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THE EFFECTS OF INSTITUTIONAL PRESSURES ON ORGANIZATIONAL CITIZENSHIP BEHAVIORS FOR THE ENVIRONMENTS IN MANAGING MEGAPROJECTS

Ge Wang¹, Qinghua He², Giorgio Locatelli³, Xue Yan⁴, and Tao Yu⁵

ABSTRACT

This paper extends previous literature of megaproject environmental practices by empirically exploring the effects of institutional pressures on organizational citizenship behaviors for the environment (i.e., a form of voluntary pro-environmental behavior; OCBEs) at the individual-level. A questionnaire survey was conducted to collect data from 198 megaproject professionals in China. Partial least squares (PLS) structural equation modeling was employed to analyze the survey data and to test the research hypotheses. The PLS analysis results show that both mimetic and normative pressures have significant effects on OCBEs. However, this paper does not find support for a significant effect of coercive pressures. Furthermore, the PLS analysis results also indicate that supervisory support plays a crucial but varied mediating role in the relationships between three types of institutional pressures and OCBEs. These findings provide new insights into the use of external pressures to establish a favorable institutional context for the emergence of OCBEs and thereby improve megaproject environmental performance.

KEYWORDS

Megaprojects, Institutional Pressures, Organizational Citizenship Behaviors for the Environment.

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INTRODUCTION

Megaprojects are large-scale infrastructure projects characterized by “enormous resource consumptions, significant environmental impacts, as well as a high level of risks, innovations, and complexities” (Flyvbjerg, 2014; Locatelli and Mancini, 2010; Locatelli et al., 2017; Van Marrewijk et al., 2008). A global building boom of megaprojects (e.g., subways, nuclear power stations, high-speed rail ways, and channel tunnels) is underway, especially in developing countries such as China (Hu et al., 2013; Wang et al., 2017). The scale of China’s delivery of megaprojects evokes awe (Ansar et al., 2016); however, a high speed of megaprojects construction leads to a wide range of environmental problems, e.g., resources wastes and ecological destructions (Zeng et al., 2015). Qiu (2007) reported in *Nature* that up to 1500 antelopes’ migration and breeding activities are severely affected by the Qinghai-Tibet railway construction. Given the rising concern regarding environmental issues, megaprojects are challenged with growing pressures by stakeholders and regulatory agencies to be environmentally friendly in their implementation processes (Molle and Floch, 2008). Facing increasing institutional pressures, how to improve environmental performance has become one of the most pressing and prominent objectives for megaproject management.

The megaproject literature on environmental management has mostly focused on formal and project-level practices, e.g. the application of green technologies, the adoption of environmental auditing and certification, and the implementation of environmental management system (Wang et al., 2017). Nevertheless, environmental initiatives consist of a wide variety of measures that cannot be reduced to formal and project-level practices. The management of environmental issues depends, to a large extent, on the voluntary sharing of tacit knowledge based on individual experiences that are difficult to formalize through structured and explicit practices (Boiral et al., 2015). Moreover, the success of formal environmental practices (e.g., the implementation of ISO 14000), may hinge on individual, informal, and discretionary behaviors that are beyond the prescribed role requirements (Boiral and Paillé, 2012). Where individual involvement is insufficient, the application of environmental management policies and systems tends to be disconnected from daily activities and to be implemented symbolically rather than substantively (Boiral et al., 2016). Astonishingly, these kinds of voluntary pro-environmental behaviors, which have been recently termed “*organizational citizenship behaviors for the environment*” (OCBEs) (Boiral and Paillé, 2012), are largely unexplored in the specific and increasingly important realm of megaproject environmental management; and the social-psychological mechanism leading project participants to engage in OCBEs remains unclear.

To fill these gaps, the current study, therefore, is to analyze the determinants of OCBEs in megaprojects. Boiral et al. (2015) indicated that future study could explore how institutional pressures influence OCBEs and bridge “*the gap between emergent research on OCBEs and more established literature based on institutional theory and environmental management.*” In respond to the unanswered call of Boiral et al. (2015), this study developed a structural equation model from the perspective of institutional theory. This model involves hypotheses at the individual-level (i.e., individual project participants) and expands prior studies on megaproject environmental management

by shedding light on the ways that three types of institutional pressures influence project participants' OCBEs. The findings provide new insights into the use of institutional forces to facilitate the improvement of environmental performance by establishing a favorable context for the emergence of OCBEs. Toward this end, the overarching research question that guides this study is listed as follows:

How do three types of institutional pressures (i.e., coercive, mimetic, and normative pressures) influence the OCBEs of megaproject participants?

The remainder of this paper is structured as follows. The next section provides a theoretical framework and presents the research hypotheses based on literature reviews. Thereafter, the research methods, analytical procedures, and analysis results are reported. The last part of this paper discusses the findings and their implications for megaproject environmental management.

THEORETICAL FRAMEWORK AND HYPOTHESES DEVELOPMENT

OCBES IN MEGAPROJECTS

Boiral (2009) defined OCBEs as comprising “*individual, voluntary, and discretionary social behaviors that are not explicitly recognized by the formal management system and that contribute to effective environmental management by organizations.*” OCBEs include different types of initiatives in megaprojects, e.g., making suggestions to minimize construction wastes, providing early warning to prevent on-site pollution accidents, as well as helping colleagues to better understand project environmental goals and encouraging them to adopt more environmentally conscious behaviors in daily work. Although OCBEs may appear mundane or secondary when taken individually, they tend to have a multiplier effect on environmental performance when accumulated over time and individuals (Raineri and Paillé, 2016).

OCBES, which are based on individual, voluntary, and informal initiatives, are increasingly considered to be one of the critical success factors in improving the environmental practices and performance of organizations (Alt and Spitzeck, 2016), especially for complex, dynamic, and temporary organizations such as megaprojects (He et al., 2015; Wang et al., 2017). Because compared with “regular projects” (i.e., small- or medium-sized projects), megaprojects have more informal coordination activities between different project stakeholders (Van Marrewijk et al., 2008; Zeng et al., 2015). For example, Shanghai Expo includes 136 pavilions and over 160 supporting facility buildings. The client of Shanghai Expo faces a large number of coordinating activities (both regular and informal meetings) with hundreds of contractors and designers (Hu et al., 2014).

According to Paillé and Raineri (2015) and Boiral et al. (2015), “if individuals are aware that their organization is challenged with growing institutional pressures to be environmentally friendly, and the organization (or manager) gives appropriate support to help them better integrate environmental concerns in the workplace, they might be

more prone to reciprocate by performing OCBEs.” In accordance with this proposition, the current study is based on social exchange theory (SET), which “contends that individuals often enter into social exchanges because they perceive that the other party (e.g., supervisor) in the relationship has something to contribute.” As for megaprojects, “*project participants are more likely to perform OCBEs if they perceive that their manager gives appropriate support to help them implement environmental practices pursuant to laws, regulations, norms, and etc.*” It is notable that SET is a theoretical perspective of interest for environmental literature, especially when a responsible behavior toward the environment is not designed as a required task of the job (Paillé et al., 2013; Paillé and Raineri, 2015). Therefore, by drawing on SET, this paper develops the following research framework to further examine the determinants of OCBEs (Figure 1).

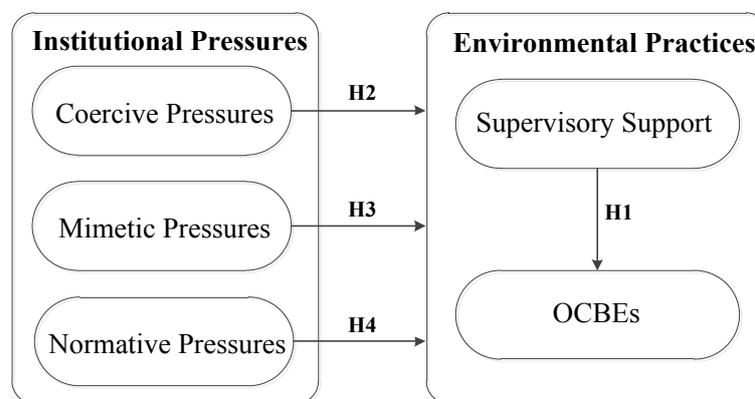


Figure 1. Research Framework

SUPERVISORY SUPPORT AND OCBES

Schaninger and Turnipseed (2005) indicated that social exchange is based on the norm of reciprocity and occurs when people respond effectively to a donor (e.g., supervisor) who provides something that is considered valuable. On this basis, Daily et al. (2009) noted that “the norm of SET suggests that supervisory support may positively relate to OCBEs.” Thus, in line with SET, it can be assumed that when megaproject managers seek to improve environmental performance and undertake supportive actions toward their subordinates, the latter would be more likely to “repay” the former by engaging to OCBEs. As a result, the following hypothesis is presented.

H1. Supervisory support is positively related to the OCBEs of megaproject participants.

INSTITUTIONAL PRESSURES AND OCBES

Boiral et al. (2015) indicated that institutional pressures can reinforce environmental values and awareness, which, in turn, foster OCBEs. As such, it is argued that megaproject participants are likely to perform OCBEs if they experience the effects of institutional pressures. According to the taxonomy of institutional pressures (DiMaggio and Powell, 1983), this paper presents the research hypotheses from the following three aspects:

Coercive pressures refer to the compulsory pressures exerted by powerful agencies such as governments. According to Testa et al., (2015), coercive pressures provide a system of actions and constraints that promote project managers' investment on environmental practices (Raineri and Paillé, 2016) and stimulate the emergence of OCBs. As a result, the following hypotheses are presented:

H2a. Coercive pressures are positively related to the supervisory support on environmental issues.

H2b. Coercive pressures are positively related to the OCBs of megaproject participants.

Mimetic pressures reflect the pressures on organizations to imitate others' successful practices (DiMaggio and Powell, 1983). As megaprojects are notorious for poor environmental performance, project managers need to increase support for keeping abreast of successful practices in peer-projects. Furthermore, Boiral et al. (2015) indicated that "leading by example" is the key to reinforce individuals' concern and commitment towards the environment and, in turn, motivate their engagement in voluntary pro-environmental behaviors. Thus, the successful environmental practices of peer-projects could be followed as a model to stimulate the emergence of OCBs among megaproject participants. All of the above reasoning suggests the following hypotheses:

H3a. Mimetic pressures are positively related to the supervisory support on environmental issues.

H3b. Mimetic pressures are positively related to the OCBs of megaproject participants.

Normative pressures mainly derive from professionalization and take the form of rules-of-thumb, standards, and norms (Phan and Baird, 2015). These norms are diffused within the professional fields through information exchange activities, including industrial conferences, professional consultations, and vocational educations (He et al., 2016). It is expected that project managers tend to build a strong sense of environmental commitment by involving such information exchange activities and thereby enhance the support on environmental protection. Moreover, through proper training programs and regular workshops, megaproject participants assimilate the professionalization, build a sense of attachment and responsibility to environmental concerns in the workplace, and in turn demonstrate their willingness to adopt environmentally responsible behaviors (Paillé and Raineri, 2015). These discussions lead to the following set of hypotheses.

H4a. Normative pressures are positively related to the supervisory support on environmental issues.

H4b. Normative pressures are positively related to the OCBs of megaproject participants.

METHODS

QUESTIONNAIRE SURVEY

To empirically validate the research framework and hypotheses, a questionnaire survey was conducted to collect primary data. The questionnaire was designed and developed based on literature reviews, project observations, and semi-structured interviews. The measurement items of coercive pressures (CPs), mimetic pressures (MPs), and normative pressures (NPs) were adopted from Cao et al. (2014) and He et al. (2016), and were modified to suit the environmental management perspective in the megaproject context. Supervisory support (SS) was assessed based on the measurement items identified by Raineri and Paillé (2016). The operationalization of OCBEs was based on the measurement items developed by Boiral and Paillé (2012); and the detailed items of OCBEs were modified to fit the context of megaproject management after rounds of interviews. All measurement items were rated using a five-point scales from 1 (strongly disagree) to 5 (strongly agree). This questionnaire was originally developed in English, and ultimately translated into Chinese to facilitate the surveyed respondents' understanding. To ensure consistency between the two language versions, this study employed the back-translation technique.

A pre-test survey invited 23 megaproject professionals to assess the rationality of the questionnaire's scope and to identify the ambiguous expressions of the measurement items. Then, with the support of megaproject owners, the formal questionnaire survey was conducted between November 2015 and March 2016 in China. To enhance the response quality, all respondents were informed of the purpose of this survey, assured of the confidentiality of their answers, and offered small gift (e.g., notepad, gel pen, and bookmark with Tongji logo) for completing the questionnaire. In addition, this survey used a question "Are you familiar with the project environmental policies and measures?" to determine how respondents perceived a project's environmental practices, with the options of "Yes," "No" or "Unsure." The adoption of an "Unsure" option was inspired by Norton et al. (2014), with the aim to prevent respondents from having to make a forced-choice response. Ultimately, only the respondents who provided a conclusive answer of "Yes" were retained, while the "No" or "Unsure" answers were discarded as invalid responses. After the omission of invalid responses and the deletion of outliers, 198 responses were included in the subsequent analysis.

Among the 198 valid responses, 72 were from owners, 61 from contractors, 39 from consultants, and 26 from designers and suppliers (Table 1). Their jobs are all related to environmental practices; they are familiar with environmental laws, regulations, and policies and have previous experiences in environmental activities (e.g., sustainable design, environmental training, and green materials supply). ANOVA test was conducted to compare the answers from owners, contractors, consultants, as well as designers and suppliers; the p-values for CPs, MPs, NPs, SS and OCBEs are 0.485, 0.644, 0.281, 0.650, and 0.936, respectively. This result suggests the insignificant difference in the answers from the four groups of responses (p-values are all above 0.05).

Table 1. Demographic Information of Respondents

Variable	Category	Number of Respondents	Percentage
Project Role	Owner/Government	72	36.36
	Contractor	61	30.81
	Consultant	39	19.70
	Designer	14	7.07
	Supplier	12	6.06
Project Type	Large-scale Exhibition Facility/ Industry Zone	63	31.82
	Urban Metro System	41	20.71
	Integrated Transport Hubs	37	18.69
	Energy Source Bases	25	12.62
	High Speed Railways	18	9.09
Location	Long-span Bridge	14	7.07
	East China	95	47.98
	South China	36	18.18
	North China	32	16.16
	West China	21	10.61
Position	Central China	14	7.07
	Project Manager	58	29.29
	Department Manager	31	15.66
	Professional Executive	45	22.73
Years of Experience	Project Engineer	64	32.32
	≤5 year	55	27.78
	6-10 year	61	30.81
	11-15year	48	24.24
	16-20 year	19	9.59
	> 20 year	15	7.58

TOOLS FOR DATA ANALYSIS

Factor analysis (FA) was performed to analyze the primary data collected in the questionnaire survey. Exploratory factor analysis with principal component analysis (PCA) can identify the underlying grouped factors and condense the measurement items (Hair et al., 2010). Partial least square (PLS) analysis was conducted to test the hypotheses. PLS is a technique that combines PCA, path analysis, and regression for the simultaneous estimation of multiple dependent variables (Ringle et al., 2012). The

main reason for using PLS lies in that it has minimal requirements on sample size and residual distribution to achieve sufficient statistical power and robustness (He et al., 2016). Moreover, PLS is most applicable to early-stage theory development, which fits well with the exploratory nature of this study (Lim and Loosemore, 2017; Wang et al., 2017).

RESULTS AND DISCUSSIONS

FACTOR ANALYSIS

FA was conducted for the 10 items of institutional pressures. The Kaiser-Meyer-Olkin (KMO) value is $0.812 > 0.6$, indicating satisfactory sample adequacy (Field, 2009). The Bartlett's Test of Sphericity (BTS) produces an approximation of $\chi^2 = 640.859$ ($df = 45$, $p = 0.000 < 0.001$), which suggests that the correlations between variables are sufficiently strong for PCA. Hair et al. (2010) noted that the loading of each measurement item on its corresponding construct should not be less than 0.5. Thus, MP4 (0.365) was deleted from the list of institutional pressure items.

A subsequent PCA was performed for the 9 remaining items. The KMO value is 0.795, thereby exceeding the recommended value of 0.6; and BTS reaches statistical significance ($\chi^2 = 588.820$, $df = 36$, $p = 0.000 < 0.001$). Finally, the PCA analysis results in the extraction of three different factors reflecting CPs, MPs, and NPs respectively. Table 2 shows that the rotated loadings of the manifest items on their intended constructs are all above the recommended threshold of 0.5 and larger than the loadings on other constructs. These results validate the rationality of using the 9 listed institutional pressures items to reflect the CPs, MPs, and NPs constructs. Similarly, FA procedures were also applied to extract the measurement items of SS and OCBEs. And no SS or OCBEs item was removed from the measurement model.

Table 2. Component List of Institutional Pressures Items

Measurement Items	Factor Loadings		
	Factor 1	Factor 2	Factor 3
NPs2	.851	.199	.082
NPs1	.829	.094	.178
NPs3	.755	.045	.303
CPs2	.126	.829	-.007
CPs1	.170	.810	.120
CPs3	.008	.788	.268
MPs1	.067	.181	.856
MPs2	.204	.141	.778
MPs3	.424	.031	.726

Variance explained (%)	24.432	23.016	22.917
Variance cumulatively explained (%)	24.432	47.448	70.365

EVALUATION OF THE MEASUREMENT MODELS

The validity of all measurement items was further assessed in terms of the internal consistency, convergent validity, and discriminant validity. Internal consistency was assessed by estimating the composite reliability. Table 2 shows that the composite reliability values are all larger than 0.7, indicating a satisfactory level of reliability of internal indicators with each construct (Hair et al., 2011). Convergent validity measures the extent to which the items underlying a particular construct actually represent the same conceptual variable. The initial evidence of convergent validity is reflected by the values of average variance extracted (AVE). Table 2 indicates that the AVE values are all larger than 0.5, suggesting a satisfactory level of convergent validity of the constructs (Hair et al., 2011). In addition, the square roots of AVE (values on the diagonal of the correlation matrix) are all larger than the absolute value of the inter-construct correlations (off-diagonal values), which indicates that the constructs have satisfactory discriminant validity.

Table 2. Measurement Validity and Construct Correlations

Construct	CR	AVE	Correlation Matrix				
			CPs	MPs	NPs	SS	OCBEs
CPs	0.866	0.683	0.826				
MPs	0.865	0.681	0.330	0.825			
NPs	0.880	0.710	0.296	0.442	0.843		
SS	0.842	0.572	0.293	0.501	0.473	0.756	
OCBEs	0.927	0.646	0.302	0.552	0.525	0.529	0.804

HYPOTHESES TESTING

A bootstrapping procedure with 5,000 resamples was performed to compute standard errors and to test the statistical significance of path coefficients. The results of bootstrap-based PLS analysis are presented in Figure 2. The R^2 value of the dependent variable (i.e., OCBEs) is 0.446, indicating that most of the variances in the construct are explained by the research model. And the influence of SS on OCBEs is significant ($\beta = 0.239$, $p < 0.001$), thus Hypothesis 1 is supported. It is also shown that the MPs–SS link ($\beta = 0.340$, $p < 0.001$) and NPs–SS link ($\beta = 0.296$, $p < 0.001$) are all significant, thereby providing evidence for Hypotheses 3a and 4a, respectively. However, the CPs–SS link is not found to be significant ($\beta = 0.093$, $p > 0.05$), hence Hypothesis 2a is not supported.

Regarding the relationships between institutional pressures and OCBEs, only the influence of CPs is not found to be significant when the effect of SS is included ($\beta=0.056$, $p > 0.05$). Meanwhile, the MPs–OCBEs link ($\beta = 0.297$, $p < 0.001$) and NPs–OCBEs link ($\beta = 0.264$, $p < 0.001$) are all significant, thus providing evidence for Hypotheses 3b and 4b, respectively. Together with the significant links between

MPs and SS and between SS and OCBEs, this finding further indicates that the influence of MPs on OCBEs is partially mediated by SS. A similar conclusion is also reached for NPs.

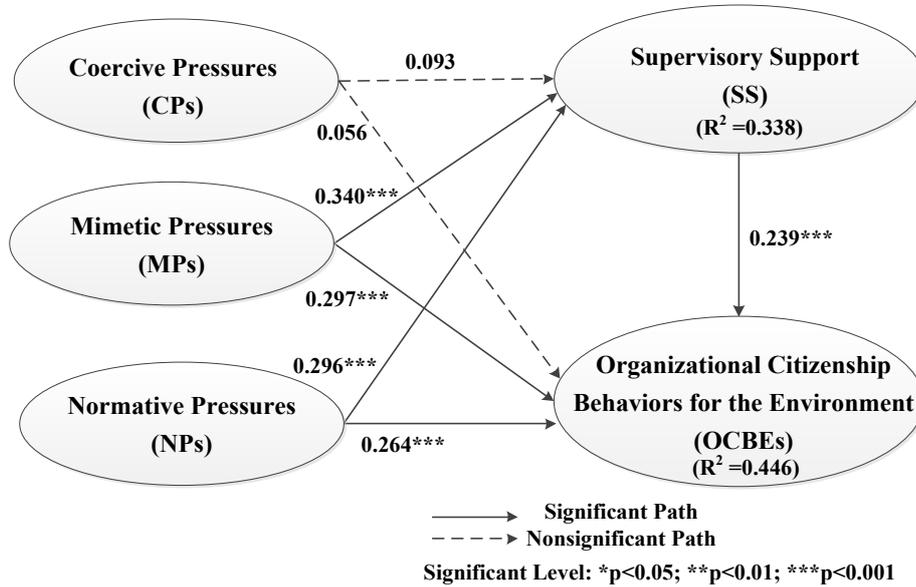


Figure 2. Results of PLS Analysis for the Research Model

To further investigate the effects of CPs, MPs, and NPs on OCBEs, an alternative model without the mediator (i.e., SS) was tested using the collected data. The results of the PLS analysis for the alternative research model are presented in Figure 3. Although the intermediating effect of SS is excluded, the direct influence of CPs on OCBEs is still insignificant. Thus, Hypothesis 2b is not supported by the data.

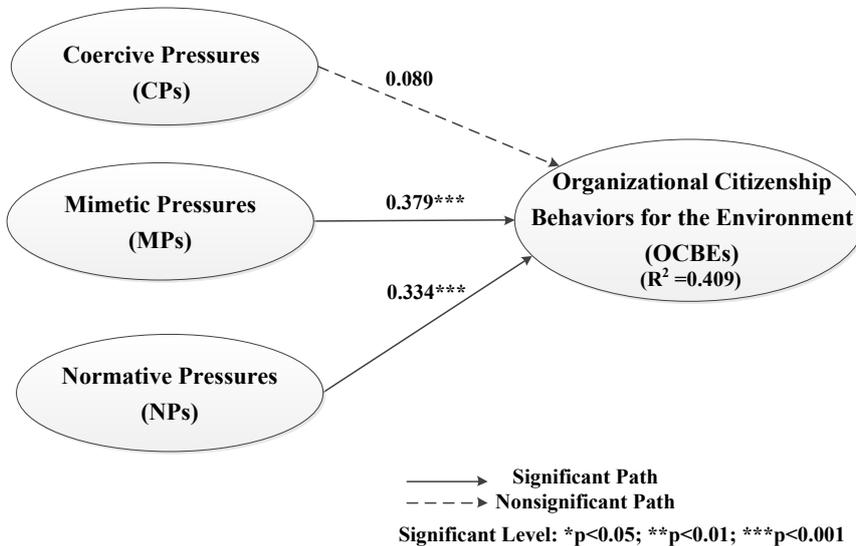


Figure 3. Results of PLS Analysis for the Alternative Research Model

CONCLUSIONS

Given the rising concerns regarding environmental sustainability, megaprojects are under growing external pressures from a wide range of stakeholders (e.g.,

regulatory agencies, industry associations, and benchmark projects) to become “greener” in their implementation processes (Zeng et al., 2015). The institutional conditions in which project are implemented are important drivers that shape the project context and influence project participants’ environmental behaviors (Yusof et al., 2016). Boiral et al. (2015) posited that institutional pressures in the form of environmental regulations or stakeholders’ expectations have positive influences on the emergence of OCBEs. Interestingly, the findings confirm the important role of mimetic and normative pressures in promoting OCBEs; however, coercive pressures have an insignificant or marginally significant impact on OCBEs. Future studies on the external determinants of OCBEs should not use one latent variable to represent different pressures from various institutional constituents. This approach may mix the different institutional effects and weaken the explanatory power.

Mimetic pressures are the strongest external drivers of OCBEs, which further confirms the critical role of “leading by example” in promoting OCBEs (Boiral et al., 2015). The benchmark practice of peer-projects tends to speak much louder than words (e.g., project documents and industry standards). Therefore, in order to enforce the willingness of project participants to sustain and support the megaproject’s environmental practices on a discretionary basis, one effective way is to establish regular communication/interaction activities with peer-projects. In other words, project participants need regular access to the best practices and successful experiences of environmental management in benchmark projects.

Normative pressures are also external determinants of OCBEs that cannot be ignored. In the context of megaproject implementation, industry professional bodies play an important role in spreading information on innovative environmental measures and in advocating cutting-edge green technologies. However, an interviewee in this study noted that “the actual level of involvement of professional communities is not high in China’s megaprojects,” which partly explains why the influences of normative pressures on OCBEs seems moderate. To address this concern, one possibility is to introduce on-site representatives from industry professional bodies (e.g., LEED accredited professionals) to megaprojects’ environmental practices.

Coercive pressures have insignificant influences on project participants’ OCBEs. Megaprojects are “large unique projects” where the public sectors act as clients/owners or even as the main contractors and thus are very likely to be in a regulatory “vacuum” (Locatelli et al., 2017). In the context of strong governments and weak regulations (Zeng et al., 2015), coercive pressures are insufficient to enforce project participants’ willingness to contribute their efforts to megaprojects’ environmental practices. In this case, independent third-party environmental supervisors are in a compromising position to fill regulatory “vacuum” and more importantly guide and encourage project participants to adopt environmentally conscious behaviors.

Notwithstanding its contributions, the current study has several limitations that warrant considerations in future research. *Firstly*, this study was conducted in a specific institutional context in China. This may limit the generalizability of the empirical results to other institutional contexts. A natural extension of the current study is to compare the influences of institutional pressures on OCBEs in different cultural and market environments. *Secondly*, while a number of methodological

measures were adopted to minimize the effects of common method variance and social desirability, it is important to recognize that this study collected data in the same session and from the single source (i.e., questionnaires). Therefore, future study may use a longitudinal research design to verify the stability of the observed correlations over time. *Thirdly*, the focus of this study has been placed on individual-level OCBs, and future investigations may analyze the contextual factors that enable the manifestation of OCBs at the project-level.

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