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Quality management practices and inter-organizational project performance: Moderating effect of governance mechanisms

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Abstract

While research on the relationship between quality management practices and inter-organizational project performance has found inconsistent results, few studies have considered the contextual factors of quality management practices. Inter-organizational projects involve external participants in quality management and thus, this study tested the moderating role of governance mechanisms (contract governance and trust) on the relationship between quality management practices and inter-organizational project performance. Results of 265 valid questionnaires from China indicated that quality management practices contribute to inter-organizational project performance. Contract governance magnifies the positive effect of quality management practices on inter-organizational project performance while the moderating effect of trust is insignificant. The moderating effect of contract governance indicates a means for strengthening the effect of quality management practices in inter-organizational projects. Further research on more contextual factors of quality management practices should be conducted.
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Keywords: Quality management practices; Governance mechanisms; Project performance; Inter-organizational project

1. Introduction

Inter-organizational projects have become increasingly important as more organizations seek flexible ways to handle the rapidly changing market environments (Kenis et al., 2009; Bakker et al., 2011). The importance of inter-organizational projects leads to a result that quality management often requires the involvement of outside participants (Hong et al., 2019). Quality management practices refer to any activity aimed at achieving and maintaining high-quality results (Flynn et al., 1994). All participants involved should exert efforts to implement better quality management practices (Sun et al., 2009). Managers in inter-organizational projects have to integrate their quality management practices with external organizations to gain a competitive advantage (Kosmol et al., 2018).

Some scholars have focused on the effect of quality management practices on inter-organizational project performance (Hoonakker et al., 2010; Sullivan, 2011; Hong et al., 2019). Prior research has found mixed results. Several studies found that quality management practices have considerable positive effect on inter-organizational project performance (Hoonakker et al., 2010; Panuwatwanich and Nguyen, 2017). However, other studies obtained different results and found that the effect of quality management practices on inter-organizational project performance is insignificant (Haupt and Whiteman, 2004; Tang et al., 2009; Sullivan, 2011).

To address the lack of 'universal validity' of quality management practices, scholars have utilized contingency theory

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and suggested that contextual factors could be the cause of the inconsistent implementation of quality management practices (Sousa and Voss, 2002). However, the context in previous studies was usually a firm or an industry (Sila, 2007; Jayaram et al., 2010; Zhang et al., 2012). McAdam et al. (2019) proposed that more studies should focus on the context-dependence of quality management practices. Inter-organizational project differed from other organizations because of its temporary nature and requires a cooperation atmosphere in the application of quality management practices (Kosmol et al., 2018). The contextual factors of quality management in inter-organizational projects have yet to be studied.

An inter-organizational project is essentially a temporary association among different organizations working towards a mutual goal (Levering et al., 2013). Its final product depends on the combined effort of multiple participants (Tang et al., 2009). Establishing a high level of cooperation and consistency among participants has frequently proven to be difficult (Love et al., 2004), thereby reducing the efficiency of quality management practices. Governance mechanisms expedite the efficiency of management practices by promoting cooperation (Lumineau and Quelin, 2012; Huang et al., 2014). Therefore, governance mechanisms may function as contextual factors for implementing quality management practices in inter-organizational projects.

Governance mechanisms contain contract governance and trust (Liu et al., 2008; Edelenbos and Eshuis, 2012; Yang et al., 2011; Addae-Boateng et al., 2015). Contract governance controls and coordinates expected behavior (Ryall and Sampson, 2009; Abdi and Aulakh, 2012). Trust improves cooperation and aligns participants' interests (Costa and Bijlsmafrankema, 2007; Malhotra and Lumineau, 2011). A high level of contract governance helps enforce quality standards and control project processes stringently, thereby improving the impact of quality management practices on project performance (Han et al., 2011). Trust creates an atmosphere of cooperation and learning, which improves the application efficiency of quality management practices (Lu et al., 2015; Ning, 2017; Lu et al., 2017). Hence, the current study will test the moderating effect of contract governance and trust on the relationship between quality management practices and inter-organizational project performance.

The remainder of this paper is structured as follows. Section 2 reviews existing studies on project performance, quality management practices and governance mechanisms, which leads to the development of the research model. Section 3 presents the hypotheses. Section 4 presents the methodology, including the sampling and data collection procedures, measures and instruments, the reliability and validity of the measurement. Section 5 depicts the statistical tests of hypotheses. Section 6 discusses the results of the research. Finally, Section 7 presents the conclusion.

2. Literature review and theoretical background

2.1. Project performance

Project performance, also known as project success, refers to the accomplishments and achievements of project goals (Zaman et al., 2019). Early research used criteria, such as efficiency, impact on team, impact on customers, and business success to evaluate project performance (Tam et al., 2011; Turner and Zolin, 2012; Chang et al., 2013). A series of measures were adopted based on these criteria, such as, meeting schedule, meeting cost, meeting quality requirements, team satisfaction, meeting requirements, and market share (Turner and Zolin, 2012; Cserhati and Szabo, 2014; Demirkesen and Ozorhon, 2017; Bjorvatn and Wald, 2018). Among these measures, quality, cost, and time are eminent indicators of project performance (Arditi and Gunaydin, 1997; Shenhar et al., 2001; Agarwal and Rathod, 2006). Shenhar et al. (2001) argued that a successful project should not only be within schedule, within cost, and with good quality, but also in line with customer requirements. Zaman et al. (2019) measured IT project performance with cost, time, quality, and customer's satisfaction. Such measurement of performance was also used in inter-organizational projects (Turner and Zolin, 2012; Lu et al., 2017). Based on the discussion above, we identified inter-organizational project performance by time, cost, quality, and customer satisfaction.

Researchers emphasized the necessity of improving quality through practical application and critical activities in project management (Arditi and Gunaydin, 1998; Belay et al., 2011). Quality work is important to meet customer's needs by improving quality, reducing costs and shortening the development time (Flynn et al., 1994; Sullivan, 2011). The improvement of quality leads to increased sales and larger market share or alternatively, less elastic demand and higher price (Sousa and Voss, 2002). Quality work was also accepted widely as one of the most important factors for success in inter-organizational projects (Lau et al., 2013).

2.2. Quality management practices

Quality management practices are managerial measures that refer to quality management activities (Flynn et al., 1994). Quality management practices can help improve the quality of products and reduces scrap and rework, thereby minimizing production costs and time (Orwig and Brennan, 2000; Raz and Barad, 2000). Quality management practices also enable participants to develop their full potential and achieve the objectives by cooperation and learning with each other to contribute positively to performance (Stefan and Yvonne, 2012; Sila, 2007).

Quality management practices include a number of activities (Belay et al., 2011; Al-Otaibi et al., 2015). Flynn et al. (1995) and Zu (2009) presented two dimensions of quality management practices in general. One dimension refers to practices associated with people and the other refers to practices related to the technique and methodology factors (Zu, 2009). The practices associated with people focus mostly on the involvement of leadership, customers, and participants (Flynn et al., 1995). Prajogo and Cooper (2010) called this kind of practices as people-related practices. The practices related to technique and methodology factors focus on managerial processes (Criado and Calvomora, 2009). In this study, we refer to this kind of quality practices as process-related practices. Based on

the above classification, the six quality management practices in our research are grouped as follows: top management support, customer focus, employee involvement and quality training (people-related practices), process management and quality strategic planning (process-related practices). The descriptions and supporting literature on quality management practices are provided in Table 1.

Findings on the relationship between quality management practices and inter-organizational performance are mixed. Some studies show the relationship is positive (Prajogo and Sohal, 2003; Panuwatwanich and Nguyen, 2017), while others failed to find a positive relationship (Tang et al., 2009; Sullivan, 2011). Contingency theory is useful in explaining the inconsistencies in quality management implementation (Sousa and Voss, 2008). Several studies that focus on the firm or industry level identified contextual factors that may lead to variations in the effectiveness of quality management practices, including country (Rungtusanatham et al., 1998), firm size (Sila, 2007), quality program duration (Jayaram et al., 2010), and uncertainties (Zhang et al., 2012). McAdam et al. (2019) proposed that considering more contextual factors in the implementation of quality management practices.

2.3. Governance mechanisms

Governance mechanisms refer to formal methods or informal relations used to control the behavior, nourish cooperation and govern the relationship of various participants (Liu et al., 2009). Governance mechanisms encompass contract governance and trust (Liu et al., 2008; Edelenbos and Eshuis, 2012; Yang et al., 2011; Addae-Boateng et al., 2015). Contract governance promotes cooperation through formal rules, terms, and procedures (Ryall and Sampson, 2009; Abdi and Aulakh, 2012). It furnishes principles, general procedures, and major responsibilities for all participants involved and provides a legal and institutional framework to guide the completion of tasks (Luo, 2007). As Ouchi (1979) described, contract governance serves as a coordination device that integrates resources and maintains cooperation to achieve valuable creations and control the behavior of project participants during the process. Contract governance is used to control behavior and coordinate relationships in cooperation (Mellewigt et al., 2007; Lu et al., 2016).

Trust is an informal relationship mechanism that enhances cooperation by proving each other's goodwill and competence (Liu et al., 2008). Trust refers to the willingness of one participant to have positive expectations regarding the intentions or behavior of other participants (Costa and Bijlsmafrankema, 2007; Malhotra and Lumineau, 2011; Ning, 2017). When mutual trust is high, all participants are confident that their counterpart will not act contrary to their mutual interests (Barney and Hansen, 1994). Trust allows participants to be more open to each other making the inter-organizational relationship more accountable, stable, and durable (Kumar et al., 1995). It enables an organization to execute strategies that benefit performance and implement activities helpful to project management (Khalfan et al., 2010). Management context with a high level of trust tends to be conducive for participants to cooperate with and learn from one another (Stefan and Yvonne, 2012). A trust context is beneficial to the implementation of planning and the achievement of consistency in the project process (Lu et al., 2015).

Effective governance mechanisms should be considered in inter-organizational projects to ensure the cooperation context (Tiwana and Keil, 2009). An inter-organizational project is

Table 1
Main quality management practices.

Quality management practices	Description	References	Label
Top management support	(Top management) formulating quality strategies and goals; participating in quality improvement activities; encouraging participation; accepting quality responsibility; emphasizing quality	Arditi and Gunaydin (1998); Raz and Barad (2000); Haupt and Whiteman (2004); Tang et al. (2009); Jung and Wang (2006); Belay et al. (2011); Lau et al. (2013); Munizu (2013); Altayeb and Alhasanat (2014); Al-Otaibi et al. (2015);	People-related practices
Participant involvement	(Participants) participating in quality improvement activities; proposing quality improvement initiatives; solving problems and engaging in teamwork; understanding norms and standards of quality	Arditi and Gunaydin (1998); Raz and Barad (2000); Conca et al. (2004); Jung and Wang (2006); Singh (2008); Belay et al. (2011); Lau et al. (2013); Al-Otaibi et al. (2015)	People-related practices
Customer focus	(Project) realizing customer demand; considering improving customer satisfaction; keeping close contact with customers	Arditi and Gunaydin (1998); Orwig and Brennan (2000); Cua et al. (2001); Lai (2003); Haupt and Whiteman (2004); Talavera (2004); Jung and Wang (2006); Tang et al. (2009); Belay et al. (2011); Lau et al. (2013); Munizu (2013); Altayeb and Alhasanat (2014); Al-Otaibi et al. (2015)	People-related practices
Quality training	(Project) providing quality training for participants, and managers	Haupt and Whiteman (2004); Tang et al. (2009); Belay et al. (2011); Altayeb and Alhasanat (2014); Al-Otaibi et al. (2015)	People-related practices
Process management	(Project) maintaining standards, written working processes, steps, project routine, and seamless implementation; (Participant) obtaining information about project	Jung and Wang (2006); Tang et al. (2009); Munizu (2013); Lau et al. (2013); Altayeb and Alhasanat (2014); Al-Otaibi et al. (2015)	Process-related practices
Quality strategic planning	(Quality planning) basing on client requirements; basing on corporate capability; (Project) having quality target	Cua et al. (2001); Haupt and Whiteman (2004); Conca et al. (2004); Munizu (2013); Altayeb and Alhasanat (2014); Al-Otaibi et al. (2015)	Process-related practices

peculiar because it includes diverse participants who represent various organizational identities, obligations, and commitments (Hu et al., 2019). Diverse participants often have different interests and lack prior collaboration experience on which they can ground their experiences and predictions (Gulati, 1995). It is necessary to promote cooperative behavior and develop familiarity as well as to prove each other's goodwill and competence in an inter-organizational project (Maurer, 2010). Turner and Keegan (2001) indicated that inter-organizational governance promotes participants' interaction in a project by setting the objectives of the project, determining the means of attaining these objectives, and monitoring project performance.

The conceptual framework was shown in Fig. 1. The framework illustrated the effect of quality management practices on inter-organizational project performance and the moderating effect of contract governance and trust. We reviewed the relevant literature and proposed six hypotheses to be tested in this framework in the next section.

3. Hypothesis development

3.1. Quality management practices and inter-organizational project performance

People-related quality management practices increase project performance through cooperation and learning. First, top management and participants have to exert effort to improve project quality (Al-Otaibi et al., 2015). Altayeb and Alhasanat's (2014) empirical research on construction projects showed that top management mobilizes participants from different organizations to contribute to the quality of the projects by formulating strategies and goals for quality, encouraging participation, and emphasizing quality. Sun et al. (2009) survey of new product development projects showed that participants fulfilled their own quality responsibilities can contribute to quality improvement activities. The efficiency of cooperation is improved by clarifying all the obligations of top management and general participants in quality work. Good cooperation will lead to satisfactory performance returns (Lu et al., 2016). Second, learning is important to achieve success in projects (Brady and Davies, 2004). Lau et al. (2013) stated the importance of project participants learning quality information and knowledge from market and trainings. Quality training allows project participants to develop competence to complete the tasks assigned by customers (Samsudin et al., 2012). Meanwhile, customer requirements can be fully understood through constant contact with customers (Panuwatwanich and Nguyen, 2017). Project participants have the ability to accomplish customer tasks accurately by focusing on customers and quality training (Samsudin et al., 2012), thereby increasing the customers' satisfaction (Iyer et al., 2013).

Due to the above evidence on the positive effect of people-related quality management practices on project performance, we anticipate that the positive association still fits with inter-organizational projects. Cooperation and learning are also critical approaches to gain success in inter-organizational projects (Leufkens and Noorderhaven, 2011; Sydow and Braun, 2018). Yan and Wagner (2017) stated that inter-organizational project performance will improve if top management and participants are all devoted to learning and working for the objective. Hence, we propose the following hypotheses.

Hypothesis 1. People-related quality management practices are positively associated with inter-organizational project performance.

Process-related quality management practices involve the use of scientific methods and tools for quality management implementation in projects. Argote and Fahrenkopf (2016) noticed that project outcomes depend considerably on the methods and tools used in the process. Project quality strategic planning is based on client requirements and organization ability (Tang et al., 2009). Once quality strategic planning is established, it can be expanded and transferred into objectives in the form of a quality manual. As in Singh (2008) empirical research in manufacturing projects, unified quality procedures, work processes, and work instructions can be developed by referring to the quality manual, thereby helping reduce waste and rework occurrence. Haupt and Whiteman (2004) provided empirical evidence that project standards and standardization decrease process variations and increases reliability, thereby potentially reducing cost and time.

Planning and standards are also important tools and methods in inter-organizational projects (Jung and Wang, 2006). According to Zhang et al. (2018), choosing effective methods and tools can be helpful in accomplishing the tasks in inter-organizational projects.

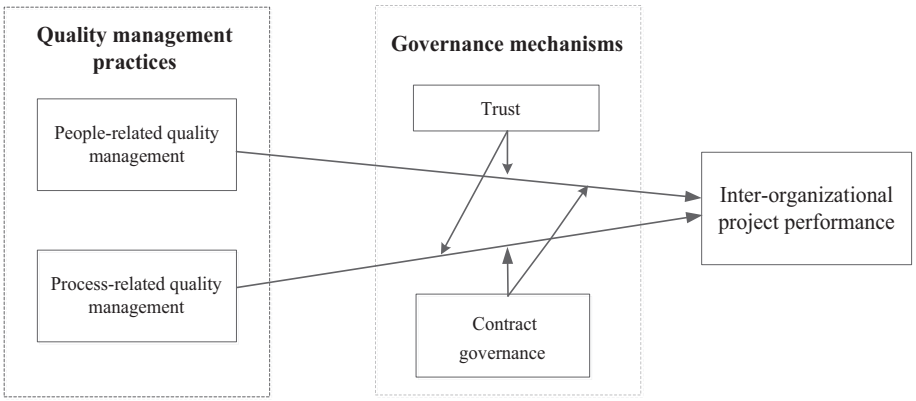

Fig. 1. Conceptual framework.

We anticipate that the association between process-related quality management practices and project performance is still exists in inter-organizational projects because of the evidence on the positive consequence of process-related quality management practices in projects. Hence, we propose the following hypotheses.

Hypothesis 2. Process-related quality management practices are positively associated with inter-organizational project performance.

3.2. Moderating effect of governance mechanisms on the relationship between quality management practices and project performance

3.2.1. Moderating effect of contract governance

Contract governance focuses on creating a governance structure in which participants become collaborative and aligned to the goals of a project (Huang et al., 2014). Inter-organizational projects are organized by participants from different groups who have disparate interests (Medlin, 2006). Vugt (2009) observed that self-interests have considerable effect on individual behavior. The main challenge for an inter-organizational project is to ensure that the behavior of all participants is in accordance with the overall goal (Leufkens and Noorderhaven, 2011). Lumineau and Quelin (2012) found that contract governance controls participants' behavior and enhances coordination in an inter-organizational project. Hence, the quality management practices work more smoothly with a high level of contract governance in an inter-organizational project.

Contract governance enhances the relationship between people-related quality management practices and inter-organizational project performance by promoting cooperative behavior and learning of quality information. On the one hand, a high level of contract governance stipulates explicit quality provisions that all participants have to implement (such as quality standards, objectives, and change) (Lu et al., 2015). Moreover, contractual control can impede participants' behavior that exhibit uncertainties and minimize the risk of shirking responsibilities to pursue their own interests, thereby ensuring that the different participants in the quality activities work in accordance with the quality standards (Han et al., 2011). On the other hand, Ashnai et al. (2016) determined that doubts and misunderstandings still occur in inter-organizational projects. The doubts and misunderstandings can reduce the efficiency in the project management. Chen and Partington (2004) found that a high level of contractual coordination promotes information exchange among all participants from different backgrounds, thereby alleviating misunderstandings in inter-organizational projects. A good cooperation atmosphere that ensures all participants can share quality information is created, which benefits the learning atmosphere and learning efficiency (Lagrosen and Lagrosen, 2012). Therefore, contract governance helps people-related quality management practices play a role in inter-organizational projects.

Contract governance facilitates the efficiency of implementing process-related quality management practices. Lu et al. (2015) found that a high level of contractual control restricts unexpected contingencies that may cause misunderstanding of each participant. This control enhances the efficiency of process management and improves the quality of work procedures. By conducting a survey in China, Han et al. (2011) proved that a high level of contractual coordination promotes the quality of information shared among participants, thereby improving the efficiency of the implementation of quality strategic planning. Therefore, contract governance improves the implementation and efficiency of process-related quality management practices.

On the contrary, when the level of contract governance is low, the functions of contractual control and coordination will be limited (Wang et al., 2018). Cooperation transforms into confusion and the behavior of the participants will be unconstrained. The behavior may hinder the participation of members in quality improvement activities and present obstacles for process management (Han et al., 2011). Moreover, quality strategies will not be implemented well in such an uncoordinated situation (Lagrosen and Lagrosen, 2012). Hence, the low level of contract governance compromises the efficiency of implementing quality management. Based on the above evidence, we propose the following hypotheses.

Hypothesis 3a. Contract governance moderates the positive association of people-related quality management practices and inter-organizational project performance such that the positive association is stronger when contract governance is higher.

Hypothesis 3b. Contract governance moderates the positive association of process-related quality management practices and inter-organizational project performance such that the positive association is stronger when contract governance is higher.

3.2.2. Moderating effect of trust

Trust promotes cooperative behavior and proves each other's goodwill. An inter-organizational project is formed temporarily for a particular task (Bakker et al., 2011). In inter-organizational projects, participants from different organizations have different goals, which may create doubts and misunderstandings (Medlin, 2006). Many scholars have noticed that trust enables a participant to accept vulnerability through positive expectations on the intentions and behavior of other participants (Hoffmann et al., 2010; Malhotra and Lumineau, 2011; Mumdziev and Windsperger, 2013). It increases cooperation and learning in inter-organizational project-level and facilitates management efficiency.

The relationship between people-related quality management practices and inter-organizational project performance is enhanced by trust. With a high level of trust, top management will gain confidence in the ability of participants from other organizations and backgrounds (Barnir and Smith, 2002), and participants will be more willing to propose suggestions for quality improvement (Claver et al., 2003). Meanwhile, project participants with a significant level of mutual trust maintain good communication and share information freely (McEvily et al., 2003; Pinto et al., 2009), thereby obtaining unified norms and standards of quality. Kadefors (2004) noticed that good communication can suppress conflicts, disputes, and other undesirable behavior, which will strengthen the common goals

and consistent values of the different participants. The above-mentioned evidence shows trust will promote the efficiency of people-related quality management practices.

Trust facilitates and improves the efficiency of implementing process-related management practices. Dille and Söderlund (2011) stated that participants of inter-organizational projects come from different organizations which operate under diverse regulations, norms, and rules established. According to Ning (2017), cooperative participants with a high level of trust are more willing to accept new concepts, which are beneficial to the overall interest. Likewise, all participants of inter-organizational projects would accept and implement common quality strategic planning under high level trust. Trust can also reduce the friction between participants from different organizations in the project process (Lu et al., 2017). Consequently, standards become easily acceptable in such an environment (Chow et al., 2012). Trust also encourages good communication and information sharing, which are beneficial to the accumulation of knowledge and project experience (Kadefors, 2004). Professional knowledge and work experience facilitate implementing planning and standards (Mathieu and Schulze, 2006). Therefore, trust can enhance the relationship between process-related quality management practices and project performance.

In contrast, Pinto et al. (2009) argued that doubts and disputes may arise among different participants when the level of trust is low, thereby decreasing cooperation among participants. Participants with doubts may not be willing to communicate with others. The lack of communication will reduce the efficiency of strategic implementation and process management may become difficult in such a doubtful environment (Lagrosen and Lagrosen, 2012). Therefore, a low level of trust impedes the implementation and decreases the efficiency of quality management practices. Hence, we propose the following hypotheses.

Hypothesis 4a. Trust moderates the positive association of people-related quality management practices and inter-organizational project performance such that the positive association is stronger when trust is higher.

Hypothesis 4b. Trust moderates the positive association of process-related quality management practices and inter-organizational project performance such that the positive association is stronger when trust is higher.

4. Methodology

4.1. Data collection

Data were collected from completed construction projects in the central and southern regions of China. Construction project is a typical example of inter-organizational project (Panuwatwanich and Nguyen, 2017). Construction projects provide a good starting point for examining the moderating effect of contextual factors in inter-organizational quality management practices. A typical construction project contains different organizations, including contract-issuing partners (clients), contractors, and supervisors. Contractors are responsible for the construction; clients focus on the quality, cost, and duration of the project; and the supervisor monitors quality, cost, and duration during the entire construction cycle (Mosey, 2009).

To obtain a representative sample, we selected 25 firms registered or active in Central and Southern China from a list provided by the Chinese Construction Enterprises Association. We requested the assistance of several Master of Business Administration (MBA) students from a renowned Chinese university, who were engaged in construction-related industries, to help contact these firms and to ensure recovery. A total of 14 firms accepted the invitation. Among them, three enterprises have the First Grade Construction Enterprise Qualification Standard certificated by Ministry of Construction in China, five enterprises have the Second Grade Construction Enterprise Qualification Standard certificated by Ministry of Construction in China, and six enterprises have no such certifications. No significant difference ($\chi^2 = 1.025$, $p > 0.05$) was observed between the distribution of our sample and the total quantity in the central and southern regions of China (first grade enterprises: 3 vs 1091; second grade enterprises: 5 vs 2904; others: 6 vs 4418). By referring to the database of the firms, we chose respondents who have been team leaders of completed projects during the entire cycle of construction in the projects. The completion time of the selected projects should be less than one year before our investigation time. This requirement can prevent respondents from encountering recall issues when they respond to the questionnaire. The survey lasted for five months. A total of 380 questionnaires were sent and 320 were returned. After removing invalid responses (with incomplete data), 265 valid questionnaires were left, thereby yielding a valid response rate of 69.74%.

Among the project classifications of the 265 valid questionnaires, commercial construction was in the uppermost project classification with a total of 133 projects (50.19%), followed by 102 public construction projects (38.49%), 22 office and residential projects (8.30%), and 8 infrastructural construction projects (3.02%). Regarding project duration, 71 projects lasted <6 months, 98 projects lasted 6–12 months, 35 projects lasted 12–18 months, 24 projects lasted 18–24 months, and 37 projects lasted >24 months, corresponding to the rates of 26.79%, 36.98%, 13.21%, 9.06% and 13.96%, respectively. Regarding project budget, the total investments cost <50 million RMB (approximately USD 8 million) for 19 projects, 50–100 million RMB (approximately USD 8–16 million) for 24 projects, 100 million to 1 billion RMB (approximately USD 16–160 million) for 163 projects, and >1 billion RMB (approximately USD 160 million) for 59 projects, corresponding to the rates of 7.17%, 9.06%, 61.51% and 22.26%, respectively.

4.2. Measures

We used multi-item measurement scales derived from existing literature that have been validated by scholars. The English version of the instruments was translated into Chinese by two professors in project management, and then translated back into English by three doctoral candidates in management. To guarantee the accuracy of the translation, the final measurement scales were inspected and polished by two quality experts. Each

item was rated on a five-point Likert scale (ranging from 1 for "strongly disagree" to 5 for "strongly agree"). The items and their loadings were specified in Appendix A.

4.2.1. Quality management practices

Quality management practices were developed around two dimensions: people-related and process-related quality management practices. The measurements for people-related quality management practices were adopted from quality literature. The scale for top management support (5 items) was from Ahmed et al. (2016); those for participant involvement (4 items) and customer focus (3 items) were from Conca et al. (2004); and that for quality training (3 items) was from Kaynak and Hartley (2008). The measurements for process-related quality management practices were adopted from quality literature. The scale for process management (6 items) was from Singh (2008); and that for quality strategic planning (3 items) was from Cua et al. (2001). Their Cronbach's α values were 0.874, 0.791, 0.769, 0.786, 0.853, and 0.711, respectively.

4.2.2. Contract governance

A scale with 8 items was adopted from Goo et al. (2009) for measuring contract governance. The Cronbach's α of contract governance was 0.881.

4.2.3. Trust

The trust scale (6 items) was adopted from Romahn and Hartman (1999) and Pinto et al. (2009), and the Cronbach's α value was 0.915.

4.2.4. Project performance

According to the work of Pinto et al. (2009) and our field practitioner interview, 6 items were used to measure project performance. The Cronbach's α value was 0.931.

4.2.5. Control variables

To control for the influence of irrelevant variables on the conceptual model, the basic situation of projects (project duration, project cost) (Liu, 2015), ownership (Liu et al., 2016) were placed into the model test as control variables.

Table 2
Values of reliability and convergent validity.

Variables	Cronbach's α	Composite reliability	AVE
Project performance	0.931	0.955	0.781
Top management support	0.874	0.909	0.667
Participant involvement	0.791	0.865	0.616
Customer focus	0.769	0.869	0.689
Quality training	0.786	0.881	0.713
Process management	0.853	0.908	0.624
Quality strategic planning	0.711	0.838	0.634
Contract governance	0.881	0.906	0.547
Trust	0.915	0.935	0.704

4.3. Reliability and validity

Data analysis was conducted using the software SPSS 18.0 and Mplus 7.4. The reliability and validity of the constructs were examined. Cronbach's α is frequently used to indicate internal consistency reliability. A Cronbach's α value that exceeds 0.7 is considered acceptable (Robinson et al., 1991). In our study, Table 2 showed that each multi-item variable's Cronbach's α value was higher than 0.7, which indicated sufficiency of the internal consistency.

The results further demonstrated that the standardized factor loadings bigger than 0.60, these results provided strong evidence of convergent validity (Flynn et al., 2010). Composite reliability (CR) and average variance extracted (AVE) are usually adopted to measure convergent validity. CR must be higher than 0.7 (Robinson et al., 1991), and AVE must be higher than 0.5 (Hair et al., 1992). In our study, the CR values ranged from 0.838 to 0.955, and the AVE values ranged from 0.547 to 0.781, which jointly imply high convergent validity. Table 2 showed the Cronbach's α, CR, and AVE of the latent variables. Discriminant validity is another value that can distinguish constructs and is assessed by the comparison of the square root of an AVE and the absolute value of the correlative coefficients of the other variables. By averaging the items of each construct in each questionnaire, we got the value of each variable in each questionnaire. After that we calculated the means, standard deviations, and correlations of each variable. Table 3 showed the AVE of a construct exceeded all correlations between that factor and any other construct within the study. Thus, the discriminant validity was satisfactory (Gefen and Straub, 2005).

4.4. Common method bias

We conducted two tests to eliminate potential common method bias. Firstly, we performed marker variable analysis. We selected 'respondent's gender' as a marker variable, which was unrelated to other variables in the analysis. As shown in Table 3, a comparison of the correlations above and below the diagonal line indicated that all significant correlations remained significant after such adjustment. Thus, the common method bias was unlikely to be a serious concern in this study (Liu et al., 2016).

We also assessed the occurrence of common method bias by comparing the fit among the one-factor model, the measurement model with only traits and the measurement model with traits and a method factor (Flynn et al., 2010; Zhao et al., 2011). The one-factor model yielded the following fit indices: $\chi^2/df = 5.446$, normed fit index (NFI) = 0.739, comparative fit index (CFI) = 0.775 and root mean square error of approximation (RMSEA) = 0.130. These values were significantly worse than those of the measurement model with only traits ($\chi^2/df = 2.695$, NFI = 0.876, CFI = 0.917, RMSEA = 0.079). The results of the measurement model with traits and a method factor did not improve the fit of the measurement model with only traits (NFI: 0.876 versus 0.876, CFI: 0.917 versus 0.917, RMSEA: 0.080 versus 0.079). Moreover, no significant difference was observed between the

Table 3
Means, standard deviations, and correlations.

Variable	Mean	SD	1	2	3	4	5	6	7	8	9	10	`11	12
1. Project performance	3.450	0.693	**0.884**	0.722 ***	0.733 ***	0.732 ***	0.772 ***	0.784 ***	0.768 ***	0.654 ***	0.689 ***	0.305 **	0.123 *	0.170 **
2. Top management support	3.860	0.697	0.720 ***	**0.817**	0.678 ***	0.549 ***	0.650 ***	0.624 ***	0.596 ***	0.582 ***	0.679 ***	0.245 **	0.150 *	0.146 *
3. Participant involvement	3.807	0.614	0.732 ***	0.677 ***	**0.785**	0.605 ***	0.626 ***	0.675 ***	0.617 ***	0.576 ***	0.643 ***	0.237 **	0.131 *	0.140 *
4. Customer focus	3.862	0.637	0.733 ***	0.547 ***	0.605 ***	**0.830**	0.694 ***	0.630 ***	0.636 ***	0.519 ***	0.624 ***	0.184 **	0.024	0.015
5. Quality training	3.668	0.808	0.771 ***	0.650 ***	0.626 ***	0.693 ***	**0.844**	0.673 ***	0.664 ***	0.612 ***	0.722 ***	0.274 **	0.099	0.147 *
6. Process management	3.840	0.609	0.783 ***	0.624 ***	0.675 ***	0.629 ***	0.673 ***	**0.790**	0.702 ***	0.718 ***	0.688 ***	0.251 **	0.126 *	0.149 *
7. Quality strategic planning	3.843	0.636	0.769 ***	0.593 ***	0.617 ***	0.637 ***	0.663 ***	0.700 ***	**0.797**	0.690 ***	0.668 ***	0.215 **	0.205 **	0.193 **
8. Contract governance	4.015	0.572	0.653 ***	0.582 ***	0.576 ***	0.519 ***	0.612 ***	0.718 ***	0.690 ***	**0.740**	0.686 ***	0.200 **	0.172 **	0.210 **
9. Trust	3.801	0.713	0.687 ***	0.680 ***	0.643 ***	0.621 ***	0.722 ***	0.688 ***	0.665 ***	0.685 ***	**0.839**	0.287 **	0.055	0.087
10. Project duration	2.460	1.345	0.301 **	0.247 **	0.236 **	0.180 **	0.274 **	0.251 **	0.211 **	0.200 **	0.289 **	–	0.056	0.103
11. Project cost	2.480	1.279	0.126 *	0.146 *	0.130 *	0.028	0.098	0.124 *	0.208 **	0.172 **	0.051	0.049	–	0.790 ***
12. Ownership	2.550	1.406	0.169 **	0.147 *	0.140 *	0.014	0.147 *	0.149 *	0.193 **	0.210 **	0.087	0.104	0.786 ***	–
13. MV maker (responder's gender)	1.250	0.431	–0.036	0.034	–0.003	–0.046	0.010	0.009	–0.048	–0.003	0.034	0.071	–0.091	0.009

Note: The diagonal elements (i.e., bold values) are the square roots of AVEs.
Unadjusted correlations appear below the diagonal; correlations adjusted for the common method appear above the diagonal.
* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$.

two models (χ^2 = 0.344, p = .557). These results showed that the common method bias is not a major concern in our study (Paulraj et al., 2008; Flynn et al., 2010; Zhao et al., 2011).

4.5. Validation of data structure

We conducted confirmatory factor analysis (CFA) on five measures to test for discriminant validity. The five-factor model provided a generally good fit to the data (χ^2/df = 2.695, NFI = 0.876, CFI = 0.917, RMSEA = 0.079). It was considerably better than the four-factor model (i.e. quality management practices, contract governance, trust, project performance; χ^2/df = 2.845, NFI = 0.866, CFI = 0.909, RMSEA = 0.084), the three-factor model (i.e. quality management practices, governance mechanisms, project performance; χ^2/df = 3.543, NFI = 0.832, CFI = 0.873, RMSEA = 0.098), the two-factor model (i.e. combining quality management practices and governance mechanisms; χ^2/df = 4.165, NFI = 0.801, CFI = 0.840, RMSEA = 0.109) and the one-factor model (χ^2/df = 5.446, NFI = 0.739, CFI = 0.775, RMSEA = 0.130), which supported the discriminant validity of the variables. The complete CFA of the data is provided in Table 4.

4.6. Variance inflation factor

We adopted the methods of Huang et al. (2014) and conducted variance inflation factor (VIF) by OLS regression model through SPSS 18.0. The OLS regression is a highly sensitive parameter estimator with inflated variances (Song and Kroll, 2011). The dependent variable was project performance and the independent variables contain control variables, people-related practices, process-related practices, and moderating variables. The highest variance inflation factor was 3.025. Given that its value was below 10, multicollinearity was not a major concern in our study (Neter et al., 1990).

5. Results

A covariance-based structural equation model (SEM) was then used to test the hypotheses via Mplus 7.4. Bollen (1989) reported that covariance-based SEM provides good coefficient estimates and accurate model analyses. The path analysis results were presented in Table 5. Model 1 was used to test the effect of the control and independent variables on project performance. Model 2 was used to test the effect of the control, independent and moderating variables. Model 3 was used to test the effect of the control, independent and moderating variables and the

Table 4
Model comparison.

Model	χ^2	df	χ^2/df	NFI	CFI	RMSEA	RMR
1-factor model	1628.416	299	5.446	0.739	0.775	0.130	0.049
2-factor model	1241.078	298	4.165	0.801	0.840	0.109	0.041
3-factor model	1048.791	296	3.543	0.832	0.873	0.098	0.036
4-factor model	833.655	293	2.845	0.866	0.909	0.084	0.032
5-factor model	775.753	288	2.695	0.876	0.917	0.079	0.030

Table 5
Structural equation model(SEM) of main effect and the moderating effect of latent variable.

Path	Estimates	p-value	Est./S.E.	R^2
Model 1				
Project duration → project performance	0.051	0.090	1.695	0.005
Ownership → project performance	0.081 *	0.031	2.157	0.015
Project cost → project performance	−0.073	0.067	−1.830	0.010
People-related practices → project performance	0.560 ***	0.000	4.460	0.360
Process-related practices → project performance	0.385 ***	0.000	6.915	0.258
Model 2				
Project duration → project performance	0.051	0.065	1.848	0.007
Ownership → project performance	0.076 *	0.028	2.195	0.016
Project cost → project performance	−0.074 *	0.041	−2.041	−0.110
People-related practices(IP) → project performance	0.560 ***	0.000	7.616	0.454
Process-related practices(CP) → project performance	0.404 ***	0.000	5.203	0.330
Contract governance(CG) → project performance	−0.027	0.545	−0.606	0.000
Trust → project performance	−0.103 *	0.027	−2.209	0.008
Model 3				
Project duration → project performance	−0.031	0.224	−1.215	0.002
Ownership → project performance	0.109 **	0.003	2.967	0.032
Project cost → project performance	−0.104 **	0.005	−2.824	0.024
People-related practices(IP) → project performance	0.538 ***	0.000	7.899	0.446
Process-related practices(CP) → project performance	0.427 ***	0.000	6.206	0.319
Contract governance(CG) → project performance	0.070 *	0.035	2.105	0.002
Trust(TR) → project performance	−0.037	0.343	−0.947	0.001
IP × CG → project performance	0.161 *	0.019	2.343	0.010
CP × CG → project performance	0.163 *	0.011	2.529	0.011
IP × TR → project performance	0.051	0.331	0.973	0.002
CP × TR → project performance	−0.057	0.315	−1.004	0.002

Note: Number = 265;
IP: people-related quality management practices; CP: process-related quality management practices;
TR: trust; CG: contract governance;
R^2: coefficient of determination;
Control variables: project duration; project cost; ownership.
* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$.

interaction terms. The main effect of independent variables and moderating effect in model 3 was shown in Fig. 2.

Hypothesis 1 and Hypothesis 2 predicted a direct effect of people-related and process-related quality management practices on project performance. The results of testing this hypothesis were presented in the Fig. 2 and indicate main effect for the people-related ($\beta = 0.538$, $p < 0.001$) and process-related quality management practices ($\beta = 0.427$, $p < 0.001$) on project performance. Therefore, Hypotheses 1 and 2 were supported.

Hypothesis 3a stated that contract governance moderates the relationship between people-related quality management practices and project performance. The results in the Fig. 2 showed a significant moderating effect of contract governance on the relationship between people-related quality management practices and project performance ($\beta = 0.161$, $p < 0.05$). Therefore, Hypothesis 3a was supported. Similarly, Hypothesis 3b stated that contract governance moderates the relationship between process-related quality management practices and project performance. The results in Fig. 2 showed a significant moderating effect of contract governance on the relationship between process-related quality management practices and project performance ($\beta = 0.163$, $p < 0.05$). Therefore, Hypothesis 3b was supported.

Hypothesis 4a stated that trust moderates the relationship between people-related quality management practices and project performance. The results in Fig. 3 showed an insignificant moderating effect of trust on the relationship between people-related quality management practices and project performance ($\beta = 0.051$, $p > .05$). Therefore, Hypothesis 4a was non-supported. Similarly, Hypothesis 4b stated that trust moderates the relationship between process-related quality management practices and project performance. The results showed an insignificant moderating effect of trust on the relationship between process-related quality management practices and project performance ($\beta = -0.057$, $p > 0.05$). Therefore, Hypothesis 4b was non-supported.

To thoroughly understand the moderating role, we plotted the interactions on a graph following Cohen and Cohen (1983). For the levels of contact governance, we selected values one standard deviation above and below the mean. Fig. 3 illustrated the moderating effect of contact governance on the relationship between quality management practices and project performance. Under high contact governance, the quality management practices relate more positively to project performance (dashed line) than under low contact governance.

6. Discussion

6.1. Quality management practices positively influence inter-organizational project performance

This paper examined the effect of two dimensions of quality management practices on inter-organizational project performance. By using Chinese construction projects as the start, our results revealed the role of quality management practices in inter-organizational projects. Hoonakker et al. (2010) and Panuwatwanich and Nguyen (2017) examined the effect of total quality management practices in construction projects, our study highlighted the role of people-related practices in promoting participants' involvement and process-related practices as tools and methods. The empirical results showed both people-related and process-related quality management practices have significant positive effect on inter-organizational project performance.

6.2. Governance mechanisms as contextual factors in inter-organizational projects

This work is the first empirical research that examined the contextual factors of quality management in inter-

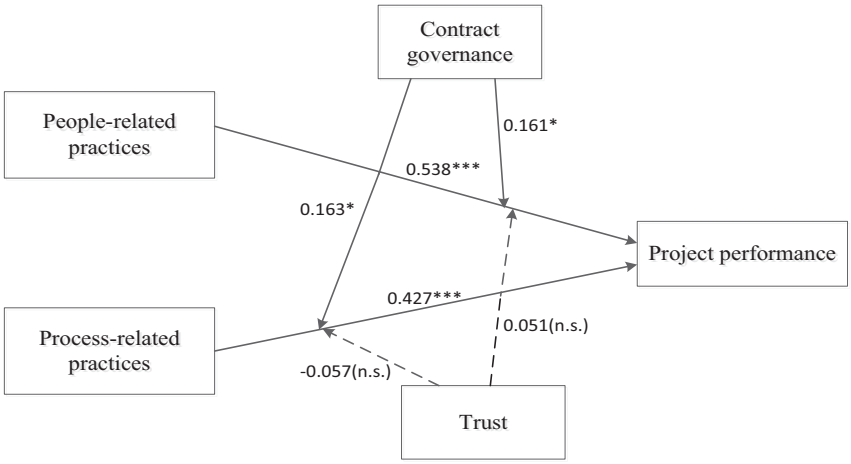

Fig. 2. Structural equation model(SEM)of moderating effect (*p < 0.05, **p < 0.01, ***p < 0.001).

organizational projects. Sila (2007) and Jayaram et al. (2010) focused on the internal and external organizational contextual factors (e.g., firm size, industry type, market environment) at firm level, we took our research in Chinese construction projects and consider governance mechanisms as inter-organizational contextual factors. Considering the mixed results in examining the relationship between quality management practices and inter-organizational performance (Haupt and Whiteman, 2004; Tang et al., 2009; Sullivan, 2011; Panuwatwanich and Nguyen, 2017), we examined the moderating effect of governance mechanisms on the relationship between quality management practices and inter-organizational project performance.

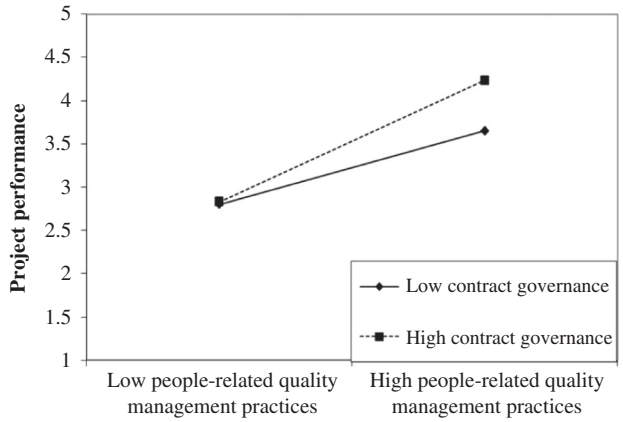

Fig. 3. Moderating effect of contract governance on relationship between quality management practices and project performance.

6.3. Moderating effect of governance mechanisms on the relationship between quality management practices and inter-organizational project performance

The results showed the effect of quality management practices on inter-organizational project performance varied across the different levels of contact governance. Previous literature has tested the effect of quality management practices and governance mechanisms on inter-organizational project performance separately (Poppo and Zenger, 2002; Lee and Cavusgil, 2006; Liu et al., 2009; Lu et al., 2015; Ning, 2017; Lu et al., 2017; Kosmol et al., 2018; Hong et al., 2019). We tested the moderating effect of governance mechanisms on the relationship between people-related quality management practices and inter-organizational project performance, which provided evidence for Han et al. (2011) who suggested that quality management practices can work better when applying governance mechanisms.

Contract governance can moderate the relationship between quality management practices and inter-organizational project performance by promoting cooperation and learning. This finding is consistent with the viewpoints of Lagrosen and Lagrosen (2012). According to their study, an atmosphere of cooperation and learning is conducive to the implementation of quality management practices. The failure in finding a significant positive moderating effect of trust might be explained by the effectiveness of trust being dependent on relationship length (Liu et al., 2008) and inter-organizational projects are temporary. As Liu et al. (2008) mentioned, relational length is a key element to make trust play its role in China.

This study demonstrated different moderating effect of trust and contract governance. Previous studies proposed that more research should be conducted to determine whether quality management practices are context dependent and what contextual factors are involved (Zhang et al., 2012; McAdam et al., 2019). This research responded to this call and identified that contract governance had positive interactions with quality management practices in inter-organizational projects, while trust had not.

7. Conclusions

7.1. Theoretical contributions

This article revealed the moderating effect of governance mechanisms between quality management practices and inter-organizational performance and carried out an empirical research. This research contributed to the literature in the following ways.

The study supported the contingency view of quality management practices and validated empirically the moderating effect of contract governance on the link between quality management practices and performance. Previous studies presented that contingency factors affect the implementation of quality management in internal and external organizations (Sila, 2007; Jayaram et al., 2010). The empirical study grounded the view in inter-organizational projects, an area where the application of the contingency theory is still in its early stages (Sauser et al., 2009). Moreover, the moderating effect of contract governance demonstrated the boundary conditions of the effect of quality management practices in inter-organizational projects, which could serve as evidence to account for the mixed results of quality management practices. This study can also be viewed as empirical evidence that serves as a starting point for future context studies on quality management practices.

7.2. Managerial implications

Inter-organizational project performance can be improved by quality management practices. The results of this study suggested that quality management practices can be accomplished through two different approaches. One is to encourage participant involvement in quality activities and the other is to use tools and methods correctly. Top managers should provide additional support for quality management and cooperation among different participants in a project to utilize fully the skills and knowledge of participants from different organizations. The other pertains to the quality management process, wherein effective methods and tools must be chosen to achieve excellent performance in management.

Quality management practices work better in high-level contract governance within inter-organizational projects. Promoting cooperative behavior and proving participants' goodwill are enormous challenges in inter-organizational projects. From a managerial perspective, participants in inter-organizational projects should establish effective governance to ensure efficient implementation of quality management. The presence of contract governance allows quality management practices to work more smoothly. Thus, project managers should emphasize contract governance and quality management jointly in inter-organizational projects.

7.3. Limitations and future directions

Although this study provided valuable insights, it still has several limitations. Firstly, the sample was limited through its single country context and targeted at single industry. Future studies might extend our study to other contexts, in order to test the generalizability and robustness of the findings. Secondly, the questionnaires were responded by single respondent. Although the common method bias was not a serious concern in the study, the potential for this bias resulting from the use of monadic data is not completely eliminated. In order to fully understand quality management in a project, dyadic perspective data are more appropriate. Thirdly, we measured project performance by cost, quality, time and customer's satisfaction. Some scholars have proposed that other aspects of performance should be included (Shenhar et al., 2001; Turner and Zolin, 2012), such as market performance and relational performance (Turner and Zolin, 2012; Sariola and Martinsuo, 2016). Further work can use broader measurement in order to reflect project performance more comprehensively.

Our research examined the contextual factors in inter-organizational quality management practices by regarding governance mechanisms as contextual factors. Future research can make several extensions. First, other contextual factors could be considered because inter-organizational contextual factors. Communication can promote the consistency of different participants (Aros and Gibbons, 2018) while conflict inhibits cooperation (Wu et al., 2017). Communication and conflict may also moderate the relationship between quality management practices and inter-organizational performance. Second, the effect of quality management practices is context-dependent (Zhang et al., 2012). Thus, different contextual factors of quality management practices could be further studied under other contexts beyond inter-organizational projects. Third, because of the differences in the moderating effect of contract governance and trust, more nuanced research should be conducted to raise the level of understanding of the moderating effect of governance mechanisms as applied to quality management practices.

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Appendix A. List of items

Quality management practices.

Construct		Items	Loading
Top		management support	TOP1
	Top	management actively participates in quality improvement activities.	0.839
	TOP2	Top management encourages participants to take part in quality improvement activities.	0.846
	TOP3	Top management takes active responsibility for the quality.	0.803
	TOP4	Top management makes strategies and goals for quality.	0.812
TOP5	Top	management discusses quality issues during meetings.	0.782
Participant		involvement	PI1
		Participants actively participate in quality improvement activities.	0.803
	PI2	Participants have problem-solving skills.	0.836
	PI3	Participants have teamwork abilities.	0.729
PI4		Participants understand the norms and standards of quality.	0.768
Customer focus	CF1	This project can realize the demand of the customer.	0.814
	CF2	This project always considers improving customer satisfaction.	0.856
	CF3	This project always keeps close contact with the customers.	0.819
Quality training	QT1	This project provides quality training for participants.	0.891
	QT2	This project provides quality training for management.	0.862
	QT3	This project provides quality training for suppliers.	0.776
Process		management	PM1
	This	project has a standard, written working process, and construction steps.	0.812
	PM2	This project routinely carries out tests of various detection including materials, construction process, and the completed parts.	0.781
	PM3	This project has continuous control and improvement for the key link in the process of construction.	0.790
	PM4	The quality activities of this project can solve problems effectively.	0.842
	PM5	The participants of this project can obtain information on time, cost, and quality conveniently.	0.814
PM6	The	project quality diary is updated frequently.	0.693
Quality strategy planning	QSP1	Quality strategy planning of this project is based on the requirements of the clients.	0.838
	QSP2	Quality strategy planning of this project is based on corporate ability	0.805
	QSP3	This project also has a clear and formal written quality target.	0.743
Contract governance	CG1	Our relationship with the other participants is governed primarily by written contracts.	0.763
	CG2	The contract has detailed the obligations and rights of every participant.	0.678
	CG3	The contract has a clear statement of the time, place, and the way of project fulfillment.	0.741
	CG4	The contract has specified the major principles or guidelines for handling unanticipated contingencies as they arise.	0.740
	CG5	The contract has provided alternative solutions for responding to various contingencies that are likely to arise.	0.795
	CG6	The contract has allowed us to respond quickly to match evolving client requirements.	0.794
	CG7	We have a clear expression of the default definitions and formulas.	0.676
	CG8	The contract has a detailed description of the conditions under which termination may occur.	0.721
Trust	TR1	We are certain that the other participants have the ability to perform their tasks.	0.819
	TR2	We are certain that the other participants have the ability to meet technical and management requirements.	0.814
	TR3	We believe that the project participants trust each other's working ability.	0.841
	TR4	We believe that all participants involved in the project will comply with the contract.	0.849
	TR5	We believe that each other's commitment is reliable.	0.865
	TR6	We believe that the project participants are upright and honest.	0.846
Project		performance	PP1
	The	project results, or deliverables, are in line with the client objectives.	0.899
	PP2	The project is within the budget.	0.955
	PP3	This project is on schedule.	0.884
	PP4	The construction and deliverables quality accord with the standard.	0.938
	PP5	The project passed the quality inspection.	0.634
PP6	The	participants of this project maintain good cooperation.	0.950

References

Abdi, M., Aulakh, P.S., 2012. Do country-level institutional frameworks and inter-firm governance arrangements substitute or complement in international business relationships. J. Int. Bus. Stud. 43 (5), 477–497.

Addae-Boateng, S., Wen, X., Brew, Y., 2015. Governance, relational governance, and firm performance: the case of Chinese and Ghanaian and family firms. Am. J. Ind. Bus. Manag. 5 (5), 288–315.

Agarwal, N., Rathod, U., 2006. Defining 'success' for software projects: an exploratory revelation. Int. J. Proj. Manag. 24 (04), 358–370.

Ahmed, R., Mohamad, N.A., Shakil, A.M., 2016. Effect of multidimensional top management support on project success: an empirical investigation. Qual. Quant. 50 (1), 151–176.

Al-Otaibi, F., Alharbi, M.F., Almeleehan, A., 2015. Effect of total quality management practices factors on the competitiveness: evidence from Saudi Arabia. Int. J. Business Manag. 10 (5), 85–97.

Altayeb, M.M., Alhasanat, M.B., 2014. Implementing total quality management (TQM) in the Palestinian construction industry. Int. J. Qual. Reliab. Manag. 31 (8), 878–887.

Arditi, D., Gunaydin, H.M., 1997. Total quality management in the construction process. Int. J. Proj. Manag. 15 (4), 235–243.

Arditi, D., Gunaydin, H.M., 1998. Factors that affect process quality in the life cycle of building projects. J. Constr. Eng. Manag. 124 (3), 194–203.

Argote, L., Fahrenkopf, E., 2016. Knowledge transfer in organizations: the roles of members, tasks, tools, and networks. Organ. Behav. Hum. Decis. Process. 136 (4), 146–159.

Aros, S.K., Gibbons, D.E., 2018. Exploring communication media options in an inter-organizational disaster response coordination network using agent-based simulation. Eur. J. Oper. Res. 269 (2), 451–465.
Ashnai, B., Henneberg, S.C., Peter, N., Francescucci, A., 2016. Inter-personal and inter-organizational trust in business relationships: an attitude–behavior–outcome model. Ind. Mark. Manag. 52 (4), 128–139.
Bakker, R.M., Knoben, J., Vries, N., Oerlemans, L.A.G., 2011. The nature and prevalence of inter-organizational project ventures: evidence from a large scale field study in the Netherlands 2006–2009. Int. J. Proj. Manag. 29 (6), 781–794.
Barney, J.B., Hansen, M.H., 1994. Trustworthiness as a source of competitive advantage. Strateg. Manag. J. 15 (S1), 175–190.
Barnir, A., Smith, K.A., 2002. Interfirm alliances in the small business: the role of social networks. J. Small Bus. Manag. 40 (3), 219–232.
Belay, A.M., Helo, P., Takala, J., Kasie, F.M., 2011. Effects of quality management practices and concurrent engineering in business performance. Int. J. Business Manag. 6 (3), 45–63.
Bjorvatn, T., Wald, A., 2018. Project complexity and team-level absorptive capacity as drivers of project management performance. Int. J. Proj. Manag. 36 (6), 876–888.
Bollen, K.A., 1989. Structural Equations with Latent Variables. John Wiley and Sons, New York.
Brady, T., Davies, A., 2004. Building project capabilities: from exploratory to exploitative learning. Organ. Stud. 25 (9), 1601–1621.
Chang, A., Chih, Y.Y., Chew, E., Pisarski, A., 2013. Reconceptualising mega project success in Australian Defence: recognising the importance of value co-creation. Int. J. Proj. Manag. 31 (8), 1139–1153.
Chen, P., Partington, D., 2004. An interpretive comparison of Chinese and Western conceptions of relationships in construction project management work. Int. J. Proj. Manag. 22 (5), 397–406.
Chow, P.T., Cheung, S.O., Chan, K.Y., 2012. Trust-building in construction contracting: mechanism and expectation. Int. J. Proj. Manag. 30 (8), 927–937.
Claver, E., Tari, J.J., Molina, J.F., 2003. Critical factors and results of quality management: an empirical study. Total Qual. Manag. 14 (1), 91–118.
Cohen, J., Cohen, P., 1983. Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences (Hillsdale, Erlbaum).
Conca, F.J., Llopis, J., Tari, J.J., 2004. Development of a measure to assess quality management in certified firms. Eur. J. Oper. Res. 156 (3), 683–697.
Costa, C.A., Bijlsmafrankema, K., 2007. Trust and control interrelations. Group Org. Manag. 32 (4), 392–406.
Criado, F., Calvomora, A., 2009. Excellence profiles in Spanish firms with quality management systems. Total Qual. Manag. Bus. Excell. 20 (6), 655–679.
Cserhati, G., Szabo, L., 2014. The relationship between success criteria and success factors in organizational event projects. Int. J. Proj. Manag. 32 (4), 613–624.
Cua, K.O., McKone, K.E., Schroeder, R.G., 2001. Relationships between implementation of TQM, JIT, and TPM and manufacturing performance. J. Oper. Manag. 19 (6), 675–694.
Demirkesen, S., Ozorhon, B., 2017. Impact of integration management on construction project management performance. Int. J. Proj. Manag. 35 (8), 1639–1654.
Dille, T., Söderlund, J., 2011. Managing inter-institutional projects: the significance of isochronism, timing norms and temporal misfits. Int. J. Proj. Manag. 29 (4), 480–490.
Edelenbos, J., Eshuis, J., 2012. The interplay between trust and control in governance processes: a conceptual and empirical investigation. Adm. Soc. 44 (6), 647–674.
Flynn, B.B., Schroeder, R.G., Sakakibara, S., 1994. A framework for quality management research and an associated measurement instrument. J. Oper. Manag. 11 (4), 339–366.
Flynn, B.B., Schroeder, R.G., Sakakibara, S., 1995. The impact of quality management practices on performance and competitive advantage. Decis. Sci. 26 (5), 659–692.
Flynn, B.B., Huo, B., Zhao, X., 2010. The impact of supply chain integration on performance: a contingency and configuration approach. J. Oper. Manag. 28 (1), 58–71.
Gefen, D., Straub, D., 2005. A practical guide to factorial validity using PLS graph: tutorial and annotated example. Commun. Assoc. Inf. Syst. 16 (1), 91–109.
Goo, J., Kishore, R., Rao, H.R., Nam, K., 2009. The role of service level agreements in relational management of information technology outsourcing: an empirical study. MIS Q. 33 (1), 119–145.
Gulati, R., 1995. Does familiarity breed trust? The implications of repeated ties for contractual choice in alliances. Acad. Manag. J. 38 (1), 85–112.
Hair, J.T., Anderson, R.E., Tatham, R.L., Black, W.C., 1992. Multivariate Data Analysis with Reading. Macmillan, New York.
Han, J., Trienekens, J., Omta, S., 2011. Relationship and quality management in the Chinese pork supply chain. Int. J. Prod. Econ. 134 (2), 312–321.
Haupt, T.C., Whiteman, D.E., 2004. Inhibiting factors of implementing total quality management on construction sites. TQM Mag. 16 (3), 166–173.
Hoffmann, W.H., Neumann, K., Speckbacher, G., 2010. The effect of inter-organizational trust on make-or-cooperate decisions: disentangling opportunism-dependent and opportunism-independent effects of trust. Eur. Manag. Rev. 7 (2), 101–115.
Hong, J., Liao, Y., Zhang, Y., Yu, Z., 2019. The effect of supply chain quality management practices and capabilities on operational and innovation performance: evidence from Chinese manufacturers. Int. J. Prod. Econ. 212 (6), 227–235.
Hoonakker, P., Carayon, P., Loushine, T., 2010. Barriers and benefits of quality management in the construction industry: an empirical study. Total Qual. Manag. Bus. Excell. 21 (9), 953–969.
Hu, N., Wu, J., Gu, J., 2019. Cultural intelligence and employees' creative performance: the moderating role of team conflict in inter-organizational teams. J. Manag. Organ. 25 (1), 96–111.
Huang, M.C., Cheng, H.L., Tseng, C.Y., 2014. Reexamining the direct and interactive effects of governance mechanisms upon buyer-supplier cooperative performance. Ind. Mark. Manag. 43 (4), 704–716.
Iyer, A., Saranga, H., Seshadri, S., 2013. Effect of quality management systems and total quality management on productivity before and after: empirical evidence from the Indian auto component industry. Prod. Oper. Manag. 22 (2), 283–301.
Jayaram, J., Ahire, S.L., Dreyfus, P., 2010. Contingency relationships of firm size, TQM duration, unionization, and industry context on TQM implementation-a focus on total effects. J. Oper. Manag. 28 (4), 345–356.
Jung, J.Y., Wang, Y.J., 2006. Relationship between total quality management (TQM) and continuous improvement of international project management (CIIPM). Technovation 26 (5), 716–722.
Kadefors, A., 2004. Trust in project relationships-inside the black box. Int. J. Proj. Manag. 22 (3), 175–182.
Kaynak, H., Hartley, J.L., 2008. A replication and extension of quality management into the supply chain. J. Oper. Manag. 26 (4), 468–489.
Kenis, P., Janowiczpanjaitan, M., Cambré, B., 2009. Temporary organizations. Tidsskriftet Sykepleien 85 (8), 201–219.
Khalfan, M.M.A., Kashyap, M., Li, X., Abbott, C., 2010. Knowledge management in construction supply chain integration. Int. J. Netw. Virt. Organ. 7 (2/3), 207–221.
Kosmol, T., Reimann, F., Kaufmann, L., 2018. Co-alignment of supplier quality management practices and cognitive maps-a neo-configurational perspective. J. Purch. Supply Manag. 24 (01), 1–20.
Kumar, N., Scheer, L.K., Steenkamp, J., 1995. The effects of perceived interdependence on dealer attitudes. J. Mark. Res. 32 (3), 348–356.
Lagrosen, S., Lagrosen, Y., 2012. Trust and quality management: perspectives from marketing and organisational learning. Total Qual. Manag. Bus. Excell. 23 (1), 13–26.
Lai, K.H., 2003. Market orientation in quality-oriented organizations and its impact on their performance. Int. J. Prod. Econ. 84 (1), 17–34.
Lau, A.W.T., Tang, S.L., Li, Y.S., 2013. The level of TQM application by construction contractors in Hong Kong. Int. J. Qual. Reliab. Manag. 32 (8), 830–862.
Lee, Y., Cavusgil, S.T., 2006. Enhancing alliance performance: the effects of contractual-based versus relational-based governance. J. Bus. Res. 59 (8), 896–905.
Leufkens, A.S., Noorderhaven, N.G., 2011. Learning to collaborate in multi-organizational projects. Int. J. Proj. Manag. 29 (4), 432–441.

Levering, R., Ligthart, R., Noorderhaven, N., Oerlemans, L., 2013. Continuity and change in interorganizational project practices: the Dutch shipbuilding industry, 1950–2010. Int. J. Proj. Manag. 31 (5), 735–747.
Liu, S., 2015. Effects of control on the performance of information systems projects: the moderating role of complexity risk. J. Oper. Manag. 2015 (36), 46–62.
Liu, Y., Li, Y., Tao, L., Wang, Y., 2008. Relationship stability, trust and relational risk in marketing channels: evidence from China. Ind. Mark. Manag. 37 (4), 432–446.
Liu, Y., Luo, Y., Liu, T., 2009. Governing buyer–supplier relationships through transactional and relational mechanisms: evidence from China. J. Oper. Manag. 27 (4), 294–309.
Liu, H., Wei, S., Ke, W., Wei, K.K., Hua, Z., 2016. The configuration between supply chain integration and information technology competency: a resource orchestration perspective. J. Oper. Manag. 2016 (44), 13–29.
Love, P.E.D., Irani, Z., Edwards, D.J., 2004. A seamless supply chain management model for construction. Supply Chain Manag. 9 (1), 43–56.
Lu, P., Guo, S., Qian, L., He, P., Xu, X., 2015. The effectiveness of contractual and relational governances in construction projects in China. Int. J. Proj. Manag. 33 (1), 212–222.
Lu, P., Qian, L., Chu, Z., Xu, X., 2016. Role of opportunism and trust in construction projects: empirical evidence from China. J. Manag. Eng. 32 (2), 212–221.
Lu, P., Yuan, S., Wu, J., 2017. The interaction effect between intra-organizational and inter-organizational control on the project performance of new product development in open innovation. Int. J. Proj. Manag. 35 (8), 1627–1638.
Lumineau, F., Quelin, B.V., 2012. An empirical investigation of interorganizational opportunism and contracting mechanisms. Mpra Paper 23 (3), 75–78.
Luo, Y., 2007. A coopetition perspective of global competition. J. World Bus. 42 (2), 129–144.
Malhotra, D., Lumineau, F., 2011. Trust and collaboration in the aftermath of conflict: the effects of contract structure. Acad. Manag. J. 54 (5), 981–998.
Mathieu, J.E., Schulze, W., 2006. The influence of team knowledge and formal plans on episodic team process-performance relationships. Acad. Manag. J. 49 (3), 605–619.
Maurer, I., 2010. How to build trust in inter-organizational projects: the impact of project staffing and project rewards on the formation of trust, knowledge acquisition and product innovation. Int. J. Proj. Manag. 28 (7), 629–637.
McAdam, R., Miller, K., Mcsorley, C., 2019. Towards a contingency theory perspective of quality management in enabling strategic alignment. Int. J. Prod. Econ. 207 (1), 195–207.
McEvily, B., Perrone, V., Zaheer, A., 2003. Trust as an organizing principle. Organ. Sci. 14 (1), 91–103.
Medlin, C.J., 2006. Self and collective interest in business relationships. J. Bus. Res. 59 (7), 858–865.
Mellewigt, T., Madhokb, A., Weibel, A., 2007. Trust and formal contracts in inter-organizational relationships-substitutes and complements. Manag. Decis. Econ. 28 (8), 833–847.
Mosey, D., 2009. Early Contractor Involvement in Building Procurement: Contracts, Partnering and Project Management. Wiley-Blackwell, New York.
Mumdziev, N., Windsperger, J., 2013. An extended transaction cost model of decision rights allocation in franchising: the moderating role of trust. Manag. Decis. Econ. 34 (4), 170–182.
Munizu, M., 2013. The impact of total quality management practices towards competitive advantage and organizational performance: case of fishery industry in South Sulawesi Province of Indonesia. Pak. J. Commer. Soc. Sci. 7 (1), 184–197.
Neter, J., Wasserman, W., Kutner, M., 1990. Applied Linear Statistical Models. Irwin, Homewood.
Ning, Y., 2017. Combining formal controls and trust to improve dwelling fit-out project performance: a configurational analysis. Int. J. Proj. Manag. 35 (7), 1238–1252.
Orwig, R.A., Brennan, L.L., 2000. An integrated view of project and quality management for project-based organizations. Int. J. Qual. Reliab. Manag. 17 (4/5), 351–363.
Ouchi, W.G., 1979. A conceptual framework for the design of organizational control mechanism. Manag. Sci. 25 (9), 833–848.
Panuwatwanich, K., Nguyen, T.T., 2017. Influence of organizational culture on total quality management implementation and firm performance: evidence from the Vietnamese construction industry. Manag. Prod. Eng. Rev. 8 (1), 5–15.
Paulraj, A., Lado, A.A., Chen, I.J., 2008. Inter-organizational communication as a relational competency: antecedents and performance outcomes in collaborative buyer–supplier relationships. J. Oper. Manag. 26 (1), 45–64.
Pinto, J.K., Slevin, D.P., English, B., 2009. Trust in projects: an empirical assessment of owner/contractor relationships. Int. J. Proj. Manag. 27 (6), 638–648.
Poppo, L., Zenger, T., 2002. Do formal contracts and relational governance function as substitutes or complements? Strateg. Manag. J. 23 (8), 707–725.
Prajogo, D.I., Cooper, B.K., 2010. The effect of people-related TQM practices on job satisfaction: a hierarchical model. Prod. Plan. Control 21 (1), 26–35.
Prajogo, D.I., Sohal, A.S., 2003. The relationship between TQM practices, quality performance, and innovation performance: an empirical examination. Int. J. Qual. Reliab. Manag. 20 (8), 901–918.
Raz, T., Barad, M., 2000. Contribution of quality management tools and practices to project management performance. Int. J. Qual. Reliab. Manag. 17 (4/5), 571–583.
Robinson, J.P., Shaver, P.R., Wrightsman, L.S., 1991. Criteria for scale selection and evaluation. Meas. Person. Soc. Psychol. Attitud. 11 (2), 1–16.
Romahn, E., Hartman, F., 1999. Trust: a new tool for project managers. Proceedings of the 30th Annual Project Management 1999 Seminars and Symposium (Philadelphia).
Rungtusanatham, M., Forza, C., Filippini, R., Aderson, J.C., 1998. A replication study of a theory of quality management underlying the deming management method: insights from an Italian context. J. Oper. Manag. 17 (1), 77–95.
Ryall, M.D., Sampson, R.C., 2009. Formal contracts in the presence of relational enforcement mechanisms: evidence from technology development projects. Manag. Sci. 55 (6), 906–925.
Samsudin, N.S., Ayop, S.M., Sahab, S.S., Ismail, Z., 2012. Problems and issues on the implementation of quality management system in construction projects. IEEE Symposium on Business, Engineering and Industrial Applications. vol. 2012 (Bandung).
Sariola, R., Martinsuo, M., 2016. Enhancing the supplier's non-contractual project relationships with designers. Int. J. Proj. Manag. 34 (6), 923–936.
Sauser, B.J., Reilly, R.R., Shenhar, A.J., 2009. Why projects fail? How contingency theory can provide new insights - comparative analysis of NASA's climate orbiter. Int. J. Proj. Manag. 27 (7), 665–679.
Shenhar, A., Dvir, D., Levy, O., 2001. Project success: a multidimensional strategic concept. Long Range Plan. 34 (6), 699–725.
Sila, I., 2007. Examining the effects of contextual factors on TQM and performance through the lens of organizational theories: an empirical study. J. Oper. Manag. 25 (1), 83–109.
Singh, P.J., 2008. Empirical assessment of ISO 9000 related management practices and performance relationships. Int. J. Prod. Econ. 113 (1), 40–59.
Song, P., Kroll, C., 2011. The Impact of Multicollinearity on Small Sample Hydrologic Regional Regression. Palm Springs, California.
Sousa, R., Voss, C.A., 2002. Quality management re-visited: a reflective review and agenda for future research. J. Oper. Manag. 20 (1), 91–109.
Sousa, R., Voss, C.A., 2008. Contingency research in operations management practices. J. Oper. Manag. 26 (6), 697–713.
Stefan, L., Yvonne, L., 2012. Trust and quality management: perspectives from marketing and organizational learning. Total Qual. Manag. Bus. Excell. 23 (1), 13–26.
Sullivan, K.T., 2011. Quality management programs in the construction industry: best value compared with other methodologies. J. Manag. Eng. 27 (4), 210–219.
Sun, H., Zhao, Y., Keung, Y.H., 2009. The relationship between quality management and the speed of new product development. TQM J. 21 (6), 576–588.
Sydow, J., Braun, T., 2018. Projects as temporary organizations: an agenda for further theorizing the inter-organizational dimension. Int. J. Proj. Manag. 36 (1), 4–11.

Talavera, M.G.V., 2004. Development and validation of TQM constructs: the philippine experience. Gadjah Mada Int. J. Bus. 6 (3), 355–381.

Tam, V.W.Y., Shen, L.Y., Kong, J.S.Y., 2011. Impacts of multi-layer chain subcontracting on project management performance. Int. J. Proj. Manag. 29 (1), 108–116.

Tang, W., Qiang, M., Duffield, C.F., Young, D.M., Lu, Y., 2009. Enhancing total quality management by partnering in construction. J. Prof. Issues Eng. Educ. Pract. 135 (4), 129–141.

Tiwana, A., Keil, M., 2009. Control in internal and outsourced software projects. J. Manag. Inf. Syst. 26 (3), 9–44.

Turner, J.R., Keegan, A., 2001. Mechanisms of governance in the project-based organization: roles of the broker and steward. Eur. Manag. J. 19 (3), 254–267.

Turner, R., Zolin, R., 2012. Forecasting success on large projects: developing reliable scales to predict multiple perspectives by multiple stakeholders over multiple time frames. Proj. Manag. J. 43 (5), 87–99.

Vugt, M.V., 2009. Averting the tragedy of the commons: using social psychological science to protect the environment. Curr. Dir. Psychol. Sci. 18 (3), 169–173.

Wang, L., Huo, D., Motohashi, K., 2018. Coordination Mechanisms and Overseas Knowledge Acquisition for Chinese Suppliers: The Contingent Impact of Production Mode and Contractual Governance. https://doi.org/10.1016/j.intman.2018.10.003.

Wu, G., Liu, C., Zhao, X., Zou, J., 2017. Investigating the relationship between communication-conflict interaction and project success among construction project teams. Int. J. Proj. Manag. 35 (8), 1466–1482.

Yan, T., Wagner, S.M., 2017. Do what and with whom? value creation and appropriation in inter-organizational new product development projects. Int. J. Prod. Econ. 191, 1–14.

Yang, Z., Zhou, C., Jiang, L., 2011. When do formal control and trust matter? a context-based analysis of the effects on marketing channel relationships in China. Ind. Mark. Manag. 40 (1), 86–96.

Zaman, U., Jabbar, Z., Nawaz, S., Abbas, M., 2019. Understanding the soft side of software projects: an empirical study on the interactive effects of social skills and political skills on complexity-performance relationship. Int. J. Proj. Manag. 37 (3), 444–460.

Zhang, D., Linderman, K., Schroeder, R.G., 2012. The moderating role of contextual factors on quality management practices. J. Oper. Manag. 30 (1/2), 12–23.

Zhang, Y., Sun, J., Yang, Z., Wang, Y., 2018. Mobile social media in inter-organizational projects: aligning tool, task and team for virtual collaboration effectiveness. Int. J. Proj. Manag. 36 (8), 1096–1108.

Zhao, X., Huo, B., Selen, W., Yeung, J.H.Y., 2011. The impact of internal integration and relationship commitment on external integration. J. Oper. Manag. 29 (1/2), 17–32.

Zu, X., 2009. Infrastructure and core quality management practices: how do they affect quality? Int. J. Quality & Reliab. Manag. 26 (2), 129–149.