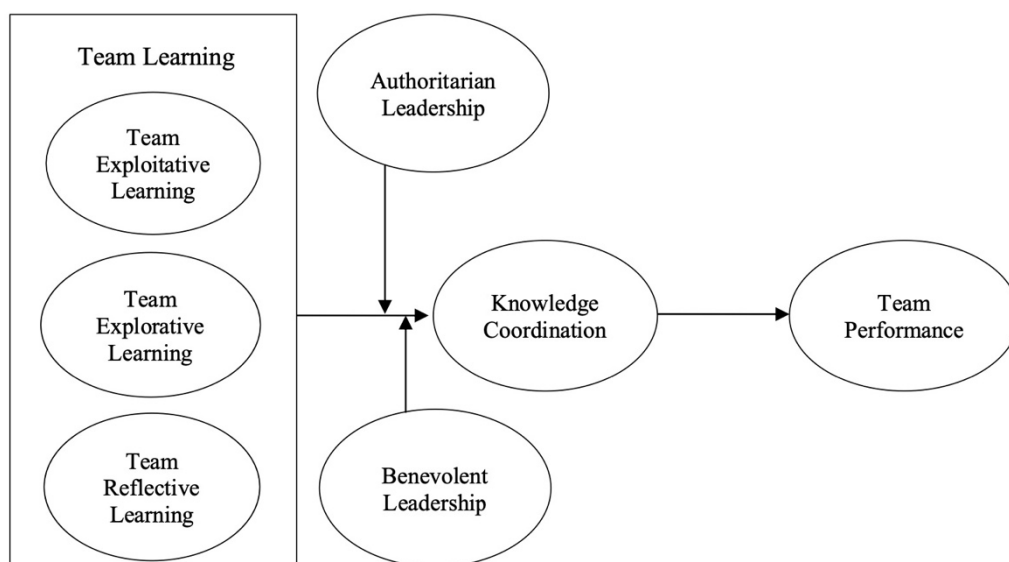


Figure 1
Research framework

and sharing (Fiore *et al.*, 2010). A team with good knowledge coordination smooths this process and eventually completes tasks efficiently (Bachrach *et al.*, 2019; Wang *et al.*, 2018). Accordingly, this study proposes its first hypothesis.

H1: Knowledge coordination positively relates to team performance.

Exploitative learning refers to the learning approach that encourages employees to make good use of and refine their current knowledge for better applications (Benner and Tushman, 2003), consequently facilitating knowledge coordination. In other words, exploitative learning motivates team members to learn from each other through a deliberate coordination that renders the team as a whole more successful than its members acting separately. As a result, exploitative learning that refines existing knowledge and skills speeds up knowledge coordination for ultimately achieving team performance (Kostopoulos and Bozionelos, 2011). All in all, we hypothesize the influence of team exploitative learning below.

H2a: Team exploitative learning positively relates to team performance via

the mediation of knowledge coordination.

Explorative learning refers to the learning approach that motivates team workers to search for new methods to cope with new challenges (March, 1991). Seeking novel methods means going beyond knowledge coordination that is merely bounded to the current team wisdom. In fact, explorative learning takes a much longer time than a general time interval for a team to learn new ways that are not familiar to them (Kostopoulos and Bozionelos, 2011) by thinking out of the box (Kim *et al.*, 2012) instead of counting heavily on the coordination of members' current knowledge. In other words, explorative learning requires a team to absorb abundant information for learning new skills and knowledge outside the team, consequently reducing knowledge coordination. To sum up, despite its possible benefits for a team in the long run, explorative learning that increases the breadth of knowledge helps reduce the extent of knowledge coordination bounded within the team (Edmondson, 1999), thus negatively influencing team performance in general time intervals. Thus, we hypothesize the effect of explorative learning on team performance below.

H2b: Team explorative learning negatively relates to team performance via the mediation of knowledge coordination.

Team reflective learning is a cognitive approach that involves the refinement of information by eliminating irrelevant or redundant elements. This process prompts team members to bridge the gap between their current state and desired outcomes (West, 1996). Teams that employ the reflective learning approach enhance collaboration by gaining a clear understanding of each other's expertise and skills, ultimately leading to the synergistic integration of knowledge (Gabelica *et al.*, 2016). This approach not only improves work outcomes by encouraging reflection on goals, plans, and actions, but also fosters a higher quality of knowledge sharing and exchange (Oertel and Antoni, 2014; Schippers *et al.*, 2013; Somech, 2006; Van Der Vegt and Bunderson, 2005).

The process of reflective learning involves the correction of mistakes by evaluating one's misbehavior, inappropriate methods, and suboptimal collaboration among team members. This self-correction mechanism serves as a

positive driver for knowledge coordination (Oertel and Antoni, 2014). In essence, the reflective learning approach contributes to refining, categorizing, and integrating various types of knowledge and skills, thereby enhancing the efficiency of work processes, collaboration, and knowledge storage. Based on the aforementioned rationale, this study proposes the following hypothesis.

H2c: Team reflective learning positively relates to team performance via the mediation of knowledge coordination.

Authoritarian leaders are known for their emphasis on clear directives and unwavering obedience from subordinates (Farh and Cheng, 2000). This style of leadership is instrumental in enhancing team efficiency as it establishes a structured environment where everyone operates within well-defined rules and instructions (Chen *et al.*, 2014). For instance, leaders with an authoritarian leadership style exert significant pressure on team members to excel in their current skills. This leadership approach serves as a catalyst, compelling members to consolidate and internalize their existing knowledge. In such teams, learning experiences often require a high degree of rigor and adherence to standards (Palmer *et al.*, 2009). Essentially, the leader's strong authority ensures that subordinates execute tasks with precision and accuracy (Zhao *et al.*, 2022). Consequently, the team operates with a heightened sense of efficiency, viewing this type of leadership as a potent driving force. Therefore, we propose that this leadership style has a positive moderating effect on team performance.

H3a: Authoritarian leadership positively moderates the relationship between team exploitative learning and knowledge coordination.

Explorative learning encourages team members to adopt open-minded approaches and explore new methods for tackling complex problems (March, 1991; McGrath, 2001). However, the trial-and-error nature of this process can consume valuable time and resources (Choo *et al.*, 2007). Explorative learning is fundamentally aimed at generating innovative methods or products that enhance a firm's profitability. However, the uncertainty and resource costs associated with this learning strategy may not always yield favorable team outcomes (Li *et al.*, 2011).

While leaders with authoritarian leadership styles are often critiqued for their strict control and authority, there are instances where this leadership style can be beneficial (Wang and Guan, 2018). When team members allocate excessive time and resources to specific projects, authoritarian leadership can serve as a catalyst or apply a certain level of pressure, prompting the team to seek creative solutions within limited time constraints. In such scenarios, authoritarian leadership may mitigate the potential negative impact of team explorative learning on team knowledge coordination. Therefore, we propose that this leadership style has a negative moderating effect.

H3b: Authoritarian leadership negatively moderates the relationship between team explorative learning and knowledge coordination.

Team reflective learning is an effective approach that encourages team members to critically review their actions and decisions (West, 2000). This process, marked by meticulous scrutiny and evaluation, enables members to enhance their skills and integrate their prior learning, ultimately contributing to superior team outcomes (Nonaka, 1994; West and Sacramento 2012; Widmer *et al.*, 2009).

Authoritarian leadership can act as a catalyst in this process of review and self-assessment. Given its strong influence, authoritarian leadership compels team members to adhere closely to the leader's directives (Zhang *et al.*, 2021). Consequently, team members consistently allocate a dedicated portion of their time to the implementation of reflective learning. This approach becomes ingrained in the team's standard operating procedure, fostering a culture where each member habitually engages in reflection and collaborative interaction, thereby enhancing the quality of knowledge coordination. As such, the presence of authoritarian leadership indeed facilitates the positive relationship between team reflective learning and knowledge coordination. Hence, we propose a positive moderating effect.

H3c: Authoritarian leadership positively moderates the relationship between team reflective learning and knowledge coordination.

Proficiency in existing skills and knowledge, known as exploitative learning, plays a crucial role in fostering team knowledge coordination. However, when a

leader employs a benevolent leadership style, characterized by a high degree of care and a reduction of psychological distance between themselves and team members, an unintended consequence may arise (Farh and Cheng, 2000).

Under benevolent leadership, team members often experience a strong sense of support and care from their leaders, leading to increased reliance on leaders during both personal and professional challenges (Pellegrini and Scandura, 2008). In such an environment, there may be less incentive for team members to actively engage in the ongoing improvement of their existing skills through the exploitative learning approach (Knapp, 2010). Consequently, benevolent leadership can weaken the previous positive relationship between exploitative learning and knowledge coordination. Thus, we propose a negative moderating effect.

H4a: Benevolent leadership negatively moderates the relationship between team exploitative learning and knowledge coordination.

Studies have consistently shown when team members perceive support from their leaders that their creativity tends to flourish (Gong *et al.*, 2009; Oldham and Cummings, 1996; Scott and Bruce, 1994; Shin and Zhou, 2003; Tierney and Farmer, 2002; Tierney *et al.*, 1999). However, the pursuit of more creative solutions often involves prolonged cycles of trial and error, which can potentially hinder effective team coordination (Li *et al.*, 2011). Under the guidance of benevolent leadership, the enhanced psychological safety and trust within the team may encourage members to explore new approaches with increased confidence. Consequently, benevolent leadership reinforces the negative relationship between explorative learning and knowledge coordination.

H4b: Benevolent leadership positively moderates the relationship between team explorative learning and knowledge coordination.

The reflective learning approach encourages team members to pause temporarily and engage in a thoughtful examination of their current and anticipated goals. By comparing and refining their actions, this approach facilitates the coordination of knowledge within the team (Kolb, 1984; Nonaka, 1994; Schippers *et al.*, 2013). Furthermore, when the team embraces a reflective approach, the collective experiences of the entire team can be transformed into

valuable knowledge assets (Decuyper *et al.*, 2010; Kolb, 1984).

A benevolent leadership style contributes to the establishment of trust and psychological safety among team members and their leader (Shen *et al.*, 2023). This atmosphere of shared understanding enhances the effectiveness of the reflective process. As benevolent leadership becomes more pronounced, team members are empowered to generate higher-quality knowledge, ultimately enriching the team's knowledge coordination efforts.

H4c: Benevolent leadership positively moderates the relationship between team reflective learning and knowledge coordination.

3. Methodology and statistical results

3.1 Subjects and procedures

The research hypotheses outlined above underwent empirical testing through a survey conducted within a prominent high-tech industry zone in Taiwan. The survey participants were drawn from a pool of professionals working in high-tech firms. This population was chosen due to its significance as one of the largest groups frequently tasked with complex assignments. To ensure the integrity and reliability of the survey data, it was administered anonymously to full-time working professionals. For a detailed overview of the sample's characteristics, please refer to Table 1. Table 2 presents the means, standard deviations, and correlations of the study variables.

Each participating team is composed of four members and one designated leader. To ensure confidentiality and separation of responses, the survey questionnaires were distributed in large envelopes, each containing two smaller envelopes: one for team members and the other for the team leader. After completing the questionnaire and sealing it in the respective small envelopes, participants from the same team (i.e., four team members and one team leader) were instructed to collectively place their sealed small envelopes into a large envelope, which was then sealed.

Table 1
Characteristics of the team members

Characteristics	N = 384	
<i>Gender</i>		
Male	181	47%
Female	203	53%
<i>Marriage Status</i>		
Single	140	36%
Married	244	64%
<i>Tenure</i>		
≤ 1 year	13	3%
2-4 years	38	10%
5-7 years	45	12%
8-10 years	68	18%
> 10 years	220	57%
<i>Ratio of Senior Members (Tenure > 10 years)</i>		
0%-20%	85	22%
21%-40%	77	20%
41%-60%	104	27%
61%-80%	80	21%
81%-100%	38	10%

Out of the 120 sets of team questionnaires collected from the subjects (comprising 440 questionnaires for team members and 110 questionnaires for their supervisors), 96 sets of team questionnaires were deemed usable for analysis. The final dataset consists of responses from a total of 384 team members and 96 leaders. Demographically, 40.67% of the participants identify as male, 70.11% attained at least a college education, and their ages range from 19 to 69 years (Mean = 36 years old, SD = 9.09).

To mitigate the potential influence of common method variance (CMV), this study employs three strategies. First, we include social desirability as a control variable to mitigate social desirability bias. Second, our focus on the moderating

Table 2
Means, standard deviations, and intercorrelations among variables

	Mean	SD	1	2	3	4	5	6	7
1. Exploitative Learning	3.91	0.40	1						
2. Explorative Learning	3.55	0.87	-.033	1					
3. Reflective Learning	3.53	0.85	0.01	0.87**	1				
4. Knowledge Coordination	4.11	0.60	0.19	-.023*	-0.10	1			
5. Team Performance	4.27	0.58	0.28**	-.030**	-0.19	0.57**	1		
6. Benevolent Leadership	3.49	0.91	0.05	0.82**	0.80**	-.014	-.028**	1	
7. Authoritarian Leadership	2.95	0.72	0.01	0.34**	0.32**	-0.02	-.002	0.11	1

variables (interaction effects) of authoritarian leadership and benevolent leadership is less susceptible to CMV, aligning with other research (Chang *et al.*, 2010; Chen and Lin, 2014). Third, we take data from leaders for the dependent variable (team performance) and the mediator (knowledge coordination), while members reported on other variables (e.g., team learning, authoritarian leadership, benevolent leadership). This approach, drawing data from distinct sources, helps guard against CMV (Kilduff and Krackhardt, 1994). In summary, this study follows established practices from the literature to address CMV concerns, such as incorporating social desirability controls, emphasizing moderating roles, sourcing data from different perspectives, and employing high-quality measurement scales (Helm and Conrad, 2015; Podsakoff *et al.*, 2003).

3.2 Measures

Before conducting our main survey, we executed a pilot test involving 60 employees to ensure clarity and comprehensibility of each survey item. These 60 employees are not included in the final survey data. All items in our study are

assessed using a five-point Likert-type scale, with responses ranging from 1 (strongly disagree) to 5 (strongly agree). The measurement scales used herein are adapted and refined from the literature.

We employ established measurement scales to assess key variables in our study. Team exploitative learning is evaluated using a slightly modified version of Kostopoulos and Bozionelos' (2011) scale, and some exemplary items are: "Our team members primarily perform routine activities." "Our team members mostly implement standardized methodologies." Team explorative learning is measured through a five-item scale adapted from the work of Kostopoulos and Bozionelos (2011). Some exemplary items are: "Our team members frequently search for new solutions to deal with team tasks." "Our team members favor new ideas to teamwork problems." For team reflective learning, we utilize a three-item scale with modifications from Oertel and Antoni's (2014) reflective team learning scale. Some exemplary items are: "Our team members often undergo self-evaluation if our actions have brought in what we expected." "Our team members periodically evaluate the results of our teamwork." To assess team knowledge coordination, we employ a three-item scale developed by Kanawattanachai and Yoo (2007). Some exemplary items are: "Our team members coordinate professional knowledge to carefully interrelate actions to each other." "Our team members integrate their knowledge to carefully make their decisions." Team performance is appraised using a four-item scale derived from Tsai *et al.*'s (2016) team performance scale. Some exemplary items are: "Our team is very competent in doing jobs." "Our team gets its work done very effectively." We evaluate leadership styles, like authoritarian leadership, which is assessed using a modified scale adapted from Chen *et al.*'s (2014) authoritarian leadership scale. Some exemplary items are: "Our team's supervisor asks us to obey his/her instructions completely." "Our team's supervisor always has the last decision in the meeting." The scale for benevolent leadership is also adapted from Chen *et al.* (2014). Some exemplary items are: "Our team's supervisor is like a family member when he/she gets along with us." "Our team's supervisor devotes all his/her energy to taking care of our team members."

3.3 Measurement model testing

The hypotheses are tested using a two-stage analysis approach. In the first stage, we conduct a measurement model test employing confirmatory factor analysis (CFA). This step is crucial to assess the convergent and discriminant validity of the survey data, following the guidelines proposed by Anderson and Gerbing (1988). Subsequently, in the second stage, this study employs hierarchical moderated regression analyses to examine the hypothesized relationships within the study.

Table 3 presents the results of the measurement model assessment. To evaluate the fit of the hypothesized model, we examine goodness-of-fit indices, which yield favorable results (PGFI=0.60; CFI=0.92; PNFI=0.74; RMSEA=0.08). These indices collectively indicate that the measurement model aligns well with the survey data and is consistent with established research standards (Chen and Lin, 2014; Tsai *et al.*, 2014).

Convergent validity is assessed following the guidelines outlined by Fornell and Larcker (1981). All factor loadings in our study are statistically significant, with the average variance extracted (AVE) for each factor exceeding 0.50. Furthermore, the reliability coefficients for each construct exceed the threshold of 0.70 (as shown in Table 4), confirming the data's satisfactory convergent validity. To evaluate discriminant validity, we conduct chi-square difference tests while controlling for the experiment-wise error rate at an overall significance level of 0.01 (Chen and Lin, 2013). The results in Table 3 demonstrate that all chi-square difference statistics in our study exceed the critical values, providing strong support for the discriminant validity of our variables.

3.4 Structural model testing

We transform the measurement model into a structural model, aligning it with the hypothesized model paths for statistical testing. To account for potential influences on team performance, we include control variables such as gender, marital status, tenure, ratio of senior members, and individual social desirability.

Table 3
Team standardized loadings and reliabilities

Construct	Indicator	Standardized loading	AVE	Cronbach's α
Knowledge Coordination	KC1	0.74 (t = 13.55)	0.70	0.86
	KC2	0.86 (t = 22.19)		
	KC3	0.90 (t = 25.77)		
Team Performance	TP1	0.88 (t = 29.06)	0.73	0.92
	TP2	0.85 (t = 24.36)		
	TP3	0.87 (t = 26.67)		
	TP4	0.82 (t = 20.65)		
Team Exploitative Learning	Exploi1	0.68 (t = 10.11)	0.63	0.83
	Exploi2	0.81 (t = 14.78)		
	Exploi3	0.87 (t = 17.21)		
Team Explorative Learning	Explor1	0.98 (t = 176.6)	0.92	0.98
	Explor2	0.95 (t = 81.05)		
	Explor3	0.94 (t = 74.42)		
	Explor4	0.96 (t = 105.2)		
	Explor5	0.97 (t = 137.7)		
Team Reflective Learning	RL1	0.96 (t = 93.78)	0.92	0.97
	RL2	0.96 (t = 86.19)		
	RL3	0.96 (t = 90.85)		
Authoritarian Leadership	AL1	0.88 (t = 31.62)	0.71	0.92
	AL2	0.85 (t = 25.79)		
	AL3	0.93 (t = 47.12)		
	AL4	0.81 (t = 21.07)		
	AL5	0.72 (t = 13.40)		
Benevolent Leadership	BL1	0.92 (t = 59.34)	0.91	0.99
	BL2	0.97 (t = 145.5)		
	BL3	0.98 (t = 174.3)		
	BL4	0.97 (t = 132.6)		
	BL5	0.95 (t = 94.65)		
	BL6	0.94 (t = 78.17)		
	BL7	0.97 (t = 133.2)		
	BL8	0.93 (t = 63.24)		

Note: Goodness-of-fit indices (N =96): $\chi^2=756.95$ (p-value < 0.001); PGFI=0.60; CFI=0.92; PNFI=0.74; RMSEA=0.08.

To evaluate the fit of the hypothesized model, we examine goodness-of-fit indices, which yield favorable results (PGFI=0.59; CFI=0.93; PNFI=0.72; RMSEA=0.08). These indices collectively indicate that the measurement model aligns well with

Table 4
Team-level chi-square difference tests

Construct pair	$\chi^2_{96} = 756.95$ (unconstrained model)	
	χ^2_{97} (constrained model)	χ^2 difference
(F1, F2)	861.54	104.59***
(F1, F3)	863.69	106.74***
(F1, F4)	863.82	106.87***
(F1, F5)	854.62	97.67***
(F1, F6)	864.67	107.72***
(F1, F7)	864.24	107.29***
(F2, F3)	905.81	148.86***
(F2, F4)	904.00	147.05***
(F2, F5)	841.33	84.38***
(F2, F6)	903.33	146.38***
(F2, F7)	904.56	147.61***
(F3, F4)	1168.76	411.81***
(F3, F5)	1024.59	267.64***
(F3, F6)	1048.59	291.64***
(F3, F7)	889.78	132.83***
(F4, F5)	1024.69	267.74***
(F4, F6)	1071.55	314.60***
(F4, F7)	954.72	197.77***
(F5, F6)	1019.44	262.49***
(F5, F7)	1157.96	401.01***
(F6, F7)	1091.71	334.76***

Notes: *** Significance at the 0.001 level by using the Bonferroni method. Legend: F1 = Team exploitative learning; F2 = Knowledge coordination; F3 = Team explorative learning; F4 = Benevolence leadership; F5 = Team performance; F6 = Authoritarian leadership; F7 = Reflective learning.

the survey data. However, it is worth noting that our analysis does not support the positive indirect effect of team exploitative learning on team performance via the mediation of knowledge coordination. Figure 2 illustrates the empirical results of our statistical analysis, confirming the validation of three hypothesized model paths within this study.

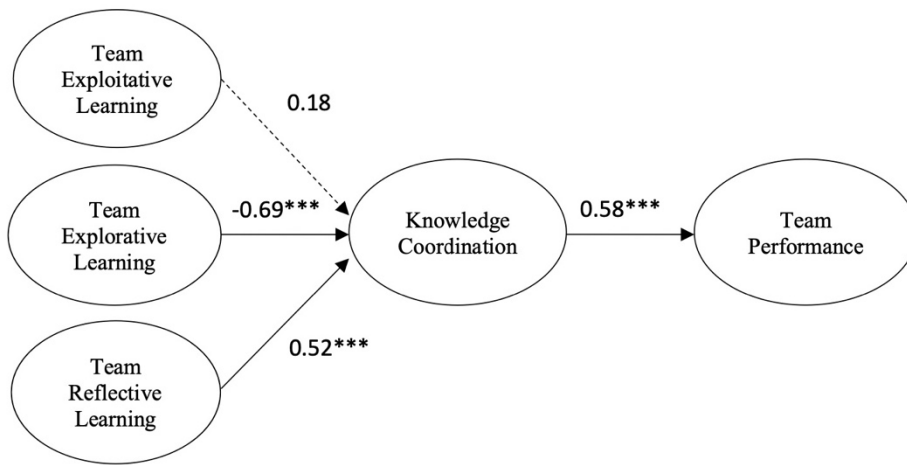


Figure 2
Test results of path analysis

4. Results

This study conducts hierarchical moderated regression analyses to assess both the mediation of knowledge coordination and the moderation effects of authoritarian leadership and benevolent leadership. Table 5 summarizes the test outcomes. Model 1 introduces knowledge coordination as an explanatory factor for team performance. The results indicate a significantly positive relationship between knowledge coordination and team performance ($\beta = 0.51$, $p < 0.01$), thus supporting H1.

Model 2 collectively evaluates knowledge coordination along with team exploitative learning, team explorative learning, and team reflective learning as predictors of team performance. The findings suggest that the influences of team explorative learning and team reflective learning on team performance are not statistically significant, implying that these factors may not directly impact team performance. However, the relationship between team exploitative learning and team performance is significant. H2a is thus not supported.

Table 5
Team-level hierarchical regression analysis

	Model 1 Team Performance	Model 2 Team Performance	Model 3 Knowledge Coordination	Model 4 Knowledge Coordination	Model 5 Knowledge Coordination
Control variables:					
Gender	0.11	0.12	0.15	0.18	0.10
Marriage status	-0.13	-0.13	-0.10	-0.04	-0.04
Tenure	-0.01	-0.01	0.01	0.01	0.01
Ratio of senior members	0.04	0.03	0.01	0.03	0.04
Social desirability	0.02	-0.09	0.23	0.21	0.22
Antecedents:					
Exploi		0.27*	0.16	0.22	0.12
Explor		-0.18	-0.34**	-0.42**	-0.64*
Reflective		0.08	0.26*	0.28*	0.19*
Mediator:					
Knowledge coordination	0.51***	0.46***			
Moderator & interaction terms:					
AL				0.04	
BL				0.02	
Exploi x AL					-0.06
Explor x AL					-0.57**
Reflective x AL					0.68**
Exploi x BL					-0.30**
Explor x BL					0.29**
Reflective x BL					0.04
Adj R ²	0.32	0.35	0.12	0.17	0.18

In Model 3 the analysis reveals that team explorative learning exhibits a negative association with knowledge coordination ($\beta = -0.34, p < 0.05$), while team reflective learning displays a positive relationship with knowledge coordination ($\beta = 0.26, p < 0.1$). These findings support H2b and H2c, respectively.

To investigate the moderation effects of authoritarian leadership and benevolent leadership, we introduce the relevant interaction terms into Model 4. In this model the interaction between team explorative learning and authoritarian leadership yields a statistically significant negative coefficient ($\beta = -0.53, p < 0.05$), indicating the presence of a negative moderating effect of authoritarian leadership on the relationship between team explorative learning and knowledge coordination. Thus, H3b is supported.

The interaction between team reflective learning and authoritarian leadership likewise shows a statistically significant positive coefficient ($\beta = 0.66, p < 0.05$), signifying a positive moderating effect of authoritarian leadership on the relationship between team reflective learning and knowledge coordination. Thus, H3c is supported. Furthermore, the interaction between team exploitative learning and benevolent leadership results in a statistically significant negative coefficient ($\beta = -0.27, p < 0.05$), thus supporting H4a. Similarly, the interaction between team explorative learning and benevolent leadership exhibits a statistically significant positive coefficient ($\beta = 0.27, p < 0.05$), thus supporting H4b.

To further validate the mediation role of knowledge coordination, we conduct bootstrapping analysis as recommended by other research (MacKinnon *et al.*, 2004). We opt for bootstrapping due to its lack of assumptions regarding the normal distribution, which is a requirement of the Sobel test (Edwards and Lambert, 2007).

As Table 6 outlines, the results obtained through bias-corrected bootstrapping procedures indicate a statistically significant negative indirect relationship between team explorative learning and team performance through knowledge coordination (point estimate = -0.08 , 95% CI $[-0.147, -0.021]$). Additionally, the findings reveal a significantly positive indirect relationship between team reflective learning and team performance through knowledge coordination (point

Table 6
Mediation test results using bootstrapping with 5,000 subsamples

Indirect effect	Point estimate	SE	95%CI _L	95%CI _U
F1→F2→F5	0.147	0.087	-0.006	0.341
F3→F2→F5	-0.080	0.033	-0.147	-0.021
F7→F2→F5	0.039	0.042	0.012	0.053

Note: Legend: F1 = Team exploitative learning; F2 = Knowledge coordination; F3 = Team explorative learning; F5 = Team performance; F7 = Reflective learning CI = Confidence interval (bias-corrected and accelerated).

estimate = 0.039, 95% CI [0.012, 0.053]). Given that the bias-corrected confidence intervals do not encompass zero, we can confidently assert that our hypothesized mediation effects involving knowledge coordination are substantiated, thus confirming the validity of the indirect effects. Table 6 summarizes our hypotheses' results.

To address potential common method bias, this study employs the ULMC methodology proposed by Williams *et al.* (1989). The findings reveal the potential existence of CMV, as indicated by significant differences in the Chi-square fit statistics between Model 1 and Model 2 (shown in Table 7). However, the significant differences observed between Model 2 and Model 3 suggest that common method biases are not the likely cause (Williams *et al.*, 1996). Consequently, we conclude that the empirical results of this study are not substantially influenced by common method bias.

4.1 Academic implications

This paper presents three crucial findings. First, our research establishes a theoretical foundation for understanding the impact of team learning approaches on team performance. We highlight that each team learning approach exerts distinct influences on team performance. A significant contribution of our study is recognizing the adverse effects associated with excessive explorative learning on team performance. Our findings challenge the conventional assumption that

Table 7
Results of the unmeasured latent method construct

Model	χ^2 difference	Critical value
(Model 1, Model 2)	167.32***	$\Delta\chi^2(33) = 47.40$
(Model 2, Model 3)	35.57	$\Delta\chi^2(53) = 70.99$

Notes: Model 1 is the trait model (the base CFA model in the preceding analysis). Model 2 is the method model (with the unmeasured latent method construct). Model 3 is the restricted CFA model of ULMC (trait correlations and trait factor loading are fixed with the values obtained from the base model).

Table 8
Test results of hypotheses

Hypothesis	Result
H1: Team knowledge coordination positively relates to team performance.	Supported
H2a: Team exploitative learning positively relates to team performance via the mediation of team knowledge coordination.	Not Supported
H2b: Team explorative learning negatively relates to team performance via the mediation of team knowledge coordination.	Supported
H2c: Team reflective learning positively relates to team performance via the mediation of team knowledge coordination.	Supported
H3a: Authoritarian leadership positively moderates the relationship between team exploitative learning and team knowledge coordination.	Not Supported
H3b: Authoritarian leadership negatively moderates the relationship between team exploratory learning and team knowledge coordination.	Supported
H3c: Authoritarian leadership positively moderates the relationship between team reflective learning and team knowledge coordination.	Supported
H4a: Benevolent leadership negatively moderates the relationship between team exploitative learning and team knowledge coordination.	Supported
H4b: Benevolent leadership positively moderates the relationship between team exploratory learning and team knowledge coordination.	Supported
H4c: Benevolent leadership positively moderates the relationship between team reflective learning and team knowledge coordination.	Not Supported

increasing knowledge through explorative learning invariably enhances team

performance (Du *et al.*, 2022). Indeed, our research underscores that an overemphasis on constantly seeking new approaches can potentially hinder team performance. This discovery aligns with the notion that an optimal balance of learning activities is pivotal for achieving optimal team performance (Soosay and Hyland, 2008).

Second, this study integrates two well-established theories (social learning theory and knowledge-based theory) to construct the theoretical framework underpinning our research. The social learning theory emphasizes the pivotal position of role models in shaping teams' learning approaches and processes, providing a solid rationale for the integration of leadership as a key moderator in our study. According to this theory, individuals learn through the observation of actions and experiences of influential figures, particularly leaders, by influencing their behaviors, beliefs, and attitudes significantly. The essence of the social learning theory lies in observational learning, where individuals acquire new behaviors by observing others and understanding the consequences of those behaviors. Acknowledging the critical significance of leadership and social learning in augmenting team performance, our research investigates the intricate interplay between these factors. Specifically, our study employs knowledge coordination as a theoretical lens and is able to identify knowledge as a critical predictor of team performance. The application of the knowledge-based theory not only enhances our comprehension of team dynamics, but also offers valuable insights for researchers aiming to harness knowledge as a strategic asset in workplace contexts. This theory posits that the firm concentrates on the role of knowledge, information, and intellectual assets in shaping an organization's competitive advantage and performance. Emphasizing knowledge as a critical resource, this theory underscores its substantial contribution to a firm's success and sustainability. Furthermore, organizations that embrace the knowledge-based theory often aspire to evolve into learning organizations. Such entities foster continuous learning and adaptation, creating an environment where employees are empowered to coordinate knowledge. In summary, our research amalgamates insights from two prominent theories and exemplifies how knowledge

coordination and team learning can be employed to elucidate the factors influencing team performance. Through this approach, we contribute to a richer understanding of the complex interrelationships at play within teams.

Third, within the context of Chinese society, there has been extensive discourse on two distinct leadership styles (Koo and Park, 2018). Nevertheless, their moderating impacts on team learning have remained largely unexplored or ambiguously defined. This study seeks to fill this gap by conducting a comprehensive examination of their differential moderating effects on team learning. Authoritarian leadership is found to exert a positive moderating influence on the relationship between reflective learning and knowledge coordination. Conversely, it serves as a negative moderator in the context of the relationship between explorative learning and knowledge coordination. Benevolent leadership emerges as a positive moderator in the relationship between explorative learning and knowledge coordination, but conversely plays a negative moderating role in the relationship between exploitative learning and knowledge coordination. Therefore, this study offers valuable insights into the specific moderating effects of these two leadership styles within the realm of team learning, shedding light on how authoritarian and benevolent leadership styles uniquely influence the dynamics of knowledge coordination.

In summary, this study addresses a significant gap in the literature by introducing three distinct team learning approaches while also considering the critical influence of two leadership styles on team learning dynamics. Furthermore, it integrates essential principles from knowledge-based theory and social learning theory in order to provide a comprehensive framework for understanding these complex interactions.

4.2 Managerial implications

This study offers three valuable managerial insights for practitioners and managers. First, it stresses the importance of reflective learning as a means to cultivate high-quality knowledge and subsequently enhance team performance. Team leaders can play a pivotal role by facilitating reflective processes that help

teams discern what is necessary and what is not. This strategic guidance can significantly contribute to overall team performance improvement.

Second, when implementing an explorative learning approach, team managers must exercise vigilance to prevent excessive allocation of time and resources. While innovation and risk-taking projects are crucial for future performance enhancement, a balanced approach is essential. Incorporating the contrasting impacts of both negative moderating effects associated with authoritarian leadership and positive moderating effects attributed to it, effective leadership should diligently oversee the optimal utilization of resources in alignment with strategic objectives.

Third, the adoption of a team exploitative learning approach can directly benefit team performance. Arising from the negative moderating effect of benevolent leadership, leaders should exercise caution in cultivating excessively close relationships with team members, as an overly familiar bond may inadvertently undermine their positive impact. In such scenarios, team members may grow less concerned about avoiding mistakes. In essence, managers should be adaptable in their approach, tailoring learning strategies to specific contexts and aligning leadership styles to maximize the effectiveness of learning initiatives.

4.3 Future direction and research limitations

This study exhibits two limitations. First, despite our data being drawn from two distinct sources, the cross-sectional nature of our investigation imposes limitations on establishing causal relationships between the research factors. To address this limitation, future research endeavors may benefit from the collection of longitudinal data to rigorously examine and validate causal relationships encountered in this study.

Second, the generalizability of our findings to broader business applications may be constrained. Our study primarily focuses on a select group of firms within Taiwan's technology industry. Consequently, the inferences derived from our dataset may not readily apply to work teams operating in diverse industries such as traditional sectors, agriculture, or banking. Moreover, the application of our

findings in regions with substantially different national cultures should be approached with caution.

In summary, future research efforts could complement this study by employing longitudinal data collection methods, extending investigations to encompass work teams across varied industries and global regions, exploring hitherto unexamined variables, or conducting field experiments. These approaches can strengthen causal inferences and enrich our understanding of the factors influencing team dynamics and performance.

Appendix A. Inter-rater reliability

Construct	ICC ₂	rwg
Team exploitative learning	0.27	0.89
Team explorative learning	0.27	0.91
Benevolent leadership	0.25	0.92
Authoritarian leadership	0.34	0.90
Reflective learning	0.26	0.91

Note: The rwg values above are all larger than the recommended level of 0.70 (James *et al.*, 1984).

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