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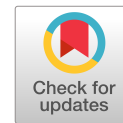
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Impact of Institutional Pressures on External Program Manager Involvement: Evidence from Large Projects in China

Mingqiang Liu, Ph.D.¹; Yongsong Zhu²; Jianjun Wei³; Yun Le⁴; and Xinyue Zhang⁵

Abstract: External program manager involvement can provide professional and systematic management services to owners. It can help to manage and coordinate different subprojects and ensure the achievement of the overall strategic goals of large projects. The promotion of external program manager involvement is not only efficiency-driven, but the institutional environment also has a significant impact. This study developed a theoretical model to explain how external program manager involvement is influenced by external institutional forces (coercive, mimetic, and normative pressures) and internal top management support. Based on a questionnaire survey, this study tested the research model through partial least-squares structural equation modeling. The empirical results revealed that coercive pressures have no significant impact on external program manager involvement; owners' top management support acts as a complete mediator between the mimetic pressures and external program manager involvement; normative pressures have the greatest impact on top management support and external program manager involvement, and top management support plays a key but partially mediating role. A direct contribution of this study is to reveal how different types of isomorphic pressures can be better exercised to facilitate the involvement of external program managers. Going further, by incorporating both external institutional pressures and internal top management support into the research model, this study provides insight into how organizations are influenced by external institutions to apply tools or approaches internally. **DOI: 10.1061/(ASCE)CO.1943-7862.0002306.** © 2022 American Society of Civil Engineers.

Author keywords: External program manager involvement; Program management; Institutional theory; Isomorphic pressures; Top management support.

Introduction

Most large projects are broken down into several subprojects according to project types or phases, and the design and construction of each subproject need to be managed (Hu et al. 2015). At the same time, it is a challenge to coordinate these decentralized project management teams, manage different subprojects in a coordinated manner, and ensure the realization of the overall strategic objectives of the large projects (Flyvbjerg et al. 2003). In this regard, developed countries such as the US, on the one hand, apply design-build (DB), engineering, procurement, and construction (EPC), and other

integrated procurement models to resolve the overall coordination challenges of the owner. On the other hand, program management is usually implemented by hiring external program managers for overall planning, coordination, and control of different subprojects (van Buuren et al. 2010). Here, program management refers to “the application of knowledge, skills, and principles to a program to achieve the program objectives and to obtain benefits and control not available by managing program components individually” (PMI 2017).

Program management has been increasingly advocated as a pragmatic and effective approach to managing large construction projects because it can effectively coordinate the execution of constituent projects (Arto et al. 2009; Hu et al. 2015; Levin 2016; Lycett et al. 2004; OGC 2006; Partington et al. 2005; Pellegrinelli et al. 2007). Many scholars believe that external program manager involvement can provide professional and systematic management services for owners with insufficient management capacity, which can be very helpful in improving the performance of large projects (Arto et al. 2009; Reiss 2006; William et al. 2010; Yi et al. 2022). Several surveys conducted in the US and UK revealed that there is a growing demand for external program managers in the construction industry (Rasdorf et al. 2010; Shehu and Akintoye 2009).

Although there have been some studies on program management, most of them focused on the more detailed operations of program management, such as more fine-grained program management methods or tools (Kim et al. 2009; Shi et al. 2014), management strategies (Martinsuo and Hoverfält 2018; Näsholm and Blomquist 2015; Nieminen and Lehtonen 2008), and evaluation models (Jia et al. 2011). There are also studies that focused on external program managers involvement, such as the positive impact

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of external program managers' involvement on program success (Yan et al. 2019), the cost and organizational model of hiring external program managers (William et al. 2010), the differences between internal and external program managers (Sato and Gnanaratnam 2014), and actual cases of external program manager involvement (Hu et al. 2015). However, no studies have explored how to facilitate the involvement of external program managers in large-project practice.

In the practice of China, despite support and recognition from academics, industry, and government, many projects still do not employ external program managers and instead are managed by the owners themselves, although the owners often have insufficient capacity to manage different subprojects in a coordinated manner (Hu et al. 2015). It is thus essential to examine how this meaningful management model (external program manager involvement to help owners in program management) can be popularized in large projects.

Previous studies have shown that the adoption of management approaches or tools is not only driven by efficiency needs, but also may be driven by the institutional environment (Koskela-Huotari et al. 2016; Saldanha et al. 2015). Furthermore, the Chinese central government has issued a policy to encourage external program manager involvement in large projects. In the Chinese construction industry, it is rare for the Chinese central government to issue a policy to promote a management model. However, despite support and recognition from the government, the involvement of external program managers is not common. Institutional theory suggests that not only coercive pressures such as government policies have impacts, but also many factors from outside the organization can influence the adoption of management approaches or tools (Diandian et al. 2018; Liang et al. 2007). Thus, it is important to explore the institutional motivation of external program manager involvement and then propose targeted measures.

To bridge the literature gap and address the practical need, this study aims to explore the institutional driving mechanism of external program manager involvement in large projects in China. Drawing on the literature on institutional theory (Berrone et al. 2013; Cai et al. 2010; DiMaggio and Powell 1983; Liu et al. 2010) and top management (Kanwal et al. 2017; Liang et al. 2007), we develop a theoretical model to explain how external program manager involvement is influenced by the external institutional forces and the internal top management support. Specifically, this study examines how three isomorphic pressures (i.e., coercive, mimetic, and normative pressures) impact external program manager involvement, and how top management support mediates the effects of the three pressures on external program manager involvement. A direct contribution of this study is to reveal how different types of isomorphic pressures can be better exercised to facilitate the involvement of external program managers. Through linking the macro institutional environment and micro organizational adoption behaviors, this study also provides insight into how organizations are influenced by external institutions to apply tools or approaches internally.

Theoretical Background and Research Hypotheses

Program Management

In the construction industry, a program refers to a large construction project that can be divided into multiple units and executed in a dispersed manner (Hu et al. 2015). In numerous large projects, such as road works, airports, and skyscrapers, the owners face a similar situation in delivering a large project as a whole although the

constituent units (projects) of each large project are executed dispersedly. The management works within a program can be divided into two parts: (1) management tasks within constituent projects with definite objectives to which the traditional project management approach can apply, and (2) coordination activities across constituent projects to realize the common program objectives. The second part mainly refers to program management (Hu et al. 2015). Program management has been increasingly advocated as a pragmatic means of improving large project performance through coordinated management of constituent projects (Arto et al. 2009; Hu et al. 2015; Levin 2016; Lycett et al. 2004; Pellegri-nelli et al. 2007).

Institutional Perspectives on External Program Manager Involvement

Different from transaction cost economics where organizational decisions are considered based on the logic of seeking efficiency and minimum cost (Williamson 1988), institutional theory emphasizes the key role of the institutional environment in influencing organizational decisions and behaviors (DiMaggio and Powell 1983; Scott 2013). Institutional theory views organizations as open systems that are affected by specific circumstances (DiMaggio and Powell 1983; He et al. 2016) and argues that organizations are under pressures to adhere to common notions of appropriate organizational behaviors (Tolbert 1985). As organizations compete for resources, customers, and economic and social status, violating these common notions may cause the organization's legitimacy to be questioned, thereby affecting its ability to obtain resources and social support (Berrone et al. 2013; DiMaggio and Powell 1983).

Many previous studies have demonstrated that institutional theory can provide powerful explanations for some organizational behaviors, such as innovation adoption and strategic change (Bhakoo and Choi 2013; Cao et al. 2014; Hu et al. 2007; Teo et al. 2003; Yang et al. 2019). Based on the successful application of institutional theory in previous studies, this study holds that institutional factors may also provide systemic insights into the involvement of external program managers in large projects. Although the involvement of external program managers is considered to have a positive relationship with large project performance, it is not only driven by efficiency, but may also mean organizational structure changes and increased management costs (Hu et al. 2015), and most projects are still on the fence about it. It has to be considered that in China, government departments and industry associations are vigorously advocating the involvement of external program managers in large projects, and the central government has also issued policies to promote it. Furthermore, in recent years, some cases of the involvement of external program managers can be seen in China; more and more participants are realizing the benefits of such involvement, and more projects are drawing on the successful experience. In institutional theory, these are institutional isomorphism processes such that the institutional environment can influence or even shape organizational behaviors (DiMaggio and Powell 1983; Scott 2013).

Role of Top Management Support

The foundation of our theoretical framework around external program manager involvement consists of two elements: institutional pressure and top management influence. Over the last few decades, institutional theory has developed into a powerful explanation of the impact of external institutions on organizational decisions, behaviors, and outcomes (DiMaggio and Powell 1983; Scott 2013). However, institutional pressures, no matter how powerful, will have

little impact on the entire organization if they do not first influence the decisions of human agents within the organization (Liang et al. 2007). Therefore, we further argue that external institutional pressures are influencing external program manager involvement through the support of key organizational members (top management).

Continuous support from top management is a critical factor in the adoption of management approaches and tools (Branzei et al. 2004; Sun and Anderson 2010). For example, Kanwal et al. (2017) found that top management has a positive impact on successful delivery and involvement of information system projects. Song et al. (2017) thought that the impact of top management could be explained by providing the necessary resources and removing barriers to the adoption of innovations through top management support. Top management can promote external program manager involvement in different ways in large projects. When owners have enough experience, knowledge, and skills to manage large projects, they need to put substantial effort into managing the programs themselves. Otherwise, they need to hire external program managers to help owners carry out professional and systematic program management. Both of these program management approaches need to be decided by the owners' top management. Based on the preceding discussion, the first hypothesis is as follows:

H1: In large projects, the owner's top management support is positively associated with external program manager involvement.

Role of Isomorphic Pressures

According to institutional theory, organizations tend to follow socially accepted norms and behaviors in order to integrate into the specific institutional environment (DiMaggio and Powell 1983; He et al. 2016). Institutions can achieve the purpose of shaping organizational behavior, which is also known as the homogenization process, i.e., institutional isomorphism (DiMaggio and Powell 1983; Scott 2013). Institutional theory distinguishes three basic types of isomorphic pressures shaping organizational behaviors: coercive, mimetic, and normative (DiMaggio and Powell 1983). Coercive pressures come from mandatory provisions such as laws, regulations, and rules that restrict organizational decisions and behaviors (Meyer and Rowan 1977). Mimetic pressures stem primarily from the prevalence of the practice in the focal organization's industry, and the success of its adoption in that industry (Haveman 1993). Normative pressures often come from diverse sources, including upstream and downstream of the supply chain, owners, users, and industry associations (DiMaggio and Powell 1983). The effects of these three isomorphic pressures are discussed next.

Coercive Pressures

Coercive pressures are defined as the pressures originating from political influences exerted by powerful organizations (such as governments) upon which the focal organizations depend (DiMaggio and Powell 1983; Liu et al. 2010; Teo et al. 2003). The more an organization depends on the powerful organizations that exert pressure, the more likely it is to comply with the pressure rather than resist it. Within the context of external program manager involvement examined in this study, coercive pressures could primarily stem from the government requirements, regulations, and policies. In China, most large projects have investment from the government, so the coercive pressures firstly come from the government (Cui and Jiang 2012). External program manager involvement has been advocated by the Chinese governments, so hiring external program managers can be considered as an act of complying with government regulations. In China, the government is an owner of many large projects at different levels, and the projects' top management teams are appointed directly by the

government (Hu et al. 2015); there are also some large projects whose owners are not the government but have close ties with the government (Ma et al. 2020). The government advocates for the involvement of external program managers in large projects, so top management's support for hiring external program managers is likely to be affected by government policies. Accordingly, the following hypotheses are proposed:

H2a: Coercive pressures are positively associated with external program manager involvement.

H2b: Coercive pressures are positively associated with owners' top management support for external program manager involvement.

Mimetic Pressures

Mimetic pressures mainly arise from an organization's successful perception of peer adoption behavior (DiMaggio and Powell 1983; Liu et al. 2010). In their quest for legitimacy, organizations compare themselves with their peers and try to behave in accordance with generally accepted standards or norms in the same institutional field (Berrone et al. 2013). Mimetic pressures can influence external program manager involvement in two ways. On the one hand, industry routines can promote and guide the involvement of external program managers. On the other hand, similar successful large projects that hire external program managers set examples for the others, promoting external program manager involvement. As an emerging economy, China is in full swing with the construction of large projects, but the owners of a particular large project lack relevant experience, and project decision makers are easily influenced by and refer to the implementation of similar projects (He et al. 2016). Thus, the following hypotheses are proposed:

H3a: Mimetic pressures are positively associated with external program manager involvement.

H3b: Mimetic pressures are positively associated with owners' top management support for external program manager involvement.

Normative Pressures

Normative pressures refer to the pressures from the common expectation that the organization can take appropriate behavior for a long time and gradually become legal in a specific organizational context (DiMaggio and Powell 1983; Liu et al. 2010; Scott 2013). With technological development and environmental changes, relevant organizations in each link of the supply chain and relevant professional bodies may gradually form common norms and shared expectations about desirable organizational behaviors (Scott 2013). These pressures also have strong impacts and will be reinforced by the impact of professional associations (Zietsma et al. 2017).

Some important associations in the construction industry, such as the China Construction Industry Association and the China Construction Association Engineering Management Branch, have vigorously promoted external program manager involvement. Therefore, external program manager involvement can be promoted through certain normative pressures, and it can be guided through informal activities such as exchange meetings and peer visits. Through direct or indirect interaction with professionals, the top management of large project owners can gain a clearer and more comprehensive understanding of program management and a better appreciation of the application value of the involvement of external program managers in their projects, thus giving more support to hire external program managers. Thus, the following hypotheses are proposed:

H4a: Normative pressures are positively associated with external program manager involvement.

Isomorphic Pressures

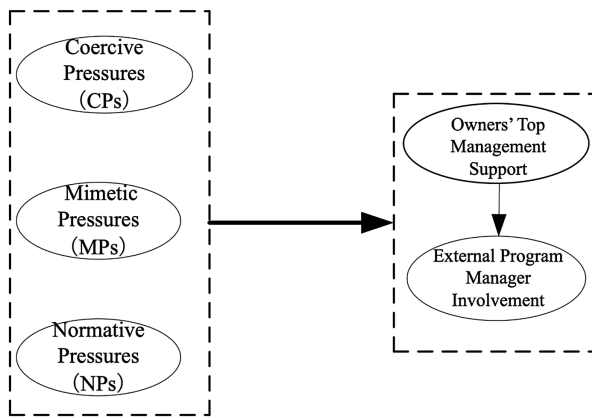


Fig. 1. Research model.

H4b: Normative pressures are positively associated with owners' top management support for external program manager involvement.

Combined with the preceding literature review and hypotheses, the research model we constructed is shown in Fig. 1.

Method

Questionnaire Development and Measurement Items

On the first page of the questionnaire, we introduced the purpose of the study and instructions for filling the questionnaire (including the research object and background knowledge on program management and external program manager involvement). We introduced our research objects as large projects and define them as follows: In this study, large projects refer to projects with large overall investment scale, high complexity, long construction period, and numerous participants. Specifically, the types of projects considered in this study include transportation infrastructures (e.g., airports, high-speed railways, subways, bridges, and hubs), public projects (e.g., hospitals, schools, and parks), environmental, energy, and hydropower facilities, and complex large-scale housing construction projects (e.g., skyscrapers and new towns).

Then came the body of the questionnaire, which included three parts: basic information on large projects, basic information of respondents, and the measurement of constructs. Construct measures for the three types of pressure, top management support, and external program manager involvement are described next, respectively.

Coercive Pressures

Liang et al. (2007) argued that coercive pressures (CPs) come primarily from regulations and government incentives. Based on their enterprise resource planning (ERP) adoption coercive pressure scale, we modified the scale to the external program manager involvement contexts.

Mimetic Pressures

Liang et al. (2007) and Liu et al. (2010) argued that mimetic pressures (MPs) come mainly from competitors and industry practice. Because their studies were based on the adoption of the system by enterprises, and there are no such competitors for large projects, we thus modified the competitors to be similar projects.

Normative Pressures

In their study on the adoption of innovation, Guo et al. (2018) argued that normative pressures (NPs) come from suppliers, retailers, and customers. In their study on building information modeling (BIM) adoption, Cao et al. (2014) argued that normative pressures come from industry associations. Combining the two, our measurement of normative pressures includes other participants (including designers, contractors, and suppliers), owners and users, and industry associations. We adopted a scale from 1 = "completely disagree" to 5 = "completely agree" to evaluate all these items.

The items described in the top management support (TMS) were developed from mainstream management literature (Jansen et al. 2008; Kanwal et al. 2017) and modified to incorporate large project contexts. We adopted a scale of 1 = completely disagree to 5 = completely agree to evaluate all these items.

External program manager involvement (EPMI) was measured by the extent to which they are involved in various program management work. Based on the literature review, we selected and classified the activities of program managers involved in large projects. In order to thoroughly examine the involvement of program managers in large projects, we searched for articles with the topic of "program manage*," "program control*," "program organiz*," and "program coordinat*" from the "architecture/business/construction/engineering" subareas, and then combed through them all. Table 1 presents the scope of external program manager involvement, and the initial questionnaire in which we measured external program manager involvement based on these 10 items. These items are reflected with five-point scale items (1 = not involved; 2 = less involved; 3 = generally involved; 4 = more involved; and 5 = deeply involved).

Pilot Test and Questionnaire Improvement

To make the measurement items modified based on classic management scales suitable for measuring in the context of large projects, we conducted two rounds of pilot surveys. In the first round, we invited two owners and three program managers to check whether the items in the questionnaire were clearly expressed and could be understood in the context of large projects. We adjusted the original questionnaire items based on their opinions. The second round of the pilot survey was conducted with five other owners and program managers. These experienced pilot interviewees answered all the questionnaire items and provided feedback on the questionnaire design. The basic information of interviewees can be seen in Table 2.

During the two rounds of the pilot tests, experts suggested that we modify the expression of the relevant measures to be more consistent with project practice. Moreover, they indicated that there were too many items concerning external program manager involvement. In conjunction with their program management practices, they gave us suggestions to merge, delete, and modify them from the original 10 items, and we finally identified five items to measure external program manager involvement. Among them, program design management was retained; program organization design and standardized process design were suggested to be combined into one item; program investment and bidding management, schedule management, and cost management were combined and modified into "preparation and implementation of program investment, bidding, schedule, cost control, and procurement"; program site safety management and quality management were combined into one item; and information system support and program knowledge management were combined into one item. We finally finalized the formal questionnaire based on the feedback

Table 1. Scope of external program manager involvement

References	Scope of external program manager involvement									
	Program organization design	Program standardized process design	Program design management	Program investment and bidding management	Program schedule management	Program cost management	Program site safety management	Program quality supervision	Information system support	Program knowledge management
Artto et al. (2009)	1									
van Buuren et al. (2010)	1			1						
Hu et al. (2015)	1	1			1				1	1
Kim et al. (2009)	1								1	
Levin (2016)	1	1	1						1	1
Lycett et al. (2004)	1									1
Martinsuo and Hoverfält (2018)	1	1							1	1
Nieminen and Lehtonen (2008)	1	1								1
OGC (2006)	1			1					1	
Partington et al. (2005)	1				1					
Pellegrinelli et al. (2007)	1	1							1	
PMI (2017)	1	1								
Reiss (2006)	1	1							1	1
Shehu and Akintoye (2009)	1	1								
William et al. (2010)	1	1								

from two rounds of pilot testing, and all items are described in Table 3.

Sample and Data Collection

Respondents were recruited from participants in large projects, members of construction industry associations in China, and those who participated in program management workshops (four times). The program management workshops were organized by our institute, which invited project practitioners from all over the country to attend, and we distributed part of the questionnaires during the workshop breaks. We distributed questionnaires in three ways, including conducting online surveys and distributing questionnaires at project sites and program management workshops. The investigation and collection process was from August 2019 to May 2020. During the data-collection process, we tried to obtain responses from managers because their views are more representative of the organization (Smith et al. 1995). A total of 350 questionnaires were distributed, including 150 online and 200 onsite questionnaires. Finally, 39 questionnaires were returned online and 80 questionnaires were returned onsite, so there were a total of 119 qualified questionnaires.

The average cost of the large projects investigated was USD 708 million (each project cost more than USD 100 million,) and their average construction time was about 3 years. The profiles of respondents are given in Table 4. The answers of respondents in different positions (general staff, primary management, middle management, and top management) were compared through the one-way analysis of variance (ANOVA), and the results of the Levene's test showed no significant difference at the 0.05 significance level ($F = 2.113$ and $p = 0.102$), meaning that the answers from different types of respondents were not significantly different.

Data Analysis Method

Partial least squares (PLS), a variance-based structural equation modeling technique, was adopted to validate the reliability and validity of the construct measures, as well as to test hypothetical models. PLS was employed mainly because it requires a smaller sample size and residual distribution compared with other methods, facilitating the desired statistical efficacy and robustness (Hair et al. 2016).

Results

Measurement Model

Internal consistency, indicator reliability, convergent validity, and discriminant validity were adopted to assess the validity of the measurement model (Hair et al. 2016). Composite reliability (CR) was adopted to assess the internal consistency, and the calculated results (ranging from 0.811 to 0.874 in Table 5) exceeded the 0.7 thresholds (Bagozzi and Yi 1988).

Convergent validity was measured by the values of the average of variance extracted (AVE), and all values of AVE (ranging from 0.585 to 0.740 in Table 6) were greater than the 0.5 cut-off (Fornell and Larcker 1981), which means that all constructs can explain the variance above 50% of corresponding constructs.

As indicated in Table 7, the discriminant validity was examined from two aspects. First, the square root of AVE for every construct was greater than their highest off-diagonal correlation with other constructs. Second, the cross-loadings of each construct were higher than that of other constructs. Indicator reliability was tested

Table 2. Basic information of interviewees in pilot study

Pilot survey	No.	Participant	Position	Education	Experience(years)	Involved large projects
First round	1	Owner	Middle management	Doctor	12	Shanghai Hongqiao Airport and Shanghai Pudong Airport
	2	Owner	Top management	Master	18	Hong Kong-Zhuhai-Macao Bridge
	3	Program manager	Top management	Doctor	13	Nanningdong Railway Station
	4	Program manager	Middle management	Doctor	15	Shanghai Disney Resort
	5	Program manager	General management	Doctor	13	Shanghai Expo
Second round	6	Owner	Middle management	Doctor	10	Shanghai Pudong Central Link
	7	Owner	Top management	Master	15	Shanghai Yueyang Hospital
	8	Program manager	Top management	Doctor	15	Shanghai West Coast Media Harbor
	9	Program manager	Top management	Doctor	27	Shanghai Expo
	10	Program manager	Middle management	Doctor	18	Guangzhou Baiyun International Airport

Table 3. Measurement items

Construct	Item
Coercive pressures (CPs)	CP1: The government requires our project to hire external program managers. CP2: Regulations and policies require our project to hire external program managers.
Mimetic pressures (MPs)	MP1: Similar projects that have hired external program managers have benefitted greatly. MP2: External program manager involvement is a common practice in the industry.
Normative pressures (NPs)	NP1: Project designers, contractors, and suppliers strongly advocate external program manager involvement. NP2: Project owners and users strongly advocate external program manager involvement. NP3: Industry associations and universities strongly advocate external program manager involvement.
Top management support (TMS)	TMS1: Top management has experience in hiring external program managers. TMS2: Top management is willing to try to hire external program managers. TMS3: Top management has developed a vision to hire external program managers. TMS4: Top management has developed a strategy for hiring external program managers. TMS5: Top management has clear requirements and standards for the work of external program manager involvement.
External program manager involvement (EPMI)	EPMI1: Program design management. EPMI2: Program organization and standardized process design. EPMI3: Preparation and implementation of program investment, bidding, schedule, cost control, and procurement. EPMI4: Program site safety and quality supervision. EPMI5: Information system support and knowledge management.

Table 4. Profiles of respondents

Item	Type	Number	Percentage
Gender	Male	97	81.51
	Female	22	18.49
Age (years)	≤25	7	5.88
	26–35	34	28.57
	36–45	46	38.66
	46–55	30	25.21
	≥56	2	1.68
Education	High school and below	4	3.36
	Undergraduate	86	72.27
	Master	25	21.01
	Doctor	4	3.36
Working years	≤5	15	12.61
	6–10	26	21.85
	11–19	37	31.09
	≥20	41	34.45
Position	General staff	32	26.89
	Primary management	38	31.93
	Middle management	25	21.01
	Top management	24	20.17

Table 5. Measurements' validity and construct correlations

Construct	AVE	CR	R^2	Correlation matrix				
				TMS	CP	MP	NP	EPMI
TMS	0.585	0.874	0.260	0.765	—	—	—	—
CP	0.704	0.824	—	0.262	0.839	—	—	—
MP	0.740	0.848	—	0.387	0.285	0.860	—	—
NP	0.592	0.811	—	0.472	0.370	0.486	0.769	—
EPMI	N/A	N/A	0.325	0.402	0.032	0.286	0.504	N/A

Note: AVE = average variance extracted; and CR = composite reliability. Bold values represent the square root of AVE. EPMI was a single indicator variable; related measures are not applicable for this construct.

by factor loadings (ranging from 0.604 to 0.975 in Table 6), higher than the threshold of 0.5 (Hair et al. 2016).

Structural Model

The structural model was tested by the significance of path coefficients and determination coefficients (R^2). The nonparametric bootstrap procedure was adopted, and 2,000 bootstrap samples were set. R^2 values of the dependent variables, TMS and EPMI,

Table 6. Item loadings

Items	Item loadings				T-value
	CP	MP	NP	TMS	
CP1	0.939	0.239	0.337	0.265	3.487
CP2	0.725	0.264	0.289	0.153	2.619
MP1	0.295	0.975	0.499	0.409	8.702
MP2	0.153	0.727	0.274	0.184	2.437
NP1	0.176	0.425	0.716	0.202	5.591
NP2	0.410	0.332	0.877	0.477	11.757
NP3	0.224	0.399	0.702	0.367	6.594
TMS1	0.294	0.217	0.331	0.686	4.919
TMS2	0.219	0.357	0.503	0.818	9.116
TMS3	0.204	0.358	0.354	0.854	9.410
TMS4	0.185	0.281	0.325	0.832	9.727
TMS5	0.090	0.223	0.206	0.604	3.927

Table 7. Structural model evaluation

Dependent variables	Hypotheses	Coefficient	t	R ²	Interpretation
TMS	H2b: CP-TMS	0.078 ^{n.s.}	1.088	0.260	Not supported
	H3b: MP-TMS	0.197 [*]	0.072		Supported
	H4b: NP-TMS	0.347 ^{***}	3.598		Supported
EPMI	H1: TMS-EPMI	0.228 ^{**}	2.969	0.325	Supported
	H2a: CP-EPMI	-0.206 ^{n.s.}	1.826		Not supported
	H3a: MP-EPMI	0.034 ^{n.s.}	0.595		Not supported
	H4a: NP-EPMI	0.456 ^{***}	5.236		Supported

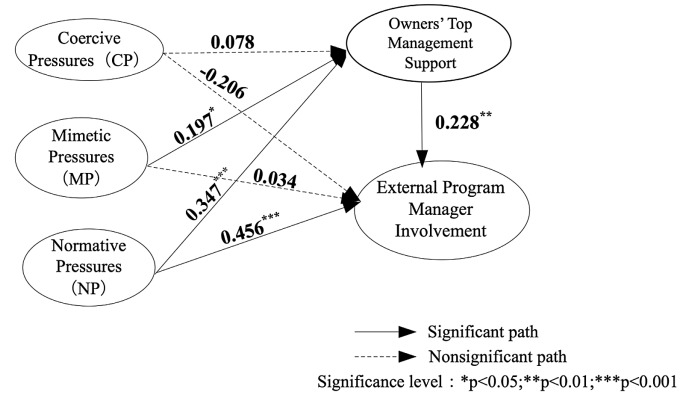
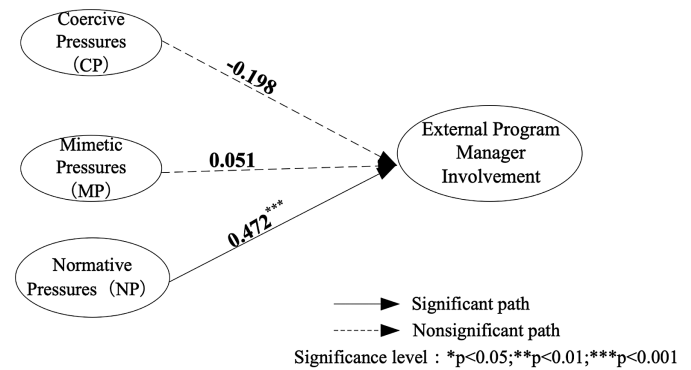
Note: * $p < 0.05$, ** $p < 0.01$, and *** $p < 0.001$. n.s. = not significant.

were 0.260 and 0.325, respectively, indicating that the model can be well explained. As indicated in Fig. 2 and Table 7, the path from TMS to EPMI was significant ($\beta = 0.228$ and $p < 0.01$), H1 was supported. When TMS was the dependent variable for CP, MP, and NP, the influence of MP ($\beta = 0.197$ and $p < 0.05$) and NP ($\beta = 0.347$ and $p < 0.001$) were significant, H3b and H4b were supported. Obviously, NP has a greater impact on TMS than MP. However, the influence of CP on TMS was not significant ($\beta = 0.078$), H2b was rejected. When EPMI was the dependent variable, the path coefficient from NP to EPMI was significant ($\beta = 0.456$ and $p < 0.001$), whereas the effects of both MP ($\beta = 0.034$) and CP ($\beta = -0.206$) on EPMI were not significant.

To comprehensively understand the impact of institutional pressures on external program manager involvement and the mediating role of owners' top management support, we constructed an alternative model without considering the mediation effect of TMS. As shown in Fig. 3, in this alternative model, only the impact of NP on EPMI ($\beta = 0.472$ and $p < 0.001$) was supported. Combined with the analysis results in Fig. 2, we can conclude that TMS plays a partially mediating role between NP and EPMI. The path result from MP to EPMI ($\beta = 0.051$) was also insignificant, but considering that the path from MP to TMS to EPMI was significant, it can be considered that H3a was also supported, and TMS acted as a complete mediating role between MP and EPMI. The path result from CP to EPMI ($\beta = -0.198$) was also insignificant, which once again proved that there was no positive correlation between CP and EPMI.

Discussion

This study explored the institutional drivers for external program manager involvement in large projects. The adoption of

**Fig. 2.** Results of research model.**Fig. 3.** Results of alternative research model.

management approaches or tools in the construction industry is not solely driven by the internal motivations and needs of the organization, and thus, the driving role of the external institutional environment cannot be ignored. Therefore, this study focused on the role of external institutional pressures and owners' top management support in driving external program manager involvement. The empirical results showed that external institutional pressures overall have a significant driving effect on external program manager involvement in large projects, but different isomorphic pressures (including coercive, mimetic, and normative pressures) have different effects. Although these three isomorphic pressures often act simultaneously, they show different effects. In addition, owners' top management support also plays an important mediating role (mainly for mimetic and normative pressures). The following sections will discuss these results.

Role of Coercive Pressures

Surprisingly, coercive pressures did not affect top management support and external program manager involvement; even the path coefficient between coercive pressures and external program manager involvement was negative. Although it is intuitively felt that coercive pressures should positively impact the adoption behaviors, Son and Benbasat (2007) have argued that coercive pressures have little impact on the organizational behavior in construction organizations, and sometimes even have a counterproductive effect. In addition, construction laws in China explicitly stipulate that special supervisors are required to supervise the construction process. In contrast, external program manager involvement does not have such a strong legal requirement; it was only suggested, not

required. Therefore, without legally mandatory provisions, industry self-discipline can hardly achieve the desired effect of the policy (King and Lenox 2002).

As Sha (2004) argued, the effect of coercive pressures on the adoption behaviors still depends on whether the rule is mandatory or not, and if it is only recommended, few projects will break their accustomed practices to try innovative approaches. Although the Chinese central government has issued policies to promote program management, owners may not be willing to pay more costs and organizational changes to try a new management method that has never been involved just because of the government's promotion (Zhang et al. 2021b). Large projects, in particular, have greater uncertainty and complexity than ordinary construction projects, and the adoption of a new management approach will therefore be more cautious.

The phenomenon that coercive pressures did not positively affect the adoption behaviors in construction can be seen in other studies as well, which can provide some explanation for our results. For example, Zhang et al. (2015) studied the promotion of public-private partnerships in China. They found that due to the immature administrative governance structure, relevant policies would generate negative constraints. Shi et al. (2019) found that in the US, compulsory safety education (which can be viewed as one coercive pressure) had no positive effect on the safety behavior of construction workers. Wang et al. (2018) found that the impact of coercive pressures on the adoption of environmental citizenship behavior in megaprojects was also not significant.

Role of Mimetic Pressures

The results showed that mimetic pressures positively affected external program manager involvement through top management support, and top management support acted as a complete mediator. It is generally accepted that mimetic pressure plays an important role when the external institutional environment is characterized by a high degree of uncertainty. External program manager involvement involves systematic changes in large projects, which is not only a simple imitation behavior at the technical level. Owners need more investment, more resources, and a long time of learning to adapt to such change (Rasdorf et al. 2010; William et al. 2010). Moreover, because external program manager involvement involves more complex organizational relationships than other adoption behaviors, owners' top management support plays an important decision-making role (Zhang et al. 2021a).

Although large projects are unique one-time endeavors, there are certain similarities between each type of project, and the experience can be replicated and learned across similar projects. However, the owner of the current project may never have been involved in a project where an external program manager was hired. After understanding the successful cases of other similar projects, the owner's top management may support the imitation of successful experience and its application in the current project. The important role of mimetic pressures and top management support was mentioned by a senior expert in the pilot survey:

Beijing Daxing International Airport hired external program managers, mainly because the top management leaders heard about the successful case of Shanghai Hongqiao Airport and Pudong Airport.

Role of Normative Pressures

Normative pressures had a positive impact on top management support and external program manager involvement, with top

management support acting as a partial mediator. In particular, it is noteworthy that the effects of coercive pressures, mimetic pressures, and normative pressures on top management support were significantly different. Among these three isomorphic pressures, normative pressures had the greatest impact, which is obviously different from the role of normative pressures in previous studies.

In a study on technology adoption, the empirical results showed that coercive pressures have the greatest impact, followed by mimetic pressures, whereas normative pressures have no significant impact (Cao et al. 2014). In a study related to organizational prosocial behavior, the empirical results showed that the effect of mimetic pressures is greater than that of normative pressures, whereas coercive pressures had no significant impact (Wang et al. 2018). Different research subjects may account for the differences in the results of the three pressures. The first study was on the adoption of a technology that was mandated by relevant policies; the second study was on a prosocial behavior that did not directly enhance organizational effectiveness or even reduced organizational outputs; whereas our study is on the application of an organizational approach that can improve organizational performance and is promoted by relevant policies but not mandated by them.

Analyzed from another perspective, this may be related to the insufficient development of program management in China, which makes normative pressures play a dominant role. In fact, in the UK, Oxford University set up the BT Center for Major Program Management in 2008, and in China, several universities have held more than 10 program management seminars so far. These are all manifestations of normative pressures, which will impact external program manager involvement in the whole construction industry.

Besides, large projects are large in scale, involve many parties, and are challenging to coordinate. Compared with general projects, large projects may be more susceptible to other parties' advocacy for hiring external program managers. Furthermore, the descriptions of the Shanghai Metro Line 1 project by one of the experts in the pilot survey could provide explanations for the results related to normative pressures:

Early large projects, such as Shanghai Metro Line 1, through the in-depth involvement of college teachers and senior experts, the innovative management method of hiring external program managers was gradually introduced.

Conclusions

From an institutional theory perspective, this study developed and empirically tested a research model to explain how three different types of isomorphic pressures influence the owners' top management support and then external program manager involvement. Overall, the empirical results provided evidence that coercive pressures have no significant impact on external program manager involvement; owners' top management support act as a complete mediator between the mimetic pressures and external program manager involvement; normative pressures have the greatest impact on owners' top management support and external program manager involvement, and owners' top management support plays a key but partially mediating role. The findings suggest that external program manager involvement is motivated not only by rational needs, but also driven by isomorphic pressures to be congruent with its specific institutional environment. This study also sheds light on how different isomorphic pressures could be better exercised to promote external program manager involvement in large projects.

This study makes theoretical contributions to the literature on external program management, institutional pressures, and adoption mechanisms. First, this study enriches the literature stream on external program management. This study examined external program management from the perspective of adoption mechanisms, which complements current research perspectives of external program management approaches and their impacts on performance. In addition, through a systematic literature review and two rounds of pilot surveys, we identified the measurement of external program manager involvement, which laid the groundwork for future external program management research.

Second, this study enriches the knowledge of institutional pressures. Embedded in the context of external program management adoption for large projects, we characterized the institutional environment from the perspective of three specific isomorphic pressures and delved into more fine-grained mechanisms. In a broader sense, this work links the macro institutional environment and micro organizational adoption behaviors. Third, this study also enriches the knowledge of adoption mechanisms. Distinguishing from the performance-driven organizational decisions emphasized by transaction cost economics, this study emphasized that organizational decisions are also influenced by institutional pressures. Besides, by integrating external institutional pressures and internal top management support into the research model, this study also provided a combined perspective of internal and external factors on organizations' mechanisms for adopting management approaches or tools. From this perspective, this study not only directly reveals how different types of isomorphic pressures can be better exercised to facilitate the involvement of external program managers in the Chinese context, but furthermore, it provides insight into how organizations can be influenced by the external institutional environment to apply other types of tools or approaches internally, which consequently benefits international readers.

The empirical results of this study also have several practical implications. First, the findings provide insights into how different types of institutional pressures can be better configured to facilitate the involvement of external program managers. Unexpectedly, coercive pressures had no significant impact on external program manager involvement, whereas normative pressures had the greatest impact. The most effective way to promote the involvement of external program managers is through advocacy by relevant organizations in each link of the supply chain and relevant professional bodies, so that all parties in the construction industry recognize external program manager involvement and make it become an industry consensus.

Second, the empirical results revealed that top management support plays an important role in external program manager involvement; especially, it acts as a complete mediator between mimetic pressures and external program manager involvement. Therefore, the demonstration projects need to be widely publicized, and the successful experience of other similar projects can enable the owner's top management to focus on the advantages of external program manager involvement, so as to promote it vigorously.

Third, the empirical results of this study directly provided new insights into how external institutional pressures facilitate external program manager involvement in the Chinese context, and further provide implications for other developing economies undergoing massive large-project construction.

Although this study provides important contributions to the comprehensive understanding of the institutional pressures for external program manager involvement, there are several limitations that open up avenues for future research. First, institutional pressures can also influence internal resource allocations, so we can discuss the different effects of different governance mechanisms

between owners and program managers in terms of the depth of cooperation (Chi et al. 2016), but in this study, only the driving mechanism was considered. Second, this study took large projects in China as examples to validate the research model. Future research can examine the proposed idea and framework in different cultural, economic, legal, and institutional contexts. Third, it is interesting to combine the perspectives of transaction cost economics and institutional theory to analyze how economic efficiency and institutional pressures jointly influence organizational decisions and the interplay of these two forces.

Data Availability Statement

All data, models, and code generated or used during the study appear in the published article.

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Supplemental Materials

Table S1 is available online in the ASCE Library (www.ascelibrary.org).

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