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HOW EMOTIONAL INTELLIGENCE AFFECTS INTER-ORGANIZATIONAL RELATIONSHIPS IN MEGAPROJECTS: THE BOUNDARY SPANNING PERSPECTIVE

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Abstract. Boundary Spanners (BSs) substantially impact relationship development in megaprojects. Yet, previous research only focused on the emotional intelligence (EI) of single-level BSs, e.g., megaproject managers and decision-makers. By clustering BSs into higher-level BSs (HBSs) and middle-lower-level BSs (M&LBSs), this article aims to investigate how to enhance inter-organizational relationships through different-level BSs' EI and boundary-spanning behaviors including ambassadors, coordination and information scanning behaviors. Data from 119 HBSs and 171 M&LBSs in 15 megaprojects were first collected with a questionnaire survey. 18 semi-structured interviews were then undertaken to give a deeper explanation to the underlying mechanism. The results show that HBSs' EI is directly and positively associated with inter-organizational relationships. However, the benefit of M&LBSs' EI in megaprojects can only be realized through the mediating effect of their boundary-spanning behaviors. HBSs' EI is effective in improving external ambassadors' activities. In contrast, M&LBSs' EI is effective in improving information scanning. This study advanced EI and relationship study in megaprojects, stating the mechanism between these two variables varies for different-level boundary spanners.

Keywords: boundary spanner, boundary spanning behavior, emotional intelligence, inter-organizational relationships, mixed-method, megaproject.

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1. Introduction

Megaprojects are delivered by multiple organizations (Denicol et al., 2021), exerting complex inter-relationships and a dense network of social connections (Zhao et al., 2023). Zhang et al. (2022) describe megaprojects as forms of Inter-Organizational Relationships (IORs) involving multiple organizations with diverse interdependent interests. However, the characteristic of large quantities of actors easily leads to its fragmentation among different organizational boundaries (Witz et al., 2021), thus hindering IORs in megaprojects. Various factors at different levels, including cultural factors, organizational factors and industry factors, are identified as barriers to improving relationship performance in project-based industry (Costa et al., 2019). However, limited studies were looking at the individual level, i.e., the behavioral aspects including the desired actions for collaborative relationships (Zheng et al., 2017) and the psychological aspects including individuals' cognition, emotion, motivation and competency (Li et al., 2019). It is very necessary to study IORs in megaprojects from the individual level since the underlying actions, interactions and characteristics at the individual level lay the foundation understanding the macro-outcomes. Thus, the micro-foundations perspective (Barney & Felin, 2013) provides the lens to better comprehend the antecedents of IORs in megaprojects.

This article takes boundary spanners (BSs) as the breakthrough to address the aforementioned gap in knowledge considering that BSs are key individuals involved in megaprojects (Tushman & Scanlan, 1981). Due to the inherent ambiguity and uncertainty of megaprojects, different BSs can feel and generate different emotions. Such emotions are critical to understanding how and when social exchanges promote solidarity intra- or inter-groups, as described by the social exchange theory (Lawler, 2001). Emotions are rarely explicit; thus, emotional intelligence (EI) is essential for BSs to perceive and understand peoples' emotions during boundary-spanning interactions. EI helps mitigate conflict's negative influence (Khosravi et al., 2020) which is a big obstacle in inter-organizational relationships (Guo et al., 2023). Also, EI is beneficial for building trust

and smooth communication, cooperation (Rezvani et al., 2018) and project commitment (Zhu et al., 2021), which further prompts relationship quality in construction (Jelodar et al., 2016a). Therefore, individuals' EI is important antecedent leading to better IORs in megaprojects.

Moreover, this article adopts both Higher-level boundary spanners (HBSs) and middle-low level BSs (M&LBSs) (Schotter et al., 2017) as the unit of analysis to fill another gap that previous literature ignores lower-level project team members and thus providing an inaccurate picture (Ashkanasy & Dorris, 2017). HBSs include the top managers of companies with key contracts in megaprojects (Wang et al., 2021). These BSs are responsible for strategic decision-making (Pitelis & Wagner, 2019). Middle BSs, such as project managers, serve as the bridge between higher and low-level team members in the hierarchical organizational perspective due to their central network position (van Meerkerk & Edelenbos, 2018). Low-level BSs are located at the peripherals, often doing specialist activities that can facilitate relationship negotiation with external stakeholders (Fellows & Liu, 2012). To better explore the impact of different-level BSs' EI on the IORs in megaprojects, we combines middle-level and low-level BSs as the M&LBSs considering two reasons: (1) Low-level BSs are usually nominated by middle-level BSs (Di Marco et al., 2012) because of their specific skills and knowledge (Du & Pan, 2013); (2) Middle-level BSs and low-level BSs are both exposed to daily project problem-solving and coordination. Based on this background, this paper aims to address the following two research questions:

(1) How do individual-level BSs' EI contribute to megaproject interorganizational relationships (IORs)?

(2) What's the difference between the impact of different-level BSs' EI on the IORs in megaprojects?

Since individuals' influence on organizations must function through individual behaviors and interactions (Huang et al., 2016), we consider boundary-spanning behaviors as the mediation to explore the underlying mechanism between different-level BSs' EI and IORs in megaprojects. Specifically, building on Joshi et al. (2009) and Marrone (2010), we examined the mediating effect of boundary-spanning behaviors across three distinct dimensions: "ambassadors' behavior", "coordination behavior", and "information scanning behavior". Ambassadors' behavior in megaprojects involves stakeholders collaborating to influence decision-making, establish legitimacy, and ensure project continuity. Coordination behavior includes both task and relationship coordination, while information scanning gathers knowledge to enhance distribution across organizations in the project network. This article addressed the call to explore individual-level antecedents (Saad & Hegazy, 2015) in megaprojects by examining the EI of project team members at different levels and its impact on IORs in megaprojects (Rezvani et al., 2018). The results confirmed that the EI of HBSs significantly impacts IORs. Yet, the EI of M&LBSs does not have a significant direct effect on IORs; instead, boundary-spanning behaviors mediate this relationship. Moreover, HBSs' EI is more effective than M&LBSs in terms of ambassadors' behavior while M&LBSs' EI is more effective in improving information scanning. This article also sheds light on practical implications for project leaders and managers on how to effectively utilize EI to boost IORs by tailoring policies to fit the traits of different-level BSs.

2. Theoretical background and hypotheses development

To address the gap in knowledge that previous literature neglects the individual-level antecedents of IORs in megaproject, this article considers BSs' EI and their boundary spanning behaviors as influencing factors. Additionally, it integrates the EI of both HBSs and LBSs to address the oversight of lower-level project team members in prior research, which has led to an incomplete understanding (Ashkanasy & Dorris, 2017). This section aims to develop a theoretical model that links the EI of both high-level and low-level BSs, their boundary-spanning behaviors, and IORs in megaprojects by reviewing relevant literature.

2.1. EI and IORs in megaprojects

2.1.1. EI in megaprojects

Extensive empirical and theoretical research has established links between EI and favorable outcomes in megaprojects (e.g., Khosravi et al., 2020; Rezvani et al., 2020; Zhang et al., 2018a; Zhu et al., 2021). The definition of EI in megaprojects aligns with that in the general management field, which has evolved into a theoretical construct dichotomy based on varying perspectives: ability-oriented EI and trait/mixed-oriented EI (Joseph & Newman, 2010). According to Mayer et al. (2001), ability oriented EI employs emotional reason and emotional knowledge to enhance thoughts. Later, Mayer et al. (2016) moderated the four-branch EI model into a novel framework encompassing: *perceiving emotion*, *facilitating thought using emotion*, *understanding emotions and managing emotions*, *calling attention to emotional problem-solving*. The trait/mixed model EI considers a mixture of cognitive and non-cognitive elements, including personality traits, influential skills and self-perceived abilities (Goleman, 2006; Bar-On, 2006; Petrides & Furnham, 2001). Representative scholars in emotionally organizational behaviors such as Joseph and Newman (2010) and O'boyle Jr. et al. (2011) suggest that the trait/mixed EI models can produce a more robust relationship prediction with performance outcomes than ability EI models. Moreover, Joseph et al. (2014) argued that researchers can borrow the relevant theory from its constituent constructions to explore trait/mixed EI models. Accordingly, in this article, the authors selected the trait/mixed model as the basement of BSs' EI model. The EI model for BSs in this article was developed by modifying the Goleman's EI (Goleman, 1995) model with four dimensions: self-awareness, self-management, social awareness and social management.

2.1.2. HBSs' EI and IORs in megaproject

Megaproject is a form of IOR and requires committed HBSs to navigate multiple organizations and deliver the project (Wang et al., 2021). HBSs engage in strategic decisions-making and taking while M&LBSs focus on particular management issues. The EI of HBSs is a crucial factor promoting effective decision-making by hindering the negative effect of stress and negative emotions (Fallon et al., 2014). Strong responses from a powerful HBS may disrupt the positive effect of diversity on decision-making processes and performance (Mihalache et al., 2014). EI helps HBSs achieve emotional stability in regular interactions. EI influences how HBSs see and understand information, subsequently affecting how they see reality and formulate strategic plans (Merlin & Prabakar, 2024).

As a leading force of diverse project partners, HBSs need to cultivate an open, communicative and collaborative atmosphere to advance positive IORs. HBSs with high EI are able to actively listen and demonstrate empathy towards others. Emotionally intelligence HBSs are adept at handling difficult talks and dispute resolution by controlling their emotions and attempting to understand one another (Hopkins & Yonker, 2015). EI also helps HBS foster a culture that values psychological safety and allows various project organizations to express themselves freely, contributing a shared leadership atmosphere among HBSs (Ormiston et al., 2022). Shared leadership encourages group decision-making to provide tactical options and resolve contradictions (Mihalache et al., 2014) and is better leadership style for megaproject (Pitelis & Wagner, 2019).

Therefore, EI influences how HBSs formulate good strategic decisions and how they establish a shared leadership team to better lead diverse project organizations and, ultimately navigate healthy IORs among different project partners (Ormiston et al., 2022). Accordingly, we proposed:

Hypothesis 1a: HBSs' EI is positively associated with IORs in megaprojects.

2.1.3. M&LBSs' EI and IORs in megaproject

M&LBs are located at the first-line of daily project interactions and responsible for reporting to HBSs (Cao et al., 2021). The complexity attribute of megaproject makes discussion among M&LBSs intense and frequent which easily leads to negative emotions and feelings. EI is thus an important factor for M&LBSs to promote IORs since EI contributes to open communication, trust and collaboration in an environment. Most of the EI research in project focuses on typical middle-level BSs – project managers. As a fundamental component of EI, managing one's and others' emotional states for project managers facilitates establishing, maintaining and achieving high-quality relationships in megaprojects (Mazur et al., 2014). Project managers with high EI tend to exert positive leadership styles which induce relationship satisfaction among different project organizations (Zhang et al., 2018a). EI is also positively related to the work attitudes including trust and job satisfaction (Rezvani et al., 2016), thus prompting a collaborative relationship. Except for project managers, ordinary team members as low-level BSs also derive benefit from high EI. Rezvani et al. (2020) concluded that emotional awareness and regulation abilities of project team members are key competencies for managing relationship conflict. Similarly, targeted at project team members, EI moderates the negative effect of project conflict (Khosravi et al., 2020). All the above literature supports the positive effect of M&LBSs' EI on collaborative relationships. Thus, we proposed:

Hypothesis 1b: M&LBSs' EI is positively associated with IORs in megaprojects.

2.2. Adding boundary spanning lens between EI and IORs

With respect to interorganizational exchanges, the influence of individuals on organizations must be mediated by individual behaviors and interactions (Hetemi et al., 2020). In other words, we put forth the proposition that the relationship between BSs' EI and IORs is mediated by their boundary-spanning behaviors. Boundary-spanning behaviors are valuable to be explored considering BSs' position in the decentralized megaproject network formed by stakeholders with well-defined roles (Cao et al., 2021; Gupta & Jha, 2023). Organizations involved in megaprojects depend on all levels of BSs to ensure the smooth execution of social and economic exchange during the collaboration. To achieve these goals, boundary spanners perform three kinds of behaviors – "ambassadors' behavior", "coordination behavior", and "information scanning behavior".

Ambassadors' behavior refers to the collaborative work from different stakeholders related to project advancement, such as deciding the overall project plans, persuading others about decision-making, creating legitimacy and ensuring continuity in the project network. Emotionally intelligent BSs accepted their responsibilities and positively addressed the pressure (Laborde et al., 2014), contributing to improving their ambassadors' behaviors (Srivastava & Tang, 2015).

Coordination behavior includes task coordination, such as discussing design issues and negotiating delivery deadlines, and relationship coordination, such as frequent, timely and accurate communication. Coordination behavior focuses on coordinating work to align different stakeholders by cultivating mutual respect (Carmeli et al., 2021). The ability to perceive and manage emotions of high EI helped create a shared climate to promote strong relationships, contributing to conflict resolution and the coordination process (Hopkins & Yonker, 2015). High EI is expected to help project team members mitigate task, relationship, and process conflict since those with high EI show better emotion regulation and management talents (Khosravi et al., 2020).

Information scanning refers to information and knowledge fetching across different stakeholders to enhance the heterogeneity of knowledge distribution within mul-

tiple organizations (Poleacovschi & Javernick-Will, 2016). Handling emotions effectively helped in scanning information (Jordan & Troth, 2002). Positive emotions motivated continued information searching (Fallon et al., 2014). The ability to perceive and manage own and others' negative emotions facilitated the information scanning "*in a reliable and at least minimally satisfactory manner*" (Helfat & Winter, 2011, p. 1244).

Taking that boundary-spanning action can occur at all levels within and across organizations, we hypothesize:

Hypothesis 2 (H2): Both EI of HBSs and M&LBSs are positively associated with IORs in megaprojects through their (a) ambassadorial behaviors, (b) coordination behaviors, and (c) information scanning behaviors.

2.3. Mediating effect comparison between higher-level and M&LBSs' behaviors

After establishing the positive link between BSs' EI and IORs in megaprojects through their boundary-spanning behaviors, we further compared the mediating effect between different-level BSs. Boundary-spanning behaviors can occur at different megaproject levels, whereas there is a different focus for BSs at higher and lower levels. Moreover, an individual's behavior reflects their personality, such as EI (Mayer et al., 2016). Therefore, the influence of EI on BSs' boundary-spanning behavior can vary, making the mediating effect of boundary-spanning behavior between BSs' EI and IORs in megaprojects different.

HBSs in megaprojects are responsible for strategic management, which helps to determine the collaboration mission and monitoring relations among different partners (Pitelis & Wagner, 2019). In megaprojects, HBSs are endowed with decision-making power related to project advancement, such as setting project orientation and developing strategic plans (Wang et al., 2021). Ambassadors' behavior was usually executed by actors holding greater power since they serve to clarify expectations, form impressions, and advocate for their organization (Ancona & Caldwell, 1992). HBSs are expected to conduct better ambassadors' behaviors than M&LBSs since their power and positions are officially acknowledged. EI of HBSs exerts better influence in identifying their key roles to act as ambassadors of their organizations. Thus, we hypothesize:

Hypotheses 3a (H3a): Compared with M&LBSs, the mediating effect of HBSs' ambassadors' behaviors between their EI and IORs is stronger.

M&LBSs mostly deal with the routine activities responsible for the operational day-to-day running decisions (Pitelis & Wagner, 2019), regularly reporting to the HBSs (Joshi et al., 2009) and providing overall management for the operating staff. In megaprojects, M&LBSs are more familiar with the background of project operation and possible results of conflicts occurring during the megaproject lifecycle (Cao et al., 2021). Thus, M&LBSs' EI is expected to be more effective than HBSs in enhancing information searching and coordination. Therefore, we hypothesize:

Hypothesis 3b (H3b): Compared with M&LBSs, the mediating effect of HBSs' coordination behaviors between their EI and IORs is weaker.

Hypothesis 3c (H3c): Compared with M&LBSs, the mediating effect of HBSs' information scanning between their EI and IORs is weaker.

Figure 1 presents the research model based on the aforementioned hypotheses development. The higher-level path represents the impact of HBSs' EI on IORs through their boundary-spanning behaviors. In contrast, the middle-lower-level path represents that of M&LBSs. H3 presents the mediation effect comparison between these two levels.

3. Methodology

3.1. Research design

Considering that this article contains multiple research questions, we conducted mixed-method research adopting a quantitative – qualitative sequential design to provide a complete picture for this study (Jiang et al., 2022). We first conducted a questionnaire-based survey to ex-

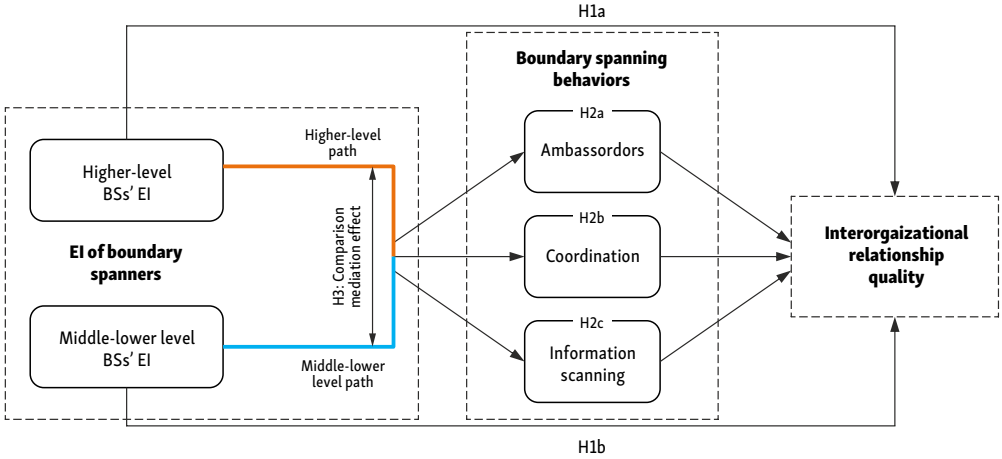

Figure 1. Research model

plore relationships between EI, boundary spanning behaviors and IORs. Such a quantitative study was appropriate for seeking statistical evidence between a network of relationships in predictive models (Klein & Müller, 2019). Then, we conducted semi-structured interviews to provide further elaboration on the results of the quantitative studies. The semi-structured interviews enrich our knowledge of the deeper psychological and behavioral explanations of the quantitative results (Klein & Müller, 2019). The mixed-method research is necessary since the qualitative study is complementary and provides a more complete picture regarding the specific result in the quantitative study (Creswell, 2009). The flowchart of the research design is shown in Figure 2.

3.2. Samples

We firstly adopted a Structure Equation Modeling (SEM) approach to assess the relationships between EI, boundary-spanning behaviors, and IORs in megaprojects. Through convenience sampling (Etikan, 2016), we selected 20 large Chinese construction companies. We asked these companies to provide a full list of projects in execution at the time of the research. We selected 15 megaprojects from that list according to two criteria: (a) cost over one billion RMB and (b) involved multiple partner organizations consistent with the boundary-spanning research requirements in this article. Each megaproject is executed by at least four partner organizations, yielding 60 construction organizations as research targets in quantitative survey.

To provide context-specific interpretations of the quantitative results, we purposively sample our cases. Three megaprojects under implementation are approached for interviews recommended by specific respondents in the questionnaire survey. We approached the interviewees through two main channels, namely, the regular semi-monthly project meetings and Wechat voice contact. The regular semi-monthly project meetings gathered different representatives from different project organizations which helps us to approach more participants in a short period of time. Interviews were conducted immediately after the meeting in two days. Yet, the interviews in the project site are all M&LBSs such as project managers and designer's representative. Thus, we also interviewed HBSs such as chief engineer and institute director in these megaprojects by Wechat. Finally, we completed 18 interviews in which 6 interviewees came from Milu Irrigation Area Project (Case 1), 5 interviewees came a Water Resources Allocation Project (Case 2), and 7 interviewees came from Changtang Reservoir Project (Case 3). The information collected was promised to be utilized solely for this research while maintaining anonymity. Table 1 summarizes the backgrounds of the interviewees. The post-survey interviews helped allay worries about the survey's low response rate because the sample size was modest (e.g., Sukanthan Rajendra et al., 2022).

3.3. Procedures

3.3.1. Survey

In the quantitively survey, we selected 152 managers from 60 construction organizations, including 59 top management team members and 93 senior managers from the partner organizations, as HBSs. Then, HBSs were asked to provide the contacts of middle managers (i.e., project managers from each site, alliance communication coordinators and design coordinators). Considering that low-level BSs can be nominated or automatically emerge from practice in the project context (Levina & Vaast, 2005), a snowball sampling technique (Figure 3) was employed to locate the LBSs. To be specific, those middle managers were required to nominate at least 5 project staffs at the project operational level according to three criteria: (1) whom they empower as his/her ambassadors; (2) whom they often turned to ask for help; (3) whom they mostly rely on for information acquiring, daily task and relationship coordination.

As shown in Figure 3, after the second round of nomination, 517 individuals were identified. These 517 individuals and the 136 middle managers were the M&LBSs in 15 megaprojects. Therefore, 152 HBSs and 653 M&LBSs are the survey population.

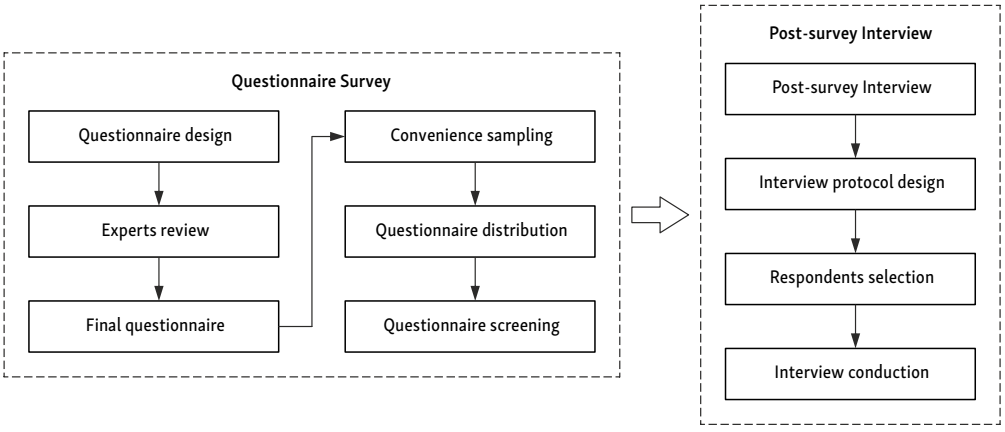

Figure 2. Flowchart of research design

Table 1. Backgrounds of interviewees

Case	Position	Number of Interviewees	Experience (years)	Mode of interview
1	Owner/senior manager	1	>15	WeChat Voice Calls
	EPC Contractor/Institute Director	1	12	WeChat Voice Calls
	EPC Contractor/Designer's Representative	1	3	In-person
	EPC Contractor/Chief Design Manager	1	8	In-person
	EPC Contractor/Constructor	2	5/6	In-person
2	EPC Contractor/Chief Engineer	1	>15	WeChat Voice Calls
	EPC Contractor/Designer's Representative	1	4	In-person
	EPC Contractor/Chief Design Manager	1	9	In-person
	EPC Contractor/Construction Manager	1	13	In-person
	Consulting Cooperate/Supervising Engineers	1	6	In-person
3	EPC Contractor/Institute Deputy Director	1	15	WeChat Voice Calls
	EPC Contractor/Constructor	2	4/4	In-person
	EPC Contractor/Designer's representative	2	3/5	In-person
	EPC Contractor/Construction Manager	1	10	In-person
	Consulting Cooperate/Supervising Engineer	1	7	In-person

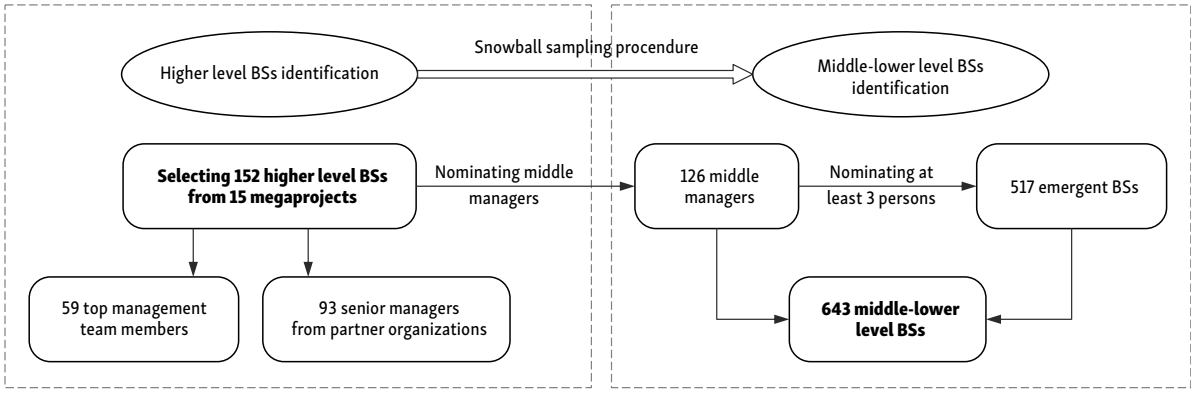

Figure 3. Data collection process

324 questionnaires from respondents in 15 megaprojects were returned, representing a response rate of 40.2%. We eliminated 15 incomplete questionnaires incomplete and 16 ones with the same answers exceeding 50% based on the data cleaning process (Dasu & Johnson, 2003), leading to 290 questionnaires, including 119 HBSs and 171 M&LBSs. Of the 290 questionnaires, 38.3% were collected at the project site, 36.5% were collected through *WeChat*, and 25.2% through email. The responses in these three manners were compared through ANOVA, revealing no significant differences at the 0.04 significance level. Thus, the data collected through these three manners were analyzed without distinction.

3.3.2. Interviews

The interviews were audio recorded during a discussion that lasted about 45 minutes and conducted at their premises. First of all, the interviewers introduced the topic and related concepts. Then, participants were invited to describe a memorable relational conflict or a good experience of collaborative relationship in megaprojects. Initial questions asked were not directly related to EI, but were designed to elicit participants' emotional reactions addressing the conflict or produced in the nice collaborative experience. For instance, questions were asked about how they perceive, show/hide and manage the emotions to indirectly explore how EI is adopted and affects IORs. In order to gain specific insights into their boundary spanning behaviors affected by EI, the key question posed to the participants was what behavior they performed and what emotional or behavioral feedback they got from other BSs. Meanwhile, the participants were required to discuss what behaviors is important in the collaborative process in order to see the difference of HBS and M&LBS. Although an interview protocol was employed as a guide, interviewees were encouraged to discuss their experiences, share examples and express their feelings and emotions freely, in order to discuss what they considered relevant and important.

3.4. Measures

The measurements of EI, boundary-spanning behaviors, and relationship quality in this article were derived from the literature (later acknowledged), with the items adapted

to the characteristics of megaprojects. All constructs were measured using multi-item, 5-point Likert scales, ranging from 1 (strongly disagree) to 5 (strongly agree) in both study 1 and study 2. All the items are shown in Table 1. The questionnaires were initially prepared in English, then two research scholars translated all the questionnaires into Chinese and then back-translated into English to ensure accuracy (Poppo et al., 2016). We selected five academics and five project managers to help review the Chinese version, pilot the administration, and fine-tune it.

Emotional intelligence. We developed question items using popular measure tools (Goleman, 1995; Mayer et al., 2001; Schutte et al., 1998). The self-awareness dimension had three items. The other three dimensions of EI (self-management dimension, social awareness and social management) had four items.

Boundary-spanning behaviors. It included three dimensions (ambassadors, coordination and information scanning) adapted from Ancona and Caldwell (1992) and Gittell (2002). Each dimension of boundary-spanning behaviors had four items.

Relationship quality. It is a measure of collaborative relationships among stakeholders in the project context. Trust, commitment, and performance satisfaction are the main attributes of relationship quality in a construction project (Jelodar et al., 2016b). Relationship quality in this paper was measured regarding relationship trust, satisfaction, and commitment. The six items were adapted to measure relationship quality based on Palmatier et al. (2006) and Jelodar et al. (2016a).

Control variables. Besides the EI, boundary-spanning behaviors, and relationship quality, we included three personal control variables (age, education, and gender) and two organizational attributes (organizational size and relationship duration). The number of members from different megaproject partners operationalized the organizational size. Organizational size is an important indicator of organizational behaviors and relationships (see Droge et al., 2003). Relationship duration was measured as the number of years the project partners had been collaborating, which is expected to influence inter-organizational relationship quality (Huang et al., 2016).

4. Findings

4.1. Survey results

4.1.1. Reliability and validity

We followed the following steps to establish the validity and reliability of the scales. First, considering all the items in this article were adapted from extant literature, we conducted an exploratory factor analysis (EFA) to check the structure validity of these items. Using varimax rotation, the result of EFA with principal components analysis conducted in SPSS 19.0 is shown in Table 2, with all items having clean loadings on their respective variables and loadings above 0.5. It indicated that these items could represent the variables well. Meanwhile, to reduce the bias caused by the self-reported questionnaire survey, we examine the risk of common method variance by Harman's single-factor approach (Podsakoff et al., 2003). The threshold value is 26.48% satisfied the required (26.48% < 50%), indicating that a single factor could account for the covariance majority.

Second, we performed a series of confirmatory factor analyses, which are reported in Table 3. Table 3 shows that the proposed five-factor model demonstrated an excellent fit with the data (χ^2 = 1468.468, df = 1224, CFI = 0.949; TLI = 0.948; RMSEA = 0.037; SRMR = 0.065). The RMSEA and SRMR were below 0.8, while CFI and TFL were above 0.9. The proposed measurement model was superior to the one-factor model (χ^2 = 2210.534, df = 1552, CFI = 0.289; TLI = 0.901; RMSEA = 0.158; SRMR = 0.195). Furthermore, we ran an additional confirmatory factor analysis whereby BSs' ambassadors' behavior, coordination behavior and information scanning were collapsed into one factor, and the yielding model fit was lower than the proposed mode at p = 0.001 (χ^2 = 1648.274, df = 1355, CFI = 0.916; TLI = 0.878; RMSEA = 0.058; SRMR = 0.0750).

Third, to assess the convergent validity of measurements, Cronbach alpha, composite reliability (CR) and average variance extracted (AVE) were examined and shown in the Table 4. As shown in Table 4, Cronbach α of each variable is between 0.77 and 0.94, exceeding 0.70, which establishes high internal consistency. CR of measurable variables is between 0.77 and 0.93, exceeding the 0.6 recommended by Fornell and Larcker (1981), implying that all research variables are in the acceptable range. The AVE of measurable variables is between 0.45 and 0.63, above the acceptable threshold recommended by Fornell and Larcker (1981). Therefore, the measurement model has good convergent validity. Additionally, the square roots of AVE are all greater than the off-diagonal correlation coefficients, indicating good discriminant validity.

4.1.2. Results from Structural Equation Model (SEM) Testing

Structural equation modeling (SEM) was conducted in Mplus 7.4, which uses the bias-corrected bootstrapping method and provides a more robust SEM estimation than traditional mediation analysis (Cheung & Lau, 2008). H1 proposed the main effect of different levels of BSs' EI and IORs quality in megaprojects. For the HBSs, the results showed that their EI has a positive and significant impact on IORs (r = 0.242, p < 0.05). While for the M&LBSs, the results showed that their EI exhibits a non-significant impact on IORs (r = –0.044, p > 0.1). Thus, H1a was supported while H1b is not. H2 further proposed the mediation effects of boundary-spanning behaviors, including their ambassadors' behavior, coordination behavior and information scanning behavior. As shown in Table 5, the mediation effect of all kinds of boundary-spanning behaviors is significant at both levels. H2 is supported.

Table 2. Rotated components matrix

Measurement items	F1	F2	F3	F4	F5
Emotional intelligence					
EI1: Be sensitive and aware of changes in one's own emotions	**.726**	.207	.216	.241	.302
EI2: Understand potential factors affecting emotions	**.763**	.250	.317	.325	.325
EI3: Understand your own limitations and advantages	**.778**	.247	.271	.233	.358
EI4: Quickly adapt to the changing environment	**.780**	.226	.292	.268	.266
EI5: Take appropriate actions to regulate stress	**.736**	.236	.241	.269	.275
EI6: Adjust the strategy according to the specific project situation	**.753**	.324	.342	.315	.249
EI7: Face difficulties and respond actively	**.788**	.297	.249	.224	.225
EI8: Sense and understand what other partners are feeling	**.746**	.304	.278	.326	.310
EI9: Identify the true needs of partners	**.719**	.295	.277	.269	.288
EI10: Understand the emotional and political atmosphere of your organization	**.749**	.238	.300	.268	.275
EI11: Respect the differences between different organizational cultures and knowledge backgrounds	**.747**	.225	.274	.283	.266
EI12: Conduct effective communication with other partners	**.812**	.268	.296	.349	.223
EI13: Focus on the collective project goals	**.816**	.299	.274	.329	.234
EI14: Good at resolving conflicts with other partners	**.812**	.273	.244	.262	.276
EI15: Proactively collaborate with other partners	**.793**	.273	.222	.323	.325
Ambassadors' behavior					
R1: Prevent other partners from "overloading" the organization with too much information or requests	.315	**.825**	.287	.232	.206
R2: Persuade other partners to support our activities or decisions	.235	**.822**	.249	.309	.299
R3: Keep other partners informed of our activities	.213	**.784**	.328	.398	.257
R4: Scan the outside environment for threats and "talk up" the organization to other partners	.292	**.798**	.304	.265	.313
Coordination behavior					
C1: Attend the negotiation with other partners for project delivery deadlines	.296	.261	**.834**	.241	.288
C2: Review project design with partner organizations	.265	.317	**.801**	.257	.272
C3: Keep frequent and timely meetings with other partners	.259	.200	**.772**	.267	.255
C4: Exchange complete and accurate information with other partners when conflict occurs	.375	.282	**.801**	.372	.346
Information scanning					
IS1: Find out what competing organizations are doing on similar projects	.353	.294	.304	**.829**	.294
IS2: Scan the environment inside or outside the organization for project ideas/expertise	.236	.357	.303	**.763**	.325
IS3: Collect technical information/ideas from members in partner organizations	.319	.287	.219	**.769**	.256
IS4: Control the release of information from partner organizations to present the profile we want to show	.256	.296	.260	**.808**	.228
Relationship quality					
RQ1: We believe in our partner organizations as being sincere	.368	.258	.329	.269	**.834**
RQ2: We have confidence that our partner organizations' future decisions and actions won't adversely affect us	.289	.247	.298	.321	**.747**
RQ3: Interactions between our organization and other partners are characterized by mutual respect	.222	.324	.365	.333	**.761**
RQ4: Our partners always explain to us the reasons for its organization policies	.315	.363	.278	.340	**.743**
RQ5: We would not replace the partner, even if another partner made a better offer.	.324	.389	.233	.312	**.754**
RQ6: Given all the things we have done with the partners; we want to continue our relationship with them	.268	.401	.256	.289	**.827**

Notes: F1 = Factor 1; F2 = Factor 2; F3 = Factor 3; F4 = Factor 4.

Table 3. Results of confirmatory analyses

Model	Chi square (χ^2)(df, p)	$\Delta\chi^2$	CFI	TLI	RMSEA	SRMR
Full measurement Model, five factors	1468.468 (df = 1224; p = 0.000)	–	0.949	0.948	0.037	0.065
Model A, one factor[a]	2210.534 (df = 1552; p = 0.000)	742.066***	0.289	0.901	0.158	0.195
Model B, three factors[b]	1648.274 (df = 1355; p = 0.000)	179.806***	0.916	0.878	0.058	0.075

Notes: *n* = 290; CFI – comparative fit index; TLI – Tucker-Lewis index; RMSEA – root-mean-square error of approximation; SRMR – standardized root mean square residual; *** p < 0.001; [a]Harman's single factor model: all variables combined into a single factor; [b]Ambassadors' behavior, information scanning and coordination behavior collapsed into a single factor.

Table 4. Convergent validity

Constructs	CR	Cronbach α	AVE	EI	R	C	IS	RQ
HBSs' EI	0.93	0.92	0.46	**0.68**				
R	0.84	0.83	0.57	0.66	**0.75**			
C	0.79	0.78	0.49	0.65	0.45	**0.70**		
IS	0.82	0.82	0.53	0.39	0.26	0.25	**0.73**	
RQ	0.92	0.91	0.67	0.77	0.66	0.65	0.57	**0.82**
M&LBS' EI	0.92	0.92	0.43	**0.66**				
R	0.77	0.76	0.46	0.48	**0.68**			
C	0.79	0.78	0.48	0.57	0.27	**0.69**		
IS	0.79	0.77	0.46	0.55	0.26	0.31	**0.68**	
RQ	0.93	0.91	0.70	0.63	0.48	0.67	0.75	**0.84**

Table 5. Mediation effect: Structural equation model results

	Effect	Estimate	S.E.	Two-Tailed P-value	95% Bias-corrected bootstrap estimates
Specific Indirect	HBSs' EI→ Ambassadors → Relationship quality	0.343	0.096	< 0.001	[0.34, 0.55]
	HBSs' EI →Coordination → Relationship Quality	0.149	0.064	0.021	[0.15, 0.29]
	HBSs' EI → Information Scanning →Relationship Quality	0.137	0.054	0.011	[0.14, 0.28]
	LBSs' EI →Ambassadors → Relationship Quality	0.120	0.0521	0.022	[0.05, 0.22]
	LBSs' EI → coordination → Relationship quality	0.289	0.069	< 0.001	[0.20, 0.42]
	LBSs'EI → information scanning → Relationship quality	0.343	0.090	< 0.001	[0.22, 0.50]

H3 compared two levels of BSs' EI on the relationship quality between different megaproject project participants through their boundary-spanning behaviors. Using chi-square difference tests, we compared the mediation effects of two different levels of BSs' boundary-spanning behaviors by constraining the two paths to be equal and then releasing the constraint. In doing so, we provided the bias bootstrap interval of (a1*b1–a2*b2). The difference is significant for the mediating effect of ambassadors' behavior (a1*b1–a2*b2: [0.07, 0.41]). The difference is not significant for the mediating effect of coordination (a1*b1–a2*b2: [–0.29, 0.01]). The difference is significant for the mediating effect of information scanning (a1*b1–a2*b2: [–0.38, –0.06]). Thus, H3a and H3c are supported, while H3b is not significant.

4.2. Post-survey interview findings

Finding 1: EI helps to address relational conflict and improve IORs

The interviews first showed that most of the participants recognized the importance of EI in enhancing IORs in megaprojects (#H1). Most of the interviewees describe a relational conflict since "bad things are always more impressive". The emotional reaction caused by the relational conflict was "angry", "upset", and "uncomfortable" (#self-awareness). All the passive emotions were needed to be "understood" (#social awareness), "adjusted", or "relieved" (#self-management, #social management) since "bad emotions lead me to lose mind in further interaction, which only makes the relationship worse". A megaproject usually gathers a lot of expertise that tends to be "difficult listening to others" or even "self-esteem" (#social awareness). If the BSs were recognized as "knowledgeable but kind (#social management) and empathetic (#social awareness)", the collaborative experience with their organization was usually given a thumbs up. Meanwhile, "BSs with stable emotions were popular [because] stable emotions and kind attitudes (#social management) help to make trouble easier and decrease conflict".

Overall divergence. It is interesting to note that although both HBSs and M&LBSs recognized the importance of EI in maintaining a good relational experience, they showed subtle differences while discussing it (#H1a

and H1b). One HBS from the EPC organization said, "[BSs from other organizations] usually take my emotion and behavior feedback seriously since understanding others' emotion (#social awareness) is easy for these persons as senior managers". Yet, M&LBSs tend to pay less attention to the emotional exchange process compared to HBSs. "Sometimes we neglect others' emotional reactions since we pay more attention to the techniques and tasks". "Emotions certainly bubble up everywhere... [but] no worries, these emotions will make way for the complex task".

Emotional exchange is especially neglected among LBSs: "We [as the contractor] sometimes do not have enough right to express emotion [because] the power is concentrated in the owner. In a few cases, I try to express my discontent and opinion while I get similar feedback from my senior managers". "Sometimes we [as the designer] fail to express emotions since we are in a passive position. I sometimes even hide my unpleasant behavior (#self-management) in front of other collaborators [BSs from other organizations]. [But I would like to show my emotion when their reaction is contrary to my organization's shared cognition". This sheds light on the perceived power asymmetry and fairness between M&LBSs' EI and IORs in megaprojects.

From the subtle differences, we can see that HBSs are usually perceived as having high EI, so they are not worried about being misunderstood by each other. M&LBSs pay less attention to the emotional exchange compared with HBSs. These findings provide a deeper analysis to explain why the total effect of M&LBSs' EI on IORs is not significant in the quantitative survey.

Finding 2: Boundary-spanning behaviors link EI and IORs

The interviews then showed that most of the participants recognized their boundary-spanning roles linked to EI and IORs in megaprojects (#H2). They have a common view that solving conflict and improving IORs needs "frequent communication", "transparent information sharing", "enough knowledge sharing", "coordination", "negotiation", and "cooperation". As BSs, they serve as problem-solving conduits, negotiating and resolving issues through "rational persuasions" and "emotional infect". Thus, behavioral exchange is accompanied by emotional exchange, and both exchanges are achieved by BSs.

"Faced with the conflict, we tried to speak out to protect our organizations. The process is certainly full of emotions, both good and bad. The best way [to persuade others] is to enlighten them with affection and motivate them with reason".

"I act as a homing pigeon to collect information and knowledge from somewhere and emit it to the person they need. I also become a coordinator when conflicts occur. The heavy roles required a lot of emotional adjustment so that I could move on to the next step".

"Sometimes, I get negative emotional reactions [from other BSs], which subsequently follow untimely cooperative activities. We need to manage and regulate such emotions to avoid irrational behavior. This easily makes the collaborative relationship worse".

There is divergence between HBSs and M&LBSs. While discussing the behavioral exchange in solving conflict or advancing collaboration, divergence occurs between HBSs and M&LBSs (#H3). HBSs usually have higher organizational and strategic commitment than M&LBSs, thus contributing more representative behavior.

"Being a good representative is a fundamental requirement for us since the organization has entrusted us with an important role. A good representative makes it possible [for our organization] to gain more resources. Besides, coordination is important if major project changes occur, but it is not regular". (Institute Director)

"I did a lot of information sharing and coordination work. But as for 'representative', it is too heavy for me. If I had to say who is the representative, I would like to nominate my whole team". (Constructor)

"I experienced a lot of coordination and communication routines with my colleagues and collaborators [other BSs] from other organizations. I need to search for relevant knowledge and information, such as the latest technical updates from the contractor". (Design manager)

"I spent more time and spirit in the daily designing work. I often neglect work for strategic tasks unless my senior manager reminds me. My leader hopes that I can link my work with the goals of organizational strategies. I think this is hard for me". (Designer's representative)

While discussing the last question directly, asking them how EI works, one senior engineer recalls the views of the company's CEO that higher-level technological experts should pay attention to their EI development. "Even as master hydraulic surveyors, they can't just focus on technology. [They should recognize that] EI is very important. Only with high EI did they realize that they should employ their consummate skills to gain reputation and resources for the organization rather than themselves". M&LBSs also recognized the importance of EI since it "makes the daily interaction easy and pleasant". This indicates that HBSs are required to focus more on organizational strategy and expectations, while M&LBSs focus more on detailed project issues. The post-survey interview provides a possible explanation for the quantitative results on H3.

5. Discussion

5.1. Theoretical implications

By investigating how BSs' EI affected the IORs in megaproject through their boundary-spanning behaviors, this article responded to the call to study individual-level antecedents of megaproject outcomes (Saad & Hegazy, 2015). Further, we also filled the gap that previous EI research only focused on middle or higher project team members (Rezvani et al., 2018) by classifying BSs into HBSs and M&LBSs. This study provides two key theoretical contributions.

5.1.1. Suppression effect exists regarding the total effect of M&LBSs' EI on IORs

Our quantitative results confirmed that HBSs' EI was significant in developing IORs (Butler & Chinowsky, 2006; Ormiston et al., 2022; Zhu et al., 2021). However, the total effect of M&LBSs' EI on IORs in megaprojects is not significant while the mediation effect of boundary-spanning behaviors exists between EI and IORs. This is inconsistent with the literature reporting that project team members' EI is associated with relationships among multiple partners (Rezvani et al., 2018, 2020). One possible reason for such inconsistence is that previous literature explored the effect of EI in a general project context (e.g., Maqbool et al., 2017; Rezvani et al., 2016). IORs in megaprojects is more complex than general project (Li et al., 2019), which is a project system organization with "*multiple and evolving actors across the multilevel and multi-layer megaprojects system*" (Denicol et al., 2021, p. 347). The huge social networks formed by multiple megaproject organizations (Shi et al., 2022) increase the distance of M&LBS to the focal power team (Le et al., 2023), leading to the powerlessness of these BSs' EI. Furthermore, high project complexity was negatively related to project members' commitment (Zhu et al., 2021) and posed a great challenge to interaction (Senescu et al., 2013), inducing different effects of BSs' EI in megaprojects. Additionally, as noted by Rezvani et al. (2020), EI is linked to relationship tasks, which resemble the coordination behaviors examined in this article. However, our paper differs from Rezvani et al. (2018, 2020) by focusing on IORs as the dependent variable at the project network level, while they concentrate on project-level performance. Furthermore, Rezvani et al. (2018) considered both individual and team EI as independent variables, finding that team EI is directly related to project performance, which may explain the inconsistencies with our findings.

The post-survey interview provides a deeper explanation and sheds light on the existence of suppression effect regarding M&LBSs' EI and IORs in megaproject. Subsequent interviews provided insights into this effect; interviewees from the EPC contractor indicated that they often struggle to express their emotions when they perceive unfairness from the project owners. M&LBS with high EI are easier to perceive unfairness and power asymmetry since EI help them understand how emotions are displayed according to context (Mayer et al., 2016). If contractor perceived high power asymmetry by owner signifies that they may adopt more coercive power which easily affects the cooperation (Lu & Hao, 2013; Zhang et al., 2018b). Similarly, the perceived unfairness hinders the cooperative behaviors (Shafi et al., 2021) and thus affects the interorganizational relationship stability (Wu et al., 2023). As such, M&LBS with high EI is sensitive to the unfair treatment in the frequent first-line interaction with other BSs, thus injuring the collaborative relationship. The perceived power asymmetry and fairness are the possible suppression variables from M&LBSs' EI to IORs.

5.1.2. A differentiation of boundary spanning lens from different-level BSs' EI to IORs

Results demonstrated that both HBSs' and M&LBSs' EI can affect IORs through the mediating effect of boundary spanning behaviors. However, HBSs' EI is more effective than M&LBSs in terms of ambassadors' behavior while M&LBSs' EI is more effective in improving information scanning. The interview shows the reason is that different levels of BSs are equipped with different responsibilities (Cao et al., 2021) and HBSs tend to have higher organizational identification with the structural empowerment (Nowak, 2021). HBSs in the interview considers the representation as "fundamental requirement" and gaining external resources as the necessary responsibility. HBSs with high position in their organization perceive an empowerment which foster organizational identification by enhancing self-worth (Ertürk & Albayrak, 2019). Moreover, EI can motivate organizational identification (Sözbilir, 2023). As such, emotionally intelligence HBS can better perform as ambassadors to improve IORs in megaprojects. On the contrary, M&LBSs such as project managers, usually focus on the daily project execution rather than the strategic aspects of projects (Patanakul & Shenhar, 2012). The interview further implicates that role overload and role ambiguous may aggravate such situation, which is salient threats to well-being (Wang et al., 2022) and their behaviors subsequently. M&LBSs need to perform various roles such as "*homing pigeon*" and *"problem-solving conduits*", and they need to switch identities frequently when communicating within and outside the organization. The role overload and stress easily injure organizational identification (Leung et al., 2024). Ambassador behavior is similar to strategy-related behaviors which are often neglected by M&LBSs (Yao et al., 2023) unless their "*senior manager reminds me*". This implies that good leader-member exchange help M&LBSs cultivate better representative awareness consistent with (Ertürk & Albayrak, 2019). Similar to the barrier of lack of vision of relationship integration identified by Costa et al. (2019), the results implicate that M&LBSs usually lack the relationship integration vision while working at the project interface.

The important mediating effect of information scanning for M&LBSs confirms that information exchange contributed the most to the high quality of project relationships (Li et al., 2019). As for the mediating effect of coordination, the quantitative results show that BSs' EI at both levels is equally effective in promoting coordination behavior. The interview results also confirm that information scanning and communication are key abilities for individuals working at the interface in project-based collaboration, as identified in previous literature (Fireman et al., 2023; Talebi et al., 2021). Yet, the interview suggested that even for coordination, the angle is different between HBSs and M&LBSs. HBSs think coordination occurs when major project changes occur but such situation "is not regular" while M&LBSs are responsible for more detailed coordination behaviors such as conflict tasks that hinders the project schedule.

5.2. Managerial implications

We showed that HBSs' EI is an effective relational management tool for IORs in megaprojects. However, based on the CEO's comment referred in the interview, EI is still a weakness for HBSs such as technical gurus. As such, EI training for HBSs should be carried out systematically and regularly in project organizations since they usually pay more attention to technical skills (Rezvani et al., 2016). Moreover, boundary-spanning behaviors are more important than EI for M&LBSs considering the suppression effect of perceived power asymmetry or unfairness. This provides managerial implications that abuse of power is a great hinder to improve project-based relationship development (Costa et al., 2019). BSs from the dominant side need to alleviate the use of mediator power (Lu & Hao, 2013) and transfer certain control rights to others appropriately (Wu et al., 2023). If the vulnerable party perceived more justice and fairness, they would like to engage in the collaborative development (Lim & Loosemore, 2017). It is essential to implement regular feedback mechanisms that allow BSs to voice their concerns and experiences to identify and mitigate perceptions of injustice or power asymmetry in day-to-day project management. This could include anonymous surveys or open forums where BSs can discuss their feelings of fairness and equity within the team. Additionally, fostering a transparent communication culture, where power dynamics are openly discussed, can help illuminate any existing imbalances. To monitor and evaluate the presence of suppression effects during the implementation of megaprojects, managers could employ tools such as regular progress assessments and performance metrics linked to EI and interorganizational relationships. Utilizing qualitative methods, such as interviews or focus groups, can provide deeper insights into team dynamics and potential suppression effects.

Additionally, a more risk/benefit-sharing contract design is a better mechanism to promote the project-based relationship (Tezel et al., 2018), given its positive impact on the performance of boundary spanning roles. Further, the organization needs to improve M&LBSs' organizational identification, which refers to the sense of belonging and emotional connection an individual feels towards a specific organization, through the daily leader-member exchange (Ertürk & Albayrak, 2019). Building on Löwstedt et al. (2018), M&LBSs who feel a strong sense of belonging and commitment to project-based organizations will prioritize strategic tasks and contribute to their long-term development. Through empowerment, HBSs could help M&LBSs to improve their organizational identification and strategy commitment, which is crucial to the project strategy implementation (Yao et al., 2023).

Further, M&LBSs in the vulnerable party would like to express their negative emotion "*when their reaction is contrary to my organization's shared cognition*". This indicated that the vulnerable party need to cultivate the group emotional intelligence (Ghuman, 2011) or shared mental model (Dionne et al., 2010) to improve the benefit of EI in the collaboration. Organizations may reward these specific BSs as compensation for the extra pressure caused by the boundary-spanning roles. Internal rewards such as power, status, and respect may be a reasonable choice for organizations to motivate M&LBSs behaviors. These measures are helpful to make the best of their EI in enhancing IORs in megaprojects.

5.3. Limitations and further research

The generalizability of the initial results presented in this article is subject to several main limitations. First, while we studied the effect of EI at the individual level, EI at the megaprojects team level is also expected to be important in advancing IORs in megaprojects. Future EI research in megaprojects may concern the team-level EI effect on IORs. Second, the research was based on self-reported survey data may produce bias in the outcomes. Although we use post-survey interviews as a supplement to support and cross-validate the survey results, the results might be strengthened using other research techniques like focus group research and observation. Third, it is important to acknowledge the lack of diversity in data sources, which may restrict the generalizability of the findings. To enhance representativeness, future research should consider incorporating a broader range of perspectives by engaging with diverse stakeholders across various sectors involved in megaprojects. Additionally, the total effect of M&LBSs' EI on IORs indicates that suppression variables are needed to be focused to mitigate the exaggerate situation of EI (Lindebaum & Jordan, 2012). More mediating variables between EI and performance outcome such as various cultures need to be explored since the effect may vary depending on the work context and specific tasks. Future research should explore the impact of various boundary-spanning behaviors, such as mediation and facilitation, on project outcomes in megaprojects. Investigating how these behaviors contribute to stakeholder engagement, conflict resolution, and collaborative problem-solving may provide valuable insights into their effectiveness. Understanding the nuanced roles of these boundary-spanning activities can help refine existing theories in project management and contribute to developing frameworks that support successful megaproject execution.

6. Conclusions

BSs are fundamental stakeholders in megaprojects; however, there is a relevant gap in the literature regarding their role. Our research focused on these crucial stakeholders from two relevant and timely perspectives: emotional intelligence and boundary-spanning behaviors. By adding a boundary-spanning lens and disentangling BSs into two levels, we offer new insights into the benefit of EI research in megaprojects. Both EI of HBS and M&LBSs are a positive factor in boosting inter-organizational exchange through the mediation effect of their behaviors. The key finding is that HBSs' EI is directly and positively associated

with IORs in megaprojects, while the effect of M&LBSs' EI can only be realized through the mediating effect of their boundary-spanning behaviors.

Moreover, the mediating effect of three different boundary-spanning behaviors differs according to the BSs' power status in megaprojects. Therefore, scholars and practitioners should pay attention to the EI of BSs at higher and middle levels to enhance megaproject relationships. Project organizations may expand the EI training to involve the M&LBSs who work at the project first-line and formulate different training courses for BSs at the different levels.

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Data availability statement

Data, models, or codes that support the findings of this study are available from the corresponding author upon reasonable request.

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