

The study on the impact of team learning on project performance in a shared leadership environment

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Abstracts

Shared leadership is an emerging and effective team leadership style. When the engineering project manager adopts the shared leadership style, the team learning of the engineering project management team is strengthened. Based on the shared leadership theory, this paper explores the impact mechanism of team learning on project performance. According to the team performance IPO theory, the relationship model between team learning, team identification and project performance is constructed. Through a questionnaire survey of 311 leaders and members of the project management team, the model was tested by using the hierarchical regression analysis method. The empirical results show that when engineering project managers adopt shared leadership, team learning and project performance are significantly positively correlated; team identity plays a partial mediating role between team learning and project performance.

Keywords: The Study on the Impact of Team Learning; Project Performance; Leadership Environment

Introduction

Since the outbreak of COVID-19, the conventional business model and industrial chain of construction engineering has suffered a huge impact(Jinquan, 2022). New situations such as declining investment, abnormal supply of building materials, sharp fluctuations in building materials prices and labor costs, and restrictions on personnel movement continue to emerge, resulting in adverse consequences such as delays in progress, quality decline, cost increases, and project performance is difficult to meet expectations. There are even extreme situations such as shutdown of production and work, unfinished engineering projects, and social problems. These problems are plaguing many construction companies. In order to survive and thrive, construction companies are more than ever eager to achieve engineering project performance. How to improve the performance of engineering projects in a changing environment has become a common concern of both the practical world and engineering management theory researchers. Among them, team learning can help the engineering project management team quickly adapt to the complex and changeable external environment, improve the ability of the team and members, and generate innovative methods to deal with challenges, and its relationship with engineering project performance has attracted much attention(Yunhong et al., 2022 : 1972-1979). However, there is still a lack of research results on the team process through which "team learning" affects "project performance" in engineering project management teams. Therefore, this study is based on the theoretical perspective of shared leadership. First, it explores whether team learning of engineering project management team can positively affect project performance; The second is to verify

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whether team identity plays a mediating role between team learning and project performance. So as to provide theoretical reference and management suggestions for project managers to improve project performance.

Theoretical basis and research assumptions

1. Team learning and engineering project performance

The engineering project management team is a typical high goal-oriented team, which needs to deliver the finished building products that meet the quality standards within the specified time, and control the cost during the management process to make the project profit meet the organization's expectations. Therefore, some scholars define engineering project performance: the project team managed by the project manager of the construction enterprise completes the construction work of the project within the specified construction period and cost budget, and delivers the final construction product according to the quality standard specified by the owner (Li, 2019 : online). For the measurement of engineering project performance, scholars have established a classic single-dimensional scale around the "iron triangle" (quality, schedule, and cost) of engineering project management (Derek, 1995 : 263-274; Liberatore et al., 2013 : 518-528). Since different stakeholders of engineering projects will have different perspectives and value propositions, etc. believe that the measurement of project performance needs to further consider the perspectives of participating stakeholders (Akintoye et al., 2000 : 159-168; Atkinson, 1999 : 337-342). Currently, the measurement of project performance not only includes quality, schedule and cost, but also focuses on factors such as whether the building function meets the requirements and whether the stakeholders are satisfied

Team learning can help improve engineering project performance. The concept of team learning is proposed by him, who believes that team learning can promote team members to cooperate with each other and improve each other's abilities, so as to achieve common goals Shared leadership, as an effective team leadership style, encourages team learning. When the engineering project management team adopts a shared leadership style, in the face of major problems in project construction, collective discussion and joint decision-making are used to formulate coping strategies. The engineering project management team is composed of highly heterogeneous members. Team members with different majors, skills and project experience put forward opinions from different professional perspectives, and after collective discussions, they jointly make team decisions. The work process is actually a process of knowledge sharing, dissemination and learning among team members. Through team learning, the professional knowledge of team members can be complemented, the experience of dealing with problems is exchanged, and incremental knowledge for solving problems is created, which improves the effectiveness of team decision-making, reduces the loss caused by problems, and has a positive impact on project performance. positive influence. It is reasonable to speculate that in a team environment where engineering project managers adopt a shared leadership style, team learning can help improve engineering project performance. This paper makes the following assumptions:

H1: Team learning has a significant positive impact on engineering project performance

2.2 The mediating role of team identification

Group identity is an important psychological variable of team members in team activities, including cognitive identity (social classification), emotional identity (interpersonal attraction) and behavioral identity (interdependence) .In a shared leadership scenario, since the leadership roles and subordinate roles can be rotated among different team members at any

time, the degree of interaction between members is high . When engineering project managers adopt a shared leadership style, shared goals and high levels of interaction facilitate maintaining a high level of team learning. High-frequency team learning, on the one hand, helps to enhance the understanding and trust between team members, strengthens each other's emotional identity, and helps members see themselves as "members of the big team" and strengthens cognitive identity On the other hand, it helps team members to accurately understand the team's goals and decisions, accept the team's norms and management, make consistent actions, and strengthen behavioral identity. Therefore, it is reasonable to speculate that in a shared leadership environment, team learning has an important impact on team identity. This paper proposes Hypothesis 2:

H2: Team learning has a significant positive impact on team identity

Based on the identity theory, we believe that when members of the engineering project management team regard themselves as members of the team, establish a strong emotional connection with the team, and internalize the goals of project construction into personal goals, in order to complete the team's common tasks, they are more likely to Willing to share knowledge and experience, help each other, unite and cooperate, and then help to improve the performance of engineering projects. Existing studies have shown that team identity helps to improve work efficiency and can improve team performance .This paper proposes Hypothesis 3:

H3: Team identity has a significant positive impact on project performance

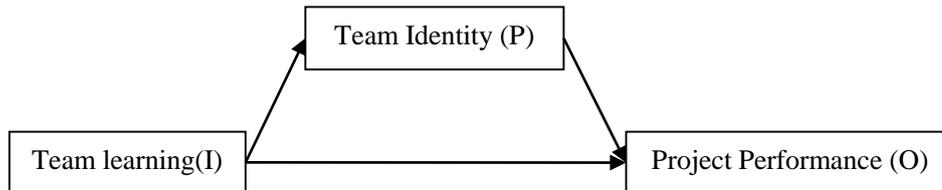
On the one hand, team learning positively affects team identity and project performance, and on the other hand, team identity improves project performance. However, there are various team paths for the impact mechanism of team learning on team performance, and the degree of impact will vary due to the heterogeneity of team members and different tasks. The heterogeneity of engineering project management team members is very obvious, and their tasks are different from management teams or innovation teams in other industries. We have reason to believe that the path or extent of team learning in engineering project management teams affects their team performance has its industry characteristics. . Existing research results have shown that team learning itself will differ to some extent due to different team leadership styles. Team performance is also affected by team leadership style (Ensley et al., 2006). Therefore, this paper focuses on the team process through which team learning affects remote engineering project performance in a shared leadership team environment.

At present, under the background of Chinese culture, the research results of team learning affecting the performance of engineering projects in the field of construction engineering management are relatively lacking, and the theoretical system is not perfect. Since engineering project performance is a kind of team output of engineering project management team, this paper constructs a theoretical model between variables with reference to the classic team performance IPO (input-process-output) model (Mcgrath & Holt, 1964 : 7). With the help of the mature analysis framework of team performance IPO, team learning is taken as input variable (I), team identity is taken as team process (P), and engineering project performance is taken as output variable (O), a theoretical model of these three variables is constructed. For empirical testing, this paper proposes the following hypotheses:

H4: Team identity plays a mediating role between team learning and project performance. Therefore, the theoretical model of this paper is shown in Figure 1.

Figure 1: Theoretical model of team learning on project performance

Study Design



1. Data collection

The data of this research comes from the team leaders and team members of the engineering project management teams of a number of Chinese construction enterprises. Questionnaires were distributed through a combination of online and offline methods, and a total of 396 questionnaires were recovered. After eliminating the missing items and answering the same answer for all the invalid questionnaires, 311 valid questionnaires were finally obtained.

2. Variable Measurement

The variable measurement tools involved in this study are all from mature scales, with Likert five-point form as the answer option. Team learning adopts the team learning dimension in the Shared Leadership Scale developed by Boyi Liu, with a total of 5 items. This scale is based on definition and connotation of shared leadership by borrowing from foreign scholars, and on the basis of interviews, he developed a shared leadership scale that fits the Chinese cultural situation.

To measure the sense of team identity, a single-dimensional localization scale developed by Mingxu Bao was used, with a total of 4 items questionnaires. This scale is based on the TI scale developed by Gerben & J. After professional English translation and back-translation, a revised team identity scale suitable for the Chinese situation.

To measure the performance of engineering projects, Huishuang Zhang's scale is used, with 6 items on a single dimension. The scale is a project performance scale developed by combining domestic and foreign mature scales (Lianying et al., 2016 : 87-92.). The items include cost, quality, progress, and stakeholder satisfaction.

Data reliability and validity analysis

1. Reliability Analysis

In this study, Cronbach's alpha coefficient was used to evaluate the reliability of the measurement scale. Cronbach's alpha for team learning = 0.928. Cronbach's alpha for team identity is 0.945. Cronbach's alpha = 0.930 of team performance. It can be seen that the Cronbach's α of each variable is > 0.8 , and the scale is generally credible.

2. Validity Analysis

The scale used in this study is a scale suitable for Chinese management scenarios revised by Chinese scholars on the basis of foreign mature scales, professional English translation and back-translation. It has been widely used and has good content validity. This paper uses AMOS24.0 software to test and test team learning, team identity, and project performance

models. The analysis results show that the factor loadings of team learning, team identity, and project performance are all greater than 0.7, the AVE values are all greater than 0.6, and the CR values of all variables are greater than 0.9, which meet the requirements of convergent validity.

3. Variable correlation analysis

SPSS23.0 was used for variable correlation analysis. Team learning was positively correlated with team identity ($R=0.362, p<0.001$), team learning was positively correlated with project performance ($R=0.395, p<0.001$), team identity and project performance were positively correlated ($R=0.395, p<0.001$). Positive correlation ($R=0.444, p<0.001$).

Data Analysis and Results

Hypotheses were tested using hierarchical regression analysis (HRM). The control variables (educational education, working years, project type, project scale, position), independent variables (team learning), mediating variables (team identity), and dependent variables (project performance) were input into SPSS23.0 software in turn. The analysis results are shown in Table 1.

Table 1 Hierarchical regression analysis of each variable

Variable		Team identity		Project performance		
		Model 1	Model 2	Model 3	Model 4	Model 5
Step1	educational background	0.079	0.061	0.200***	0.181***	0.16**
	Working years	0.064	0.112	-0.112	-0.061	-0.1
	Project type	-0.124*	-0.101	-0.132*	-0.107*	-0.072
	Project scale	0.174**	0.144**	-0.017	-0.049	-0.099*
	Team positions	-0.078	-0.111	-0.026	-0.061	-0.022
Step2	Team learning	—	0.353***	—	0.373***	0.249***
Step3	Team identity	—	—	—	—	0.351***
	R2	0.051	0.172	0.076	0.211	0.312
	Adjusted R2	0.036	0.156	0.061	0.195	0.297
	$\Delta R2$	0.051	0.121	0.076	0.1343	0.102
	F	3.311**	44.317***	5.031***	51.77***	44.846***

It can be seen from Table 1 that in Model 2, team identity is the dependent variable and team learning is the independent variable. The results of hierarchical regression analysis showed that team learning and team identity were significantly positively correlated ($\beta=0.353, p<0.001$), assuming that H2 was supported.

In Model 4, project performance is used as the dependent variable and team learning is used as the independent variable. The results of hierarchical regression analysis showed that team learning and project performance were significantly positively correlated ($\beta=0.373, p<0.001$), hypothesis H1 was supported.

Model 5 builds on Model 4 with an added sense of team identity. The results of hierarchical regression analysis showed that team identity and project performance were significantly positively correlated ($\beta=0.351, p<0.001$), assuming that H3 was supported. After introducing team identity into the model, team learning can still significantly and positively affect project performance ($\beta=0.249, p<0.001$), but its β value is reduced from 0.373 to 0.249,

indicating that team identity plays an important role in the relationship between team learning and project performance. time played a partial mediating role, assuming that H4 was supported.

Discussion

1. Main conclusions and discussions

This paper takes the engineering project management team as the research object, based on the shared leadership theory, and with the help of the IPO analysis framework of team performance, constructs the relationship model of team learning, team identity, and engineering project performance. Through empirical analysis of sample data, the following conclusions are drawn: (1) Team learning and team identification are significantly positively correlated; (2) Team learning and engineering project performance are significantly positively correlated; (3) Team identification and engineering project performance are significantly positively correlated (4) Team identity plays a mediating role between team learning and project performance.

Based on the system view of the IPO theory of team performance, we regard team learning (I), team identification (P), and project performance (O) as three subsystems as a whole. Data analysis has shown that team identification plays a mediating role. Combining data analysis results and interviews with engineering project management practitioners, we believe that team learning as team input (I) enhances the sharing of expertise and project experience within the team. Since these knowledge and experiences come from highly heterogeneous team members, people with different educational backgrounds and project work experience backgrounds experience team learning: First, the knowledge structure among team members is complemented, and the boundaries of professional knowledge are expanded. This makes it easier for team members to understand each other's thinking and behavioral characteristics, which helps to trigger cooperation between team members and improves team efficiency; second, the team members' experience in dealing with problems encountered in other projects is helpful for solving problems. Similar problems in the current project, thereby reducing the losses caused by these problems in the current project, is conducive to improving the performance of the engineering project; third, the shared team environment makes the team learn more frequently, which is conducive to emotional communication among team members, to enhance mutual understanding and trust among members, reduce conflicts among team members, and help strengthen team members' identification with the team and other members.

As a mediating team process (P), team identification is directly influenced by team learning on the one hand. On the other hand, team identity includes individuals' identification with team goals, norms, management, atmosphere, etc. Team identity helps to share knowledge and information among members and improve the quality of knowledge sharing. Within the project management team, team identification can stimulate the sense of ownership of team members, strengthen members' identification with team goals and norms, accept team management, and help them take behaviors consistent with team decision-making. Especially when the team encounters a problem or the team is in trouble, team members are more inclined to take actions that are beneficial to the team. This enables better execution of team decisions at the project management site, and more efficient team behavior, which helps the team to get out of trouble as a united team and achieve higher project performance.

2. Management inspiration

Construction companies should encourage project managers to adopt a shared leadership

style. Previous studies have shown that shared leadership can improve individual learning behavior and promote team learning (Liu et al., 2014 : 282-295). When an engineering project manager adopts a shared leadership style, it creates a team atmosphere that is more conducive to team members sharing knowledge and learning, which is conducive to triggering team learning and enhancing team identity.

Engineering project managers should pay attention to the role of team learning. With the development of the construction industry in the direction of green energy saving and intelligentization, it is necessary to integrate more and more subdivided professional knowledge and coordinate more and more types of work to complete construction tasks, which makes the project management team face highly complex Manage scenarios. It is difficult to deal with all kinds of new problems in project management only with personal knowledge, skills and project experience reserves. In order to prevent the team from making improper decisions, causing losses and reducing performance due to blind spots in personal expertise or experience. Engineering project managers should establish the concept of promoting team learning in their work.

Engineering project managers should strengthen team identity. The results of this study have shown that team identification can play a mediating role between team learning and engineering project performance. First, through high-frequency team learning, the project manager should enhance the understanding and trust of team members and promote emotional exchanges; second, they should attract team members to jointly formulate team norms and management systems to stimulate their sense of ownership; third, they should encourage unity Cooperate to improve the interdependence of team members; fourth, care about the growth and life of team members, so that they can feel the warmth of the team family.

3. Limitations and Prospects

The data collected in this study are horizontal data, and team learning and team identification are a dynamic and cumulative process from playing a role to ultimately affecting engineering project performance. This has certain shortcomings in the interpretation of causal relationships between variables, and follow-up research should consider collecting longitudinal data. Most of the scales used in this paper are revised from domestic mature scales, but there is a lack of measurement tools that meet the characteristics of the construction engineering industry.

Based on the team performance IPO theory, the future research on engineering project performance can be carried out from the following aspects: first, focus on the impact of different leadership styles on remote engineering project performance; second, focus on those variables that can reduce team learning and team identity. Research the team process that negatively affects the performance of engineering projects; the third is to develop a scale that conforms to the Chinese cultural background and the characteristics of the construction engineering industry.

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