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Accountability Effects of Public Participation Practice in Chinese Public Projects: Partial Least Squares Path Analysis

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ABSTRACT

Public participation has become an indispensable approach for governments in meeting the various needs of accountability in delivering public projects, especially those concerning urbanization and infrastructure development in China. However, it is not known how, and how much, current public participation practice can enhance project-related and social accountability (SA). Based on a survey of 158 participants with various stakeholder roles in public projects in South China, underlying relationships are revealed of project decision-making accountability (PDMA) and project implementation accountability (PIA) and their association with SA. Further partial least-squares path analysis indicates that PDMA has a long-run mediating role in the establishment of SA, while PIA does not. These results and findings not only enhance a deep understanding of the overall effects of public participation forms in the theoretic domain, but also

useful practical guides to improve China's local government and practitioner practices.

KEYWORDS: Public participation; public project; accountability.

INTRODUCTION

As a strong engine of urbanization and infrastructure development, public projects such as highways, railways, roads, airports, and urban utilities are crucial in promoting economic growth, enhancing public services, and improving social welfare (Flyvbjerg et al., 2003; Xie et al., 2014). Being the world's most populous developing country, China has made a significant investment in public projects over past two decades to deliver infrastructure, facilities, and utilities in support of its rapid urbanization (The Economist 2008). However, the lack of accountability in these projects such as lack of information disclosure, social conflicts, and insufficient benefits (e.g., overestimated traffic demand, and limited operation) has triggered such huge and wide spread risks of underperformance in the planning and implementation processes of these projects as cost overruns, schedule delays, operation capacity shortages, and environmental disputes (Ansar et al., 2016; Flyvbjerg et al., 2003; Xue et al., 2008). According to the China Audit Office's national audit, almost 27% (526) of the 1965 public projects examined across 28 provinces undertaken between 1998 and 2002 experienced at least one of these risks (Xue et al., 2008). The increasing number of public protests over the socio-economic and environmental conflicts involved in public projects (Xie et al., 2014; Li et al. 2012a) has meant that China now faces a significant challenge of governing the economic, social, and environmental issues relating to public projects - especially megaprojects (Ma et al., 2017). This has led to the increasing adoption of a public participation mechanism, now regarded as an indispensable social governance approach to reducing the risk of underperformance and enhancing social accountability (SA) (Levidow, 2007; Xie et al., 2014). Given participatory egalitarianism's relatively short history in China, the accountability of public participation practices is receiving increasing research attention (Plummer and Taylor 2004; Enserink and Koppenjan, 2007).

In contrast with developed countries, the growth in China's public participation practices appears to be following a bottom-up process, especially for public projects. Its adoption of public participation practices in internationally aided projects in the 1980s was largely because of it being a requirement for international funding (Plummer and Taylor, 2004). Since then, public participation practice in public projects has continued in a variety of ways in responding to the needs of government reforms and the country's increasing middle classes (Economist, 2009; Xie et al., 2014), as not delivering on time and within budget is likely to trigger the publics' distrust in the government or even such social disputes as protests and demonstrations. Public participation has been repositioned as a pivotal feature in recent governmental reforms modernizing the national governance system and capacity through improved social governance to enhance various accountability requirements at short and long routes, including project accountability and SA (Ma et al., 2017).

However, the relationship between project accountability (e.g., public acceptance, and improved project management efficiency) and SA (e.g., participatory decision-making, promoting economic development, and improving the public's confidence) has yet to be further examined. There is an imbalanced development in the use of various forms of public participation in the country (Li et al., 2012b) and an evaluation is needed of the overall accountability effects involved. This provides an opportune moment to examine the empirical evidence relating to how and how much current participation practices influence and shape project accountability and SA, thereby helping establish improved social governance for China's future urbanization and infrastructure development.

In response therefore, we present the results of a questionnaire survey conducted in South China, which has a relatively long 'opening-up' history and is a pioneer in public participation practice. The opinions of the different stakeholders involved in public projects (local government officials, designers, consultants, contractors and the public) are analyzed to test a series of hypothesized relationships between the region's project decision-making accountability (PDMA), project implementation accountability (PIA) and SA. Several theoretical and practical implications are then discussed, followed by some final remarks and recommendations.

PUBLIC PARTICIPATION PRACTICE IN CHINA: TOWARDS SA

Accountability is a cornerstone of modern governance across all societies (Bovens, 2005). This evolving concept has been increasingly used to evaluate the effectiveness and performance of governments' public service provision and goods delivery (Haque, 2000). In the recent emerging governance modernization initiatives across developed and developing countries around the world, accountability has been increasingly used in combination with social governance by governments to build public's trust and improve the delivery of public goods and services (Joshi, 2017). In China, it refers to “the efforts of government to serve people’s interest” (Guo, 2003; Cheung & Leung, 2007).

Driven by rapid urbanization and economic growth, China become the largest country investor in urban and infrastructure developments–estimated to be USD7.3 trillion (million million) in air travel, electricity, telephone and road infrastructures between 2008 and 2017 (Economist, 2008)–triggering the country’s rapid emergence of public projects and related public participation practices (Xie et al., 2014). This trend has been reinforced by two factors: modernization of the national governance system and capacity, and emergence of the middle class. First, in 2013, the central government identified “the modernization of the national governance system and capacity” as one of the two overall goals in deepening in the reform 18th Central Committee of the China Communist Party’s 3rd Plenary Session. Thus, the focus of current governmental reforms has moved towards strengthening social governance to improve governance capacity and serve the fundamental interests of the most number of people in the country, promoting the increasing adoption of public participation strategies in public services and project development in the past few years. Second, outstanding economic developments in recent decades also have boosted social stratification with, according to *Economist* (2009), the middle class is estimated to account for nearly 60% (nearly 800million) of the country’s population, which has further led to a concomitant increase in the adoption of public participation practices.

In the context of projects, accountability refers to the clear definition and government’ objectives and their monitoring arrangements and incentives during project development through a participatory approach (Flyvbjerg et al., 2003; Brett, 2003). However, whether current public participation practices lead to accountability in China is still a pivotal, yet debatable, issue (Xie et al., 2014; Li et al., 2012b). This may be because of ambiguity and pluralism in the definition and categorization of project accountability. Based on recent studies (Xie et al., 2014 & 2017; Aga et al., 2018), this study proposed a threefold categorization of public project accountability, including the PDMA, PIA, and SA. According to Dewachter et al. (2018), PDMA and PIA refer to short-route accountability; SA refers to long-route ones. These two types of accountability constitute a complex adaptive system that involves social actors, institutions, process, and mechanisms interacting at various levels and in various directions (Halloran, 2016). With reference to previous research on public service accountability (Devarajan et al., 2014; Dewachter et al., 2018; Halloran, 2016), two hypothetical relationships between short-route and long-route accountability in public projects can be deducted. First, investigating short-route accountability in public projects needs to consider the impact of long-route accountability and its broader context (Halloran, 2016). Second, long-route accountability largely may pave a way for short-route accountability (Dewachter et al., 2018). The levels of state responsiveness and the SA objectives (long route) established make the arrangements of local providers accountable and necessary fitting with local needs (short route) (Devarajan et al., 2014). Nevertheless, these hypothesized relationships have been seldom addressed in previous research. Therefore, it is important to develop the measures involved by quantifying public project accountability to obtain an overall understanding of public project accountability dichotomy in terms of short and long routes.

PDMA

PDMA refers to short-route effects of public participation practices in decision making (including design and planning issues) of infrastructure projects aiming to achieve project success and sustainability (Aga et al., 2018; Montalbán-Domingo et al., 2018; World Bank, 2006). This issue has been a main focus concerned by previous studies, especially those involving environmental impact assessments (EIAs) (Diduck et al., 2007; Li et al., 2012a & 2012b; Manowong and Ogunlana, 2006). For these developing countries, including publics in EIAs through public hearings or consultation is a common requirement of such international organizations as the World Bank to obtain internationally aided project funding. Similarly, public participation has been introduced into China through World Bank-aided projects since the 1980s (Plummer and Taylor, 2004). Due to the increasing socio-economic and environmental conflicts over public projects during China's rapid urbanization since the 1990s, public participation has been further adopted as a potential solution over the past two decades (Li et al., 2012b; Shan and Yai, 2011). As a result, current public participation in project decision making should lead to PDMA because it has now become an indispensable requirement for public projects through a continued legislative framework (Li et al., 2012b; Shan and Yai, 2011). Hence, we propose

Hypothesis 1 (H1). *Public participation can contribute to PDMA.*

PIA

PIA refers to short-route effects derived from public participation in project implementation processes aiming to enhance process transparency and facilitate project implementation. PIA arose from the needs of dealing with the public's concerns on the safety, environmental (e.g. dust, solid waste, air pollutants, and traffic congestion), ecological, and other issues during project development process due to the public ownership in public projects (Liu et al., 2018; Valentin et al., 2017; Xie et al., 2014, 2017). As evidenced by mass media reports, public complaints regarding public projects have increased rapidly over the past two decades because of the significant increase in public infrastructure, public events, and urban renewal and development. For instance, Guangzhou's Mayor made an open apology to residents through a local newspaper over the dust, air pollutants, and traffic jams occurring during the construction of the Asian Games venue. The solution, supported by Xie et al.'s (2014) large-sample survey of China's major cities, is for greater public participation, to provide feedback to PIA, and hence we propose

Hypothesis 2 (H2). *Public participation can contribute to PIA.*

Recognizing that PIA will emerge after PDMA, which is a part of project planning, its requirements should be written into construction contracts (Valentin et al., 2017). Thus, PDMA may serve as mediator to achieve PIA. Thus, we further assume:

Hypothesis 3 (H3).*For public projects, PDMA can help develop PIA.*

SA

SA refers to long-route accountability of continued collective public efforts derived from the entire process of pubic goods through engagement with public institutions (Joshi, 2017; Li et al., 2018), which is the original and ultimate goal of public participation initiatives in western countries due to the requirement of democratic politics (Arnstein, 1971; Irvin & Stansbury, 2004; Fox, 2015). Despite its different political system, the Chinese central government has instituted reforms since early 2013 have paid significant attention to such issues through social governance (Liu, 2017). To enhance this trend, public participation has been increasingly adopted as a form of social governance to deal with economic, social, and environmental challenges in public projects, especially for mega infrastructure development. In addition, several studies on public service accountability have revealed that the more forms of participation are jointly used, the greater are the outcomes and accountability (Gaventa & Barrett, 2012; Halloran, 2016; Joshi, 2017). Hence, we assume

Hypothesis 4 (H4). *Multi-form Public participation can help establish social accountability of public projects.*

As noted by Dewachter et al. (2018), social accountability (long-route accountability) may pave a way for short-route accountability (e.g., PDMA and PIA).That is, both PDMA and PIA may serve as mediators to establish eventual social accountability in the long run. Thus, we further assume:

Hypothesis 5 (H5).*For public projects, PDMA can help establish social accountability.*

Hypothesis 6 (H6).*For public projects, PIA can help establish social accountability.*

The final hypothesized model is shown in Figure 1, which we can examine with partial least squares (PLS) path analysis.

RESEARCH METHODOLOGY

To test the hypotheses, we used a cross-sectional survey to solicit opinions from the various project stakeholders. This was carried out mainly in Guangzhou city, Guangdong province, as is one of China’s most developed economic areas and recognized as having adopted more forms of public participation in public projects than other regions (Shan and Yai, 2011).

Measurement Development

The measurement items used in the questionnaire survey involved the forms of public participation and three accountability effects. In particular, the measurement items of three accountability effects were tested through a pilot survey study with 17 experts involved. Based on feedback of a pilot study, these 15 measure items were regarded as valid and used in the following large sample survey. Table 1 summarizes all the constructs, measurement items and their sources.

The six participation forms contextualized Wang’s (2001) six participation forms in terms of China’s public projects contexts. As noted by Wang (2001), public participation forms used in US cities include: (a) public hearings, (b) citizens’ advisory boards, (c) community or neighborhood meetings, (d) individual public representatives and public surveys, (e) citizen focus groups, (f) citizen telephone hotline, and (g) the Internet. As a result of increasing social development practices, an increasing variety of forms of public participation has been also adopted in China. Clearly, the use of different forms of participation or combinations thereof influence potential participation effects and, as Wang (2001) comments, a systematic evaluation of forms is needed. Based on a full evaluation and validation by Xie et al.'s (2014) earlier large-sample survey, the six items were adopted in this study. They are (a) public polling, (b) public exhibitions, (c) public hearings and consultation, (d) public petition and votes, (e) roundtable negotiation meetings and forums, and (f) public-participated monitoring and evaluation systems.

The measurement items regarding accountability effects identified in the earlier study through another round of literature review and expert interviews (Li et al., 2013). Seven measurement items were adopted from the earlier study of participation effects; the other eight items were identified from the recently published literature. For PDMA, we modified the measurement items suggested by Li et al. (2012b, 2013). In this study, we adopted five measurement items to evaluate whether current participation practices can achieve PDMA in China. Given the lack of a systematic evaluation of the scales regarding public participation effects, we first conducted a pilot survey with 17 academic and practitioner experts to test the scale. For PIA, we adopted five self-developed measurement items as there are no extant measurement items for this construct. Consulting earlier survey studies (Xie et al., 2014 & 2017; Lin et al., 2017) and a review of recent studies of this issue (Li et al., 2012b, 2013; Shan and Yai, 2011) yielded five measurement items. SA is a very new construct in existing public participation research in the context of project. We elaborated and expanded Xie et al.'s (2014) four items measuring the social effects of public participation to a five-item scale by incorporating Li et al. (2013) and Shan and Yai's (2011) findings on this aspect.

Sample and Data Collection

The target population comprised the main stakeholders of public projects, including government officials, clients, contractors, designers, consultants, and the public. Invitations were dispatched to the target respondents in the region during professional development courses provided by the region's South China University of Technology, a leading Chinese university in construction engineering and related disciplines. All participants were asked to evaluate the issues surrounding the forms of participation and their performance based on a five-point Likert scale. Finally, 158 valid responses were retained for subsequent analysis (Table 2).

Preliminary Analysis and Common Methods Variance

Principal component analysis (PCA) and one-way analysis of variance (ANOVA) were used to verify whether the data collected were suitable for the PLS path modeling. PCA was first conducted to extract the Forms, PDMA, PIA, and SA in Form1–Form6, P1–P5, P6–P10 and P11–Q15, respectively (Table 3). The results only indicated only one principal component extracted in each test regarding the four constructs with Kaiser-Mayer- Olkin (KMO) values higher than 0.5 at the significant level of $p< 0.0001$ (for Bartlett's test of sphericity) (Hair et al. 2006); thus, the data has significant suitability. As the survey respondents took different stakeholder roles (e,g., government, clients, designers, and contractors), ANOVA was conducted to examine whether the responses from participants with different stakeholders had significant difference. The results indicated no significant difference existed in the response across stakeholder roles; thus, the 158 responses could be analyzed as a whole for the subsequent analysis.

As the data were collected using a single-informant and cross-sectional survey, the possibility arises of common methods variance (CMV) that is a potential problem caused by the use of single measurement method to measure the two constructs with causal relationships (e.g., participation forms and accountability effects). In order to evaluate the potential CMV, we use the Harman one-factor test on the three first-order latent variables (Podsakoff and Organ, 1986). Harman one-factor test is one of the most common methods used to control the CMV through the factor analysis based on the assumption that CMV will emerge when a single factor is extracted or a general factor explains the majority of the covariance in the independent and dependent variables (Podsakoff and Organ, 1986). The result show that the first factor identified accounts for only 22.7% of the total variance explained, which is lower than the threshold of 25% suggested by Williams et al. (1989). This indicates that none of the individual factors can account for sufficient explained variance; thus, CMV biases are unlikely to exist in the dataset. In addition, we surveyed participants from six different project stakeholders to reduce potential item ambiguity (Tourangeau et al., 2000). Therefore, although the above analysis and survey design cannot entirely eliminate the possibility of CMV, CMV is nevertheless unlikely to be significant (Podsakoff and Organ, 1986).

DATA ANALYSES METHODS

The partial least-squares (PLS) was a kind of structural equation modeling methods adopted by this study to test the hypotheses. This method is a mixture of principal components analysis, path analysis, and regression analysis that can assess theory and data at the same time (Aibinu and Al-Lawati, 2010). PLS have a strong ability in examining links between measurement items and their associated constructs and among various constructs through estimated parameters (Mohamed, 2002). Compared with other structural modeling analyses, PLS has a minimum requirement on sample size, but a strong ability of dealing with non-normal data sets (Reinartz et al. 2009; Ringle et al. 2012).

This study adopted the SmartPLS V3.2.8 to assess measurement models. Regarding the assessment of a structural model, this study used a path-weighting scheme with bootstrapping aided, which would yield the significance of path coefficients for estimation.

DATA ANALYSIS RESULTS

We tested the hypotheses in terms of the analysis procedure suggested by Zheng et al. (2017). Firstly, we constructed a measurement model to validate the validity of the constructs and measurement items. Secondly, the structural model was further developed to evaluate the proposed path model and hypotheses.

Measurement Model Results

We assumed the public participation forms to be a formative construct that was measured by a group of negatively correlated items (Coltman et al., 2008). Thus, the standardized root mean square residual (SRMR) value was used to assess the validity of the measurement model. The PLS analysis results indicate that the SRMR value is 0.074, smaller than a conservative threshold value of 0.08, thereby ensuring the validity of this construct. In addition, item loadings were used to assess indicator reliability of this construct. The results indicated that only the loading of FORM6 had a value beyond 0.4. Thus, the four items, FORM1, FORM 3, FORM4 and FORM5, were dropped for further analysis. In the adjusted model, the loading values of residual items, FORM2 and FORM6, achieved the threshold of 0.4 as shown in Table 4.

By treating the three kinds of accountability construct as reflective constructs that are measured by a group of positively correlated items (Coltman et al., 2008), the validity of measurement models regarding the three accountability constructs was evaluated in terms of the internal consistency, indicator reliability, convergent validty, and discriminating validity (Hair et al., 2011; Ning and Ling, 2013; Zheng et al., 2017). First, composite reliability (CR) was used to evaluate the internal consistency. As shown in Table 4, the CR values regarding the three accountability constructs have a satisfactory value exceeding the threshold of 0.70. Second, loadings of each measurement item on corresponding constructs was used to assess indicator reliability, which is confirmed by the loading values of the 15 accountability items ranging from 0.674 to 0.873, much higher than the threshold of 0.4. Third, average variance extracted (AVE) was used to assess convergent validity (Hair et al. 2011). Each AVE of the three accountability constructs has an AVE value beyond 0.50, thereby indicating a significant convergent validity (Hair et al. 2011). Last, discriminating validity was evaluated by the square roots of AVE in

Table 4, which have a larger value than their correlations with other constructs.

Structural Model Results

In the PLS analysis, the structural model is mainly assessed by the significance of the path coefficients, coefficients of determination (R^2), and predictive relevance (Q^2). We perform the path-weighting analysis with bootstrapping aided by SmartPLS V3.2.8 software to yield the significance of the path coefficients for estimation.

The results produce several interesting findings as shown in Table 5 and Figure 2. Hypothesis 1 is supported because the path coefficient is significant at the 0.01 level, although the path coefficient appears to be not very high. In addition, the current combined use of multi-form public participation makes a significant contribution to the establishment of PDMA and PIA (Hypotheses 2 and 4), because the two path coefficients involved are significant at the 0.001 level (Henseler et al., 2009). These results strongly support Hypotheses 2 and 4, that is, the current combined use of multi-form public participation can also exert a positive effect on PDMA and PIA. With regard to the mediating role of PDMA, Hypothesis 3 and 5 are supported because the path coefficient is significant at the 0.001 level, which revealed the importance of PDMA in achieving PIA and SA. Hypothesis 6 is rejected as not being significant.

The coefficient (R^2) was used to assess predictive accuracy of the model and explore the variation in endogenous constructs. In the structural model, variations in PDMA, PIA, and SA are 29.9%, 53.6%, and 67.4%, respectively, which achieved a satisfactory level (Zheng et al., 2017). In addition, Stone–Geisser's Q^2 was used to evaluate the predictive relevance of the model (Geisser, 1974; Zheng, 2017). The results obtained have a satisfactory value beyond zero (Chin, 1998), thus indicated the predictive relevance existing in the model.

DISCUSSIONS AND IMPLICATIONS

The findings of this study have contributed to recent calls for research on governance of environmental and social issues in the construction and engineering fields by uncovering the relationships between public participation and accountability effects in public projects (Shen et al., 2017; Visscher et al., 2016). In particular, public participation is validated as a potentially pivotal approach to establishing SA, which has not been clearly addressed in previous research. Meanwhile, ascertaining the multi-dimensional roles of project accountability provides useful and practical guidance to ever-increasing participation demands in public projects across developed and developing countries, which will lead to continual improvement in formulating and implementing public participation policies and strategies in practice.

Three specific theoretical implications are immediately apparent. Firstly, this study provides a significant contribution to theory in first revealing the contribution of public participation in public projects in establishing multi-dimensional accountability based on an empirical survey in China. The results indicate that public project accountability is context-bounded and accords with the threefold categorization, which is different from that in public services and policies that do not involve a separate implementation phase.

Secondly, the study is the first to reveal the mediating role of PDMA in achieving implementation accountability and establishing SA. This is intuitively plausible because, regardless of what or how public participation forms are implemented in public projects, such participation should be grounded in PDMA and gradually contribute to SA for the public's trust in the government. The result provides empirical support for the debate over whether public participation can help achieve SA or merely fashion its political system. From a social governance perspective, contemporary public participation practices in Chinese public projects have been helping the establishment of a new social governance in the country (Ma et al., 2017). Nevertheless, PIA has not been found by this study to play a mediating role in the establishment of SA for public projects.

Thirdly, the construct of public participation forms, consisting of the six measurement items, was systematically tested in this study; the result only revealed the two main public participation forms, Form2 "public exhibitions" and Form6 "public-participated monitoring and evaluation systems", in China. The study's results confirm the validity of an earlier study (Xie et al., 2014). Thus, significant future improvement is possible if more work is directed at promoting more forms of public participation in practice.

Despite being theoretically oriented, the study's results also have several practical implications for government officials and clients involved in the public governance and project management levels, respectively. These implications first echo recent calls for the establishment of a policy for promoting the more comprehensive use of forms of public participation in Chinese public projects throughout project lifecycles (Li et al., 2012b; Qi et al. 2016); this is particularly the case in project decision making, which is critical for SA at the long route.

Furthermore, the implications provide strong support for the pivotal role of public participation in developing participatory governance and establishing SA in the current government reforms. In response, increasing numbers of local governments and clients have already been making increased efforts to promote public participation practices at the project level. The Sichuan provincial government, for instance, has incorporated public participation requirements into its major procurement decision making, such as for public projects (Liu, 2016). Despite these efforts by central and local governments (Shan and Yai, 2011), the development of public participation practices for participatory governance has still a long road to travel, which mainly rely on the gradually accumulated experience of the use of mixed participation forms at the project level that can achieve SA.

CONCLUSION, LIMITATIONS AND RECOMMENDATIONS

Although the previous studies investigate the effects of public participation in public projects in developing countries, empirical research has been lacking to date to ascertain the relationships between PDMA, PIA, and SA derived from the use of multi-form public participation. This study conducts an empirical survey of 158 project stakeholders involved in public projects in south China. Quantifying public project accountability regarding public participation with a threefold categorization, the results indicate the significance of PDMA, PIA, and SA, with PDMA having a long-run mediating role in establishing SA. Thus, the results provide not only empirical evidence to examine the role of current public participation practices in Chinese public projects, but also insights into the relationships between the three kinds of accountability.

Two limitations existed in this study. First, there exists a limitation in the sample size. Recognizing that there exists an imbalanced development in public participation practice across different areas of China (Li et al., 2012b), the sample cannot be deemed as “a large sample” due to time and resource constraints. A national survey should be considered in future if possible. Second, this study has just revealed the relationships among three accountability effects derived from current public participation practices in Chinese public projects, which might not reflect dynamic processes and mechanisms by which these accountability effects could be yielded. Thus, more efforts should be directed to longitudinal research on the use of mixed participation forms in future.

Despite being developed in the Chinese context, the model is applicable to other developing countries that have adopted similarly intended public participation in their public projects. The findings enable future research into the accountability issues of public participation in developing countries by encouraging researchers and practitioners to adopt the threefold categorization framework as a core concept in theory building.

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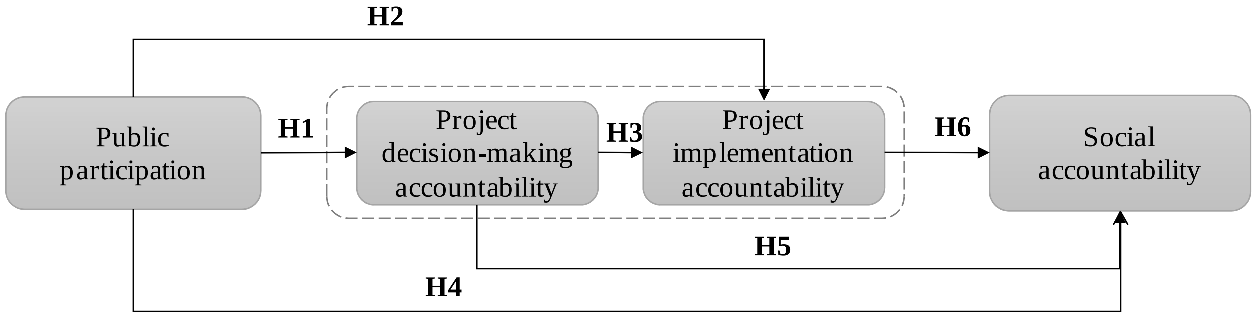

Fig. 1. Proposed path model

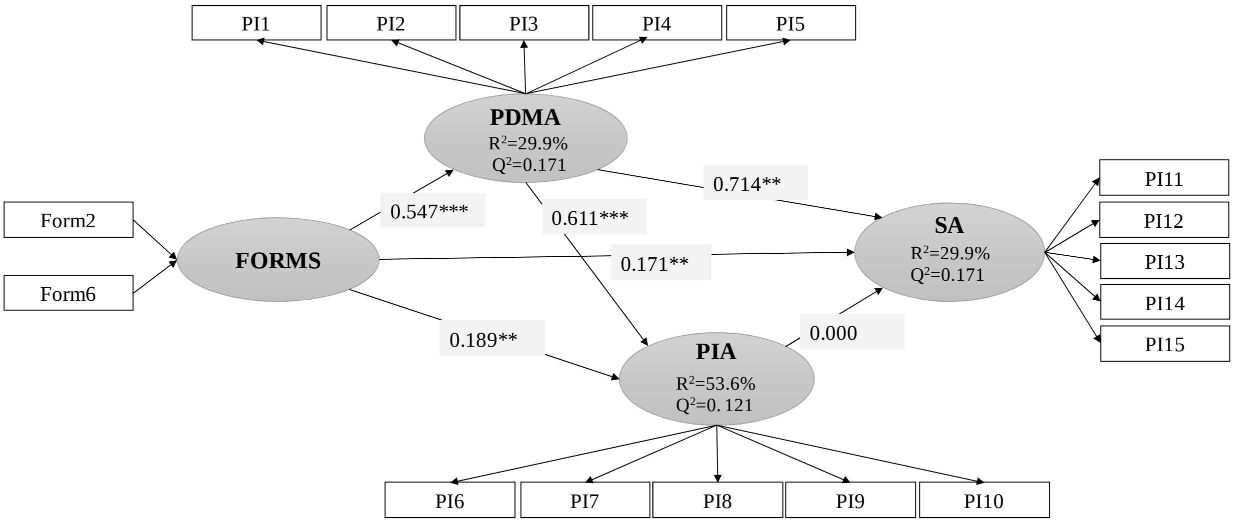

Figure 2. Structural model

(Note: ***= p <0.001(t >3.29); **= p <0.01(t >2.58); *= p <0.05(t >1.96))

Table 1 Constructs and measurement items

Code	Construct and measurement items	Sources
FORMS (Public participation forms)		
Form1	Public polling	Wang (2001); Xie et al. (2014)
Form2	Public exhibitions	
Form3	Public hearings and consultation	
Form4	Public petitions and votes	
Form5	Roundtable negotiation meetings and forms	
Form6	Public-participated monitoring and evaluation systems	
PDMA (Project decision-making accountability)		
PI1	Improve acceptance of various social classes on project planning	Li et al. (2012b & 2013); Xie et al. (2017)
PI2	Improve the profitability of public investments	
PI3	Prevent and mitigate negative environmental impacts on local residents (e.g. noise, dust, water pollution, air pollution, and traffic congestion)	
PI4	Facilitate the use of green designs and technologies for energy conservation and emission reduction in building design, construction, and operation	
PI5	Create a project design in harmony with the region's historical, cultural, and natural features	
PIA (Project implementation accountability)		
PI6	Improve project management efficiency during project execution	Li et al. (2012b, 2013); Lin et al. (2017); Shan and Yai (2011); Xie et al. (2014, 2017)
PI7	Enhance the cost effectiveness of pubic investments	
PI8	Reduce potential conflicts for a smooth project execution	
PI9	Be adaptable to the changing needs of project development.	
PI10	Improve safety control in project execution	
SA (Social accountability)		
PI11	Improve participatory decision making for better governmental governance	Shan Yai (2011) and Xie et al. (2014)
PI12	Provide more job opportunities and promote sustainable economic development in the region	
PI13	Improve the social harmony and stability of project developments	
PI14	Improve the public's confidence in the government's administrative abilities	
PI15	Improve the city's local infrastructure for the international identity and reputation	

Table 2 Profiles of the 158 participants

Profile	Category	Percentage	Number
Stakeholder role	Government	1%	2
	Clients	16%	26
	Designers	3%	4
	Contractors	65%	102
	Consultants	3%	4
	Public	13%	20
Education	Associate's degree or below	13%	25
	Bachelor's degree	83%	128
	Master's degree	3%	4
	Doctoral degree	1%	1
Working experience in the construction industry	1-5 years	7%	10
	6-10 years	26%	36
	11-15 years	22%	30
	15-20 years	22%	30
	More than 20 years	23%	32

Note: The profiles in "working experience in the construction industry" only involved 138 respondents, and the residual 20 respondents are the general public without experience in the construction industry.

Table 3 PCA and ANOVA results in terms of stakeholder roles

Item	Form 1-6	KPI 1-5	KPI 6-10	KPI 11-15
Constructs (variance explained)	Forms (53.705%)	PDMA (65.018%)	PIA (55.621%)	SA (59.771%)
KMO	0.834	0.799	0.785	0.829
Barlett's test of sphericity	0.000	0.000	0.000	0.000
p value by ANOVA (stakeholder roles)	0.403	0.110	0.128	0.344

Table 4 Measurement model results

Construct /measurement items	Item loading	*t* Value	AVE	CR
FORMS	—	—	NA	NA
Form2	0.413	3.796	—	—
Form6	0.785	9.648	—	—
PDMA	—	—	0.587	0.876
PI1	0.773	21.121	—	—
PI2	0.674	12.288	—	—
PI3	0.774	25.309	—	—
PI4	0.859	37.497	—	—
PI5	0.739	19.229	—	—
PIA	—	—	0.675	0.912
PI6	0.791	21.830	—	—
PI7	0.873	37.946	—	—
PI8	0.817	27.111	—	—
PI9	0.813	26.012	—	—
PI10	0.810	24.243	—	—
SA	—	—	0.568	0.868
PI11	0.715	12.763	—	—
PI12	0.756	19.634	—	—
PI13	0.729	17.845	—	—
PI14	0.814	27.835	—	—
PI15	0.748	19.504	—	—

Note: AVE= average variance extracted; CR=composite reliability.

Table 5 Correlations for all model constructs and evidence of discriminating validity

Construct	FORMS	PDMA	PIA	SA
FORMS	—			
PDMA	-0.55**	**0.77**		
PIA	-0.53**	0.61	**0.82**	
SA	0.56**	0.71**	0.00	**0.75**

Note: Square of AVEs are shown in the diagonal row in bold; N is between 153 and 158 (pairwise deletion of missing values); ** $p < 0.01$ and * $p < 0.05$.

Table 6 Path analysis results

Paths	Path coefficient	*t* value	Significance level	Result
H1: FORMS→PDMA	0.547	8.600	0.000	Supported
H2: FORMS→PIA	0.189	3.098	0.002	Supported
H3: PDMA→PIA	0.611	11.034	0.000	Supported
H4: FORMS→SA	0.171	3.175	0.002	Supported
H5: PDMA→SA	0.714	12.833	0.000	Supported
H6: PIA→SA	0.000	0.040	0.968	Not supported