



Improving performance of construction projects

A project manager's emotional intelligence approach

Lianying Zhang

Department of Construction Management,

School of Management and Economics, Tianjin University, Tianjin, China, and

Weijie Fan

School of Management and Economics, Tianjin University, Tianjin, China

Improving
performance

195

Abstract

Purpose – As a crucial soft skill, emotional intelligence (EI) is reported to have many benefits, yet it remains largely unexplored in construction project management. The purpose of this paper is to explore further application of project manager's EI to improve project performance.

Design/methodology/approach – A questionnaire-based survey covering 112 project managers in construction is used to determine project managers' EI, and relate that to the performance of their most recent projects, as well as examine the moderating effects of international involvement and contract type.

Findings – Results indicate high expressions of six EI factors in project performance of large and complex scale; whereas the effects of self-confidence and teamwork have not been confirmed. Additionally, international involvement and contract type are found to moderate the relationships between certain EI factors and project performance.

Practical implications – The paper makes recommendations on selection and appointment of project managers to construction organizations; meanwhile it assists project managers in recognizing the significant competencies that cater for large and complex construction projects.

Originality/value – In this paper, the EI model is modified especially for project managers, to make up for the deficiency of project managers' EI framework, as well as the project performance criteria for construction projects. Then an analysis takes place of the key EI dimensions or competencies on project performance, which contributes to the body of project managers' EI.

Keywords Emotional intelligence, Project manager, Project performance, Large and complex projects, Construction industry, Project management

Paper type Research paper

Introduction

What needs to be done to improve project performance (PP) has been voiced as a perennial and troublesome problem in construction (Love *et al.*, 2011), and the implication of project managers' (PMs) competencies becomes one of the key branches (Ahadzie *et al.*, 2009). emotional intelligence (EI) is a relatively new approach in this industry, though it has been demonstrated to predict project outcomes. Large and complex projects place additional emphasis on PMs' needs for EI, because of the unique characteristics such as complexity of personnel, multiplicity of goals, intensive of capital, strong uncertainty of activities, difficulty in coordinating stakeholders, etc. Generally, for projects of medium and small scale, PMs may achieve project success eventually through the good use of strong technical knowledge and intelligence quotient (IQ), though their EI levels are relatively low. By comparison, the properties of large and complex projects determine so many opportunities for breakdown that it is



barely allowable for PMs to make any mistakes (Mersino, 2007). PMs therefore must gain high level of EI to ensure the success of large and complex projects. Furthermore, the increasing professional competition raises PMs' concerns on large and complex projects which are considered as stepping stones to enhance their occupational abilities and promote their career development. Another reason why we conduct our research on large and complex projects is that project complexity level (one criterion of project type) was confirmed to moderate the relationship between project success and EI (Müller and Turner, 2007).

This inspiring idea, EI, captures the worldwide attention since 1995, Daniel Goleman's work titled *Emotional Intelligence: Why it can Matter More Than IQ* reached the *New York Times* Best-sellers List (Day and Carroll, 2004). Thereinto, Goleman elaborated the idea of EI basically riding on the back of Gardner's earlier remarkable work of "multiple intelligences" (Love *et al.*, 2011). Subsequent studies indicate that among the contributions of technical skills, IQ and EI to overall performance, EI is proved to be twice as important as the others (Goleman, 1998). In the past decade henceforth, more and more researchers of different disciplines came to realize the importance of EI, and then focussed their studies on EI, attempting to explore the competitive advantages to developing within industries. Thus, EI is gaining increasing acceptance as a crucial success factor in various industries, such as business, nursing, law, medicine, engineering, sports and academy fields from the traditional field of philosophy (Carmeli, 2003; Stein *et al.*, 2009; Augusto-Landa *et al.*, 2008; Brackett *et al.*, 2011; Song *et al.*, 2010). Therein, the realm of project management may benefit more from positive EI, due to the unique attributes of projects such as temporary, unique and progressively elaborated (Druskat and Druskat, 2006).

Meanwhile, as the core in project management system, PMs need high EI to deal with the complex relationships at work. At the early stage of EI research, the importance of PMs' EI competencies has been highlighted by Spencer (2001), according to a study of emotional competencies and work performance of 28 engineering and construction PMs. Similarly, by assessing 74 PMs in an international petroleum corporation, Mount (2006) provided the statistical insight that, of the skills that predict work success, 69 percent are emotional competencies. Moreover, a survey conducted by Mersino covering more than 100 PMs in 2005 indicated that most PMs have recognized the significance of EI to succeed, and generally expressed their expectations for further attentions and a better understanding of EI, yet they are unfamiliar with EI actually.

Certain quantities of both empirical and theoretical studies have centered on the application of PMs' EI to projects, among which the specific compositions of the classical EI frameworks have been stressed more than once, such as leadership, teamwork and empathy. For example, by studying 24 PMs and their associated projects of six industries, i.e. healthcare, manufacturing and sales services, project management services, information technology services and training and consulting services, Leban and Zulauf (2004) concluded that EI contributes to PM's transformational leadership style, and subsequently the actual PP, based on Mayer *et al.*'s (2000) EI theories. Leadership styles are proved to predict project success by investigating the engineering projects, information projects and organizational projects (Müller and Turner, 2007). Yang *et al.* (2010) supported that the PP of different project types are affected by teamwork to different extents, and finally influenced by leadership styles. Sunindijo *et al.* (2007) together with his partners, conducted their study in Thailand by interviewing PMs, engineers and client

representatives of construction projects, found that EI affects leadership behaviors of the project leaders and subsequently contributes to the positive project outcomes, using Goleman's (2001) EI models directly. Turner and Lloyd-Walker (2008) addressed the roles of both PMs and team members' EI in project success, by examining three overarching variables which are EI (based on Goleman's model), job satisfaction and job performance in a defense contracting organization in the USA.

However, there are a few empirical studies on PMs' EI, and most of them concentrate on the certain compositions of EI, such as leadership (Clarke, 2010a; Bratton *et al.*, 2011; Lindebaum and Cartwright, 2010; Butler and Chinowsky, 2006), yet fail to cover every branch or factor of EI distinguishingly. In addition, researches of specific project industry or project type were conducted by using an existing EI model directly, which is lack of pertinence to some extent. This paper therefore modifies a corresponding EI model for PMs, not only to make up for the deficiency of PMs' EI framework, but to guarantee the pertinence and validity of the conclusions. Based on this theoretical model, comprehensive analyses are made.

More importantly, the requirement and preference of EI ingredients differs in industries. Namely, some competencies of an EI model may strongly affect one industry, however, offer little help to others. For example, seven ingredients of EI, i.e. influence, motivation, conscientiousness, self-awareness, emotional resilience, sensitivity and intuitiveness, greatly influence information and telecommunication technology projects, while only the first three ones play important roles in engineering projects (Müller and Turner, 2010). Whereas, the concept of EI remains largely unexplored in construction industry, even though researchers pointed out many benefits of EI, and there is a real need to examine the individual or organization behaviors in order to improve the PP in construction (Love *et al.*, 2011).

This paper accordingly modifies PP criteria for construction projects, as well as an EI framework for PMs, so as to analyze the correlation between PMs' EI and PP at a convincing level of statistical significance, and then find out the significant dimensions or competencies on PP. We contribute to the body of PMs EI in two directions as follows:

- (1) specify an appropriate and qualified EI model of PM for large and complex projects, and make recommendations on selection, training or appointment of PMs for construction organizations; and
- (2) help PMs recognize which competencies (EI only) should be emphasized, so as to satisfy the requisition of large and complex construction projects.

Brief comparison of three major EI theories

A variety of EI theories defined from different perspectives have emerged, ever since the concept of EI was first proposed by Barbara Leuner in 1966. The topic of EI concept has been discussed for a long time, however, an agreement has hardly been reached to date (Mayer *et al.*, 2008). Herein, three popular theories developed by Mayer *et al.* Goleman and Bar-on have been widely used and regarded as three major EI theories (Bar-on and Parker, 2000).

Based on literature review, we make a brief comparison of the three major EI theories graphically in Table I (Matthews *et al.*, 2004; Conte, 2005; O'Boyle *et al.*, 2011; Boyatzis, 2009), from which we can find that each of the three popular EI models suffers from certain limitations when applied in a specific industry.

Comparison criteria	Mayer <i>et al.</i>	Three major EI theories	
		Goleman	Bar-on
Function	Ability model	Mixed model	Mixed model
Theoretical model	(1) Perception (2) Assimilation (3) Understanding (4) Managing emotions	(1) Self-awareness (2) Self-management (3) Social awareness (4) Social skills	(1) Interpersonal skills (2) Intrapersonal skills (3) Adaptability (4) Stress management (5) General moods
Contributions	The first to conceptualize EI	The first to popularize EI	Popularize EI
Measures	Performance-based MEIS, MSCEIT	Self-reported/360 reported ECI	Self-reported EQ-i
Structure	Hierarchy	Nonhierarchy	Nonhierarchy
Strengths	Rigorous concept; widely acknowledge by academia	Good practicality; widely acknowledge by business	Good practicality
Weakness	Less practical	Definition is overinclusive	Overlap with extant personality constructs
Main application trend	Academic research	Leaders and employees' performance in workplace	Comprehensive, such as academic success, clinical disorders, etc.

Table I.
Comparison of three major EI theories

Frameworks and moderators for this research

EI model for PMs

More recently, empirical and theoretical studies on PM's EI have been relatively popular, and there are plenty of researches conducted in that respect (Bratton *et al.*, 2011; Clarke, 2010b). However, few studies refer to an EI framework especially for PMs as mentioned above.

Directing at EI of PMs, Mersino (2007) modified an EI framework for PMs built on Goleman's framework, which is the only EI model for PMs we could find in literature. Supported by the experience of a PM, Mersino elaborated how to apply these EI competencies to manage projects theoretically. However, we deem that some subscales seem unsuitable to be put in this structure, for example, "stakeholder relationships" is a comprehensive concept that is affected by the integrated factors of "communication," "empathy," etc. Additionally, this EI model is hierarchically structured, which means the competencies could be mastered from low level to high level. For these reasons, this EI model for PMs is considered unsuitable to be applied in this research.

Therefore, as the ingredients of Goleman's EI model are more suitable to PMs, such as communications, organizational awareness, leadership, etc., we modify an EI model for PMs expressly built on Goleman's theoretical structure in this research.

In this EI model for PMs (Table II), 12 compositions are grouped into four high-ordered clusters. Hereinto, the first three clusters are from Goleman's EI model, and "team management" is arranged to meet the requirements of PMs' EI competencies. The competencies in "team management" seems to be the same as professional skills in PMBOK, however, they have different meanings: these competencies in the EI model refer to the abilities to handle works only by applying EI; while more than one approach can be used in PMBOK. More specifically, we develop some subscales to meet the occupational requirements of PMs in large and complex projects. For example,

EI	Description
<i>Self-awareness</i>	
Emotional self-awareness	Recognize one's feeling and how they affect performance
Self-confidence	Believe in and understand oneself and one's ability
<i>Self-management</i>	
Adaptability	The ability to handle changes
Emotional self-control	Keep oneself from impulses and negative emotions
Positive	Persist in pursuing goals even in trouble
<i>Social awareness</i>	
Empathy	Read others' feelings, perspectives and demands
Organizational awareness	Recognize emotional and political atmosphere
Cultural understanding	Sensibility to understand and recognize in different cultures
<i>Team management</i>	
Communication	The ability to conduct effective communications
Conflict management	The ability to resolve conflict
Inspirational leadership	Inspire and guide individuals and teams
Teamwork	The ability to cooperate in teams

Table II.
EI framework for PMs
used for this study

we involve “cultural understanding,” due to the facts that international projects become quite popular nowadays and the high international involvement is even more popular in large and complex projects, meanwhile the trend of multicultural project teams is likely to continue in construction (Ochieng and Price, 2009). We therefore think that a better understanding of different cultures may enhance PMs’ work performance. Construction work is never a solo, large and complex construction projects always involve more participants, so only by well cooperating with all team members can a PM lead his team toward the general goals of the project.

PP criteria for construction projects

Project success is an abstract concept, and there is not a generally accepted definition. Müller and Turner (2007) developed a composite project success measure of ten criteria to figure out the correlation between project success and PMs’ leadership style. In their research, these ten criteria were mainly used to measure the performance of engineering projects, information projects and organizational projects on seven-point Likert scales. According to Chan *et al.* (2002), project success criteria varied in fields, and then the indicators of time, cost, health and safety, profitability and quality, technical performance, functionality, productivity, satisfaction, environmental sustainability were categorized into “objective measures” and “subject measures,” and were stressed especially for design/build projects of construction industry. As presented below, we modify the PP criteria for construction projects according to the attributes of construction projects.

Project performance criteria for construction projects:

- (1) Meeting project’s overall performance
 - Time
 - Cost
 - Quality
- (2) Meeting owner’s requirements

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- (3) Meeting project's multiple goals
 - Health and safety and environment
 - Absence of conflicts
 - Risks management
 - Claim management
 - (4) Stakeholders' satisfaction
 - Owner's satisfaction
 - Project team's satisfaction
 - End-user's satisfaction
 - Suppliers' satisfaction
 - Other stakeholders' satisfaction

Moderators employed in correlational analysis

Apart from project size and complexity, the following two categorical variables, international involvement and contract type of projects are employed as moderators on the relationship between PM's EI and PP in the study:

(1) *International involvement.* A fairly large number of large and complex projects are of high international involvement, which may have special requirements and preferences for the specific competence of PMs' EI, such as cultural understanding and communication. Respondents are asked to judge the projects they designate and select the level of international involvement from the alternatives of international and domestic.

(2) *Contract type.* In construction, contract types can be categorized from different perspectives, such as contract relationship, pricing method, range of work and content of work. Contract relationship is a popular method to identify contract type, however, it's difficult to distinguish the moderating effect of either general contracts or subcontracts, because a large and complex project always contains a plenty of contracts. We use "pricing method" to classify contract types herein. Accordingly, respondents are asked to judge the project types they designate, and select from lump sum contract, unit price contract and cost plus contract.

Questionnaire-based Survey

We design a questionnaire to study the correlation between PM's EI and PP in the context of large and complex construction projects. To attain this goal, the questionnaire is divided into two parts: the first part is targeted to evaluate PMs' EI, while the other is to assess PP. Then we apply SPSS for statistical analysis.

Overall, this study addresses 200 Chinese PMs in construction organizations and their most recent projects, out of which 132 PMs respond and 112 questionnaires are used in analysis. Among these 112 usable responses, about 24.1 percent PM respondents have less than five years project management experiences, 43.8 percent have six to ten years experiences and 32.1 percent are of over ten years experiences.

EI assessment

Based on the EI framework for PMs modified in this study, we prepare a self-assessment EI test to assess these competencies. Accordingly, participants are

asked to evaluate their own levels of EI on a five-point Likert scale, from strongly disagree to strongly agree.

PP assessment

Study participants are asked to identify a completed and their most recent large and complex construction project, and then assess the PP in terms of 13 criteria in Table II on a five-point Likert scale from quite bad to quite good. We make a brief and explicit description of the large and complex projects in terms of size and complexity, because of the absence of a generally accepted definition of large and complex projects (Bosch-Rekvelde *et al.*, 2011).

The sample statistic shows that 37 out of the 112 construction projects are international projects, and the other 75 are domestic projects; 28.6 percent are unit price contract projects, 23.2 percent are of cost plus contract, the remaining 48.2 percent belong to lump sum contract. These international projects in this study are completed through the cooperation of Chinese contracting companies and international companies, using international general project management mode. Most of the international projects are constructed in one country (e.g. China, United Arab, Kuwait, the USA, Brazil, South Africa, Fiji, etc.); while the 75 domestic projects are all completed by Chinese contracting companies in China.

Results and analysis

Reliability and validity

We use Cronbach's α coefficient to test the internal consistency of PM's EI, as well as PP. As a result, α values for the 12 factors of PM's EI are all above 0.6; while that of PP are above 0.8, indicating an acceptable degree of reliability.

The construct validity is tested by factor analysis, using varimax rotation. Results show that the 40 items of EI are clustered into 12 factors, with the factor loadings for most of the EI items are between 0.5 and 0.9, which is considered valid and consistent with the theoretical framework in this study.

Correlations between PM's EI and PP

Correlational analysis, using Pearson coefficient, is employed to explain why PM's EI affects PP. This analysis attempts to discover the scales and subscales of PM's EI that can generate a good PP. The correlations are presented in Table III, and the following conclusions can be drawn:

- Significant positive correlation is observed between PM's total EI and the PP of large and complex projects at 1 percent level of significance.
- Six factors, emotional self-awareness, emotional self-control, empathy, organizational awareness, cultural understanding and communication are found to affect PP significantly at 1 percent level; while the adaptability, positive, conflict management and inspirational leadership lesser; however, the impact of self-confidence and teamwork on PP are not confirmed in this study.
- Pearson coefficient between the four dimensions of EI and PP are 0.246, 0.326, 0.414 and 0.315 at 1 percent significant level, which means that the four dimensions of EI contribute to PP at different levels, though it's not a significant difference.
- Additionally, we can also find out the key competencies in a certain aspect of PP, for example, both empathy and organizational awareness matter most on owner's requirements.

EI	PP	Overall performance	Four dimensions of PP		
			Owner's requirements	Multiple goals	Stakeholders' satisfaction
Total EI	0.466**	0.407**	0.372**	0.357**	0.260**
<i>Self-awareness</i>	0.246**	0.178	0.158	0.216*	0.197*
Emotional self-awareness	0.265**	0.167	0.162	0.229*	0.253**
Self-confidence	0.096	0.098	0.072	0.088	0.030
<i>Self-management</i>	0.326**	0.308**	0.272**	0.277**	0.114
Adaptability	0.206*	0.120	0.223*	0.241*	0.022
Emotional self-control	0.263**	0.187*	0.201*	0.251**	0.152
Positive	0.189*	0.263**	0.130	0.100	0.072
<i>Social awareness</i>	0.414**	0.377**	0.338**	0.292**	0.228*
Empathy	0.275**	0.254**	0.265**	0.157	0.136
Organizational awareness	0.308**	0.245**	0.281**	0.237*	0.151
Cultural understanding	0.344**	0.347**	0.216*	0.257**	0.223*
<i>Team management</i>	0.315**	0.262**	0.261**	0.214*	0.204*
Communications	0.291**	0.244**	0.223*	0.185	0.223*
Conflict management	0.191*	0.128	0.231*	0.101	0.093
Inspirational leadership	0.223*	0.192*	0.208*	0.139	0.122
Teamwork	0.142	0.155	0.011	0.160	0.124

Table III.
Correlations between PM's EI and project performance

Notes: **, *Correlation is significant at the 0.01 and 0.05 level (two-tailed), respectively

Moderating effect

The two-way analysis of variance (ANOVA) is used to analyze the moderating effects of international involvement and contract type on the relationship between PM's EI and PP. We test the joint effects of 12 EI factors and two moderators on PP, respectively, and observe five groups of significant joint effects. The *F*-value and the significant of statistical analysis are presented in Table IV, from which we can find the interactions between international involvement and three EI factors (i.e. cultural understanding, organizational awareness and adaptability), and the interactions between contract type and two EI factors (i.e. inspirational leadership and empathy). These results indicate the moderating effects of international involvement and contract type on the correlation between PM's EI and PP.

Figure 1 suggests that both international projects and domestic projects tend to perform better when the PMs own high level of cultural understanding; however, compared with domestic projects, international projects benefit more from PMs' cultural understanding: PP fluctuates with the level of cultural understanding from

EI factors	International involvement		Contract type	
	<i>F</i>	Significance	<i>F</i>	Significance
Cultural understanding	7.834	0.006		
Adaptability	3.860	0.052		
Organizational awareness	3.986	0.048		
Inspirational leadership			4.712	0.011
Empathy			3.432	0.036

Table IV.
Joint effects of EI factors and moderators on PP

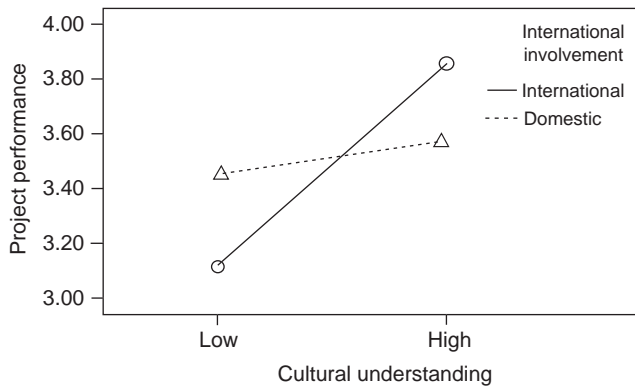


Figure 1. Correlations between cultural understanding and project performance

about 3.1 to 3.9, which means that PP may increase about 25.8 percent with the increasing of cultural understanding; while slight influence of cultural understanding on domestic projects is observed, which confirms our hypothesis. International projects show the same tendency when it comes to adaptability (see Figure 2), meanwhile, adaptability seems to offer slight help in domestic projects.

In addition, Figure 3 illustrates that domestic projects require higher level of organizational awareness to guarantee project success than international projects: PP changes from about 2.9 to 3.7 (about 27.6 percent) along with the level of organizational awareness increasing in the domestic projects; while organizational awareness accounts for about 6.1 percent increment of international projects performance.

Moreover, both inspirational leadership and empathy are proved to have joint effects with contract type on PP, as presented in Figures 4 and 5. Figure 4 indicates that unit price projects benefit more from the high level of PM's inspirational leadership, and are sensitive to the level of inspirational leadership. However, both unit price and lump sum projects experience little influence of empathy, yet empathy accounts for better PP in cost plus projects (Figure 5). These provide premise for many arguments on inspirational leadership and empathy that PMs' inspirational leadership and empathy do not affect all projects significantly.

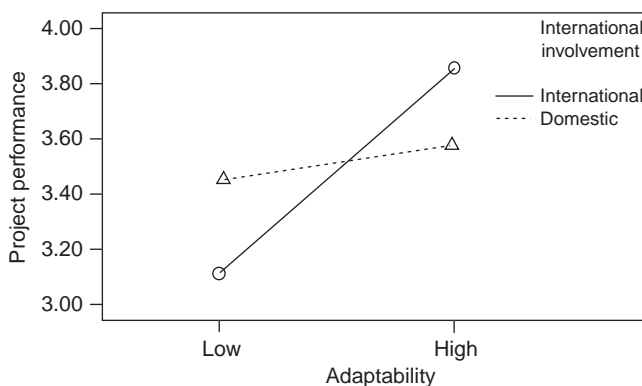


Figure 2. Correlations between adaptability and project performance

Figure 3.
Correlations between
organizational awareness
and project performance

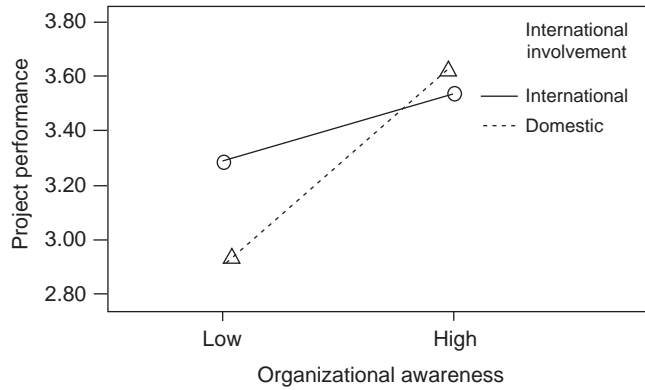


Figure 4.
Correlations between
inspirational leadership
and project performance

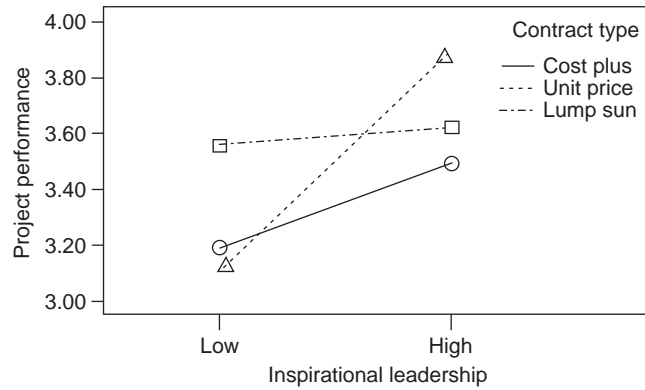
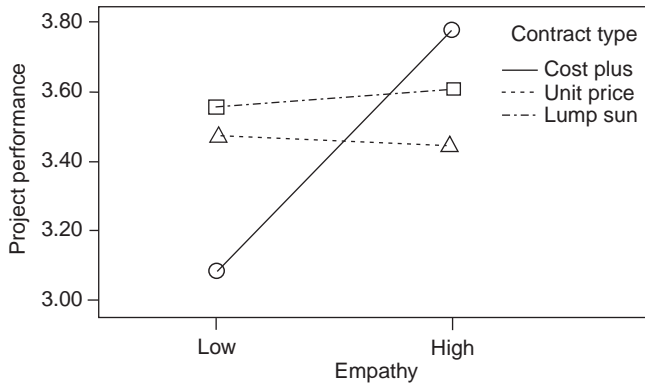


Figure 5.
Correlations between
empathy and project
performance



Conclusions and recommendations

This study focus on investigating the benefits of PMs' EI to PP in the context of large and complex construction projects, which not only contributes to improving the poor performance of construction projects from the view of PMs' EI, but also adds value to the body of a largely unexplored EI research in construction. The following achievements can be derived from this study.

First and foremost, we modify an EI model for PMs to tap into the functions of PMs, in order to provide an appropriate and qualified framework of EI competence for PMs and construction organizations. In addition, this paper revises the PP criteria for construction projects according to the attributes of construction projects.

Strong positive correlation between PMs EI and PP are observed. These correlations show each EI dimension affect PP at a different level. More detailed results between the 12 EI factors and PP support that emotional self-awareness, emotional self-control, empathy, organizational awareness, cultural understanding and communication deserve attentions due to their significant effects; whereas the effects of self-confidence and teamwork on PP have not been confirmed.

Furthermore, international involvement and contract type are examined to play moderating roles on the relationships between certain EI factors and PP. Based on the analysis of Figures 1-5 aforementioned, the following conclusions and recommendations in two directions can be made:

- To make efficient use of human resource in organizations, PMs with high cultural understanding and adaptability are supposed to be sent to international projects; meanwhile domestic projects would better to be undertaken by PMs with good organizational awareness. Then with respect to contract types, PMs with high inspirational leadership would better be allocated to the projects of unit price contract; while cost plus projects need PMs with high level of empathy to achieve better PP.
- Since international projects are strongly affected by the abilities of cultural understanding and adaptability, PMs undertaking international projects would better attach more importance to improving cultural understanding and adaptability, and domestic PMs should attempt to enhance organizational awareness. Similarly, PMs of unit price projects may try to perfect inspirational leadership, while the ability of empathy in cost plus projects instead.

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Corresponding author

Lianying Zhang can be contacted at: zhanglianying@tju.edu.cn; tjzly126@126.com