Chapter 4
Behavioural Considerations in Construction Incentivization Planning

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Abstract It is quite often assumed that all enterprises seek continual performance. In this regard, incentives in various forms have been used as performance motivators. Typically, incentive arrangements in construction involve setting cost, schedule, and outcome performance targets. Moreover, the success of incentive schemes is not guaranteed. Many projects with incentives still end with project overruns, huge claims, and embarrassing defects. It is advocated that defective design is one of the key causes of the nonfunctioning of incentive arrangements. This study reminds us that there are certain norms to be followed in the planning of construction incentivization. The characteristics of three well-known normative principles are introduced. In addition, this study advocates that construction incentivization should also be planned to engender the commitment of the contracting parties. In this respect, managing behaviours between the parties should be one of the planning norms of construction incentivization. Empirical support is also provided.

Keywords Motivation · Performance · Behavioural outcomes · Planning norms

1 Introduction

Various forms of incentive arrangements have been reported in the preceding chapters. It can be said that incentives are a versatile project management tool when continued performance is pursued. Herten and Peeters (1986) reported the successful use of incentive schemes in manufacturing military products and developing aerospace projects. In construction contracts, incentive schemes have also

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been widely used as a contract administration tool to enhance performance, especially from contracting organizations (Ibbs, 1991). Typically, incentive arrangements in construction involve setting rewards for the accomplishment of cost, schedule, and quality outcome targets (Zhu & Cheung, 2021). Effectively, this means that several project outcome aspects are used to determine if a reward can be accorded. Suprapto et al. (2016) analysed 113 capital projects and found that projects with incentives are likely to perform better if contracting parties value their relation and work as a team. Adopting a partnering/alliance contracting approach is considered appropriate because of the emphasis and investment in the relation. Ibbs (1991) further added that, inter alia, incentive schemes must be fair and interest balanced.

Nonetheless, the outcome record of incentive-equipped mega construction projects deploying incentives is far from exciting. Zhu et al., (2020a, 2020b) reported that many large-scale projects with incentive schemes failed to achieve their targets. Thus, why are the incentives not working? Boukendour and Hughes (2014) pointed out that one of the major and recurring problems in designing cost incentive contracts is setting the target cost and risk sharing ratio. These are essential because of the fundamental issue of maintaining an equitable sharing of risks and rewards while aligning the interests of the contracting parties. Minimizing adversity among parties with differing interests is also a long-standing challenge in construction contracting. Serious attempts have been made to suggest quantitative models for risk-sharing formulas (Ma et al., 2021). To this end, Chapman and Ward (2008) highlighted the importance of having a balanced incentive, meaning that the incentives should align with the interests of both the client and the contractor. Thus, these studies suggested that incentives must be thoughtfully planned to achieve the intended objectives. In this regard, the four design parameters identified from relevant theories and reported in Chap. 1 are planning pointers of construction incentivization. This chapter further operationalizes incentive design parameters by examining the incorporation of behaviours as part of construction incentivization (CI hereafter) normative planning.

2 Examples of Normative Principles

Heuristics and norms have played a significant role in human decisions. Both are largely intuition based and developed from the collective wisdom and experience of relevant participating groups. The golden rule may well be the classic example of the normative principle. Three sets of well-recognized normative principles are introduced in this section to illustrate their characteristics.

Table 1 Innovation development principles (Terninko & Zusman, 1998)

– Segmentation – Extraction – Replacement of a mechanical system – Prior action – Transformation of physical and chemical states of an object – Cushion in advance – Partial or overdone action – Nesting – Equipotentiality – Moving to a new dimension	– Convert harm into benefit – Inexperience short-lived object instead of an expensive durable one – Changing the colour – Thermal expansion – Local quality – Counterweight – Inversion – Mechanical vibration – Feedback – Homogeneity	– Use strong oxidizers – Copying – Use of porous material – Rejecting and regenerating parts – Asymmetry – Prior counteraction – Spheroidicity – Periodic action – Mediator – Use of a pneumatic or hydraulic construction	– Inert environment – Combining – Dynamicity – Continuity of useful action – Self-service – Flexible film or thin membranes – Universality – Composite material – Rushing through – Phase transition

2.1 *Principles of Innovation (TRIZ Methodology)*

Terninko and Zusman (1998) reported the work of Genrich Altshuller, who developed the TRIZ framework to understand innovation. TRIZ stands for the Theory of Inventive Problem Solving. In essence, it is a method used to systemically analyse the manners in which innovations can be understood. The 40 principles of innovation are shown in Table 1.

Moreover, these principles were developed sixty years ago; thus, with the development of IT and many advanced technologies and crests for sustainability and carbon emission reduction, these principles need updating. The lesson for this study is the way the principles are developed. Essentially, the principles display the pattern of how the innovations were harvested or their characterizing features.

2.2 *Principles of Contract Planning*

The second set of normative principles was suggested by MacNeil (1974) and is related to the planning of economic exchanges. There are six principles that enshrine the expected functions of commercial contracts.

i. ***Permitting and encouraging exchange behaviour***

It is advocated that contracts are tools to record commercial transactions. Guided by freedom of contract, the first principle is to honour the agreements between the contracting parties should they have opted to sign on the dotted line. This makes both legal and business sense when stating the intentions of the parties by way of a written contract. This makes good commercial sense, as contracts are supposed to record the intentions of the parties; seemingly, the performance of a contract is not meant to be prevented.

ii. ***Reciprocity***

By its nature, economic exchanges involve reciprocating acts from the contracting parties. It is not difficult to identify rights accompanied by respective obligations in every contract. Thus, reciprocity lies at the heart of every contractual relationship.

iii. ***Role effectuation***

Specific roles of the contracting parties or their agents are delineated in a contract. Technically, this empowering act is necessary, especially for their agents, e.g., architects, engineers, and surveyors, as they are not parties to a contract. Thus, it is imperative for the contract to spell out clearly their respective authority in exercising their roles.

iv. ***Effectuation of planning***

Under the common law, the principle of nonprevention underlies the performance of contracts. Effectively, this means that no party should do anything to prevent the other contracting parties from performing their responsibilities. In civil law, the principle of good faith is akin in concept. Thus, contractual provisions to facilitate the performance of what has been planned should be included.

v. ***Limited freedom of the exercise of choice***

The contract may well be viewed as having the effect of setting the boundary within which the contracting parties operate. Unilateral changes in the boundary are not possible. The choices of the contracting parties are de facto restricted to those that fall within the ambit of the contract. It is therefore incumbent on the contracting parties to plan for the choices that they would like to exercise before the contract is signed.

vi. ***Harmonizing contracts with their internal and external social matrices***

A contract only bounds the contracting parties and the provisions if the contract terms are agreed upon, and the parties are free to conclude the same. Moreover, when there are gaps that have not been addressed, industrial norms can be influential references. Likewise, when implied terms are considered, business efficacy is the key. Inevitably, the expectation of society is a deciding factor. This principle reminds the societal dimension even for commercial endeavours.

2.3 Risk Allocation Principles

The third set of principles is quite well known to the construction communities. Abrahamson (1984) was a leading construction lawyer and had exemplary experience in drafting standard forms of construction contract. With reference to a tunnel project, he proposed the following set of risk allocation principles:

"A party should bear a construction risk where:

i. ***The risk is within the party's control;***
ii. ***The party can transfer the risk, e.g., through insurance, and it is most economically beneficial to deal with the risk in this fashion;***
iii. ***The preponderant economic benefit of controlling the risk lies with the party in question;***
iv. ***To place the risk upon the party in question is in the interests of efficiency, including planning, incentive, and innovation; and***
v. ***If the risk eventuates, the loss falls on that party in the first instance and it is not practicable, or there is no reason under the above principles to cause expense and uncertainty by attempting to transfer the loss to another."***

This set of principles can be regarded as the most quoted in construction risk allocation studies (Cheung, 1997) because it embraces the three key allocation criteria of foreseeability, controllability, and manageability (Llyod, 1996). From the project management perspective, allocating a risk to a party who has no information to make a reasonable assessment of the extent of the risk involved is inequitable. Ideally, the party who can control the occurrence of a risk should be in the best position to minimize the occurrence. When the risk materialises, it is most efficient and effective for the party with the suitable capability to manage it so that the impact can be minimized.

2.4 Characteristics of Normative Principles

The term normative refers to the idea that the principles are regarded as standard whereby the subject matter should follow. It is therefore imperative for the principles to have the following credentials:

1. Universal applications can be expected.
2. The principles should be able to stand over time and contexts.
3. The versability of the principles is supported by empirical evidence.
4. Failing to comply with the principles exposes the subject matter to malfunctionality.

In this study, the design objectives of CI are further examined in light of the findings reported in Chaps. 1, 2 and 3. Specifically, behaviour-based design parameters are examined.

3 Construction Incentivization and Project Performance

In Chap. 1, the objectives of construction incentivization are identified through the conceptual lenses of several theories. Chapter 3 discusses when incentives or disincentives should be used. Chapter 5 introduces the importance of managing interorganizational relationships using construction incentivization. These chapters point to the fact that an effective CI should aim to activate the internal drive of the contracting organization for better performance. For this purpose, the equity gap (EG hereafter) between the contracting parties is introduced. It is advocated that the EG is an endogenous factor that has a fundamental influence on parties' contracting attitudes. For ease of reference and making this a stand-alone study, certain parts of Chap. 2, 3 and 5 are repeated in this chapter.

The use of incentives has a long history in capital work projects (Bayliss et al., 2004; Chan et al., 2010; Hughes et al., 2012). Although some encouraging success stories have been reported, there is also no shortage of failing cases (Alfie, 1993; Zhu & Cheung, 2021). Thus, there is no guarantee that project incentives will bring the desired results if CI has not been planned properly. In this section, the ingredients of effective project incentivization are first reviewed. To understand what effective CI should endeavour to achieve, the elements of project performance (PP herefter) are introduced. A conceptual CI–PP relationship framework and the associated hypotheses are proposed. The primary purpose of incentivization is to solicit 'value-added' services over and above what has already been contracted for (Bower et al., 2002). Matching the needs of the principal and the performance motivators of the agents is therefore central to an effective incentive scheme. Through a literature review, the key features of effective CI have been summarized (Zhu & Cheung, 2021). These include (1) goal commitment (Locke et al., 1988); (2) expectation alignment (Wigfield & Eccles, 2002); (3) information exchangeability (Laffont & Tirole, 1988); (4) risk efficiency (Boukendour & Hughes, 2014); and (5) relationship investment (Adams, 1963). Table 2 summarizes the key components of effective CI.

Turning now to what constitutes project performance, Richmond-Coggan (2001) describes "better performance" in some situations as the degree of effort the project participants exert to save a project that is running into difficulties or to seek additional value by proposing a change. Meng (2012) demonstrated that the aim of an incentive mechanism is to "motivate better performance apart from the contract". The prime elements of project performance (PP hereafter) therefore include (a) contractual safeguards and (b) additional value creation (Zhu & Cheung, 2021). Table 3 gives the relevant details regarding PP.

The intention of having ex post incentivization is to prevent potential slippages in performance. The use of incentivization is based on the theory of organizational behaviour modification (Luthans & Kreitner, 1975) and reinforcement theory (Skinner, 1961). The intuitional expression of CI as a "carrot or stick" is also backed by stimulus–response psychology and self-determination theory (Bresnen & Marshall, 2000; Deci & Ryan, 2009). Most CIs act as 'carrots' to attract contractors to boost performance. Case studies conducted in Australia also found that the success of

Table 2 The key components of effective project incentivization (adapted from Zhu and Cheung (2021))

No	Components	Description	Key references
1	Goal Commitment	• Project members perceive the relationship that can achieve goals by working together • A performer is willing to accept a goal regardless of its difficulty and origin, or the credibility of the assigning person • Goals need to be meaningful, specific, challenging, and acceptable to those who are attempting to achieve them	Locke et al. (1988)
2	Expectation alignment	• Motivation is the perceived likelihood that effort will produce an appropriate level of performance ('expectancy') and the perceived likelihood that this performance will be converted into an appropriate level of reward	Williamson (1979), Vroom (1964)
3	Information exchangeability	• A good information sharing system is established for information exchange and behaviour monitoring	Schieg (2008) Oliver (1990)
4	Risk efficiency	• The allocation of risks and responsibilities are more balanced towards project efficiency • Project members have common attitudes towards risks	Zou et al. (2007), Zou and Zhang (2009) Zhang et al. (2016)
5	Relationship investment	• Status recognition: The party with the power advantage makes more motivational and relational investments towards the party with less power through shared relational attitudes, offering mutual support and developing mutual trust	Cook and Emerson (1978), Oliver (1990) Fu et al. (2015) Richmond-Coggan (2001)

Table 3 Elements of project performance

No	Elements		Descriptions	Key references
1	Contractual safeguards	Cost	Incentive initiator aims to make sure that the project can progress smoothly, and the contract can be fulfilled as agreed	Herten and Peeters (1986)
		Quality		
		Schedule		
2	Value creation	Innovation	Promote innovation to generate project and social benefits	Chan et al. (2011)
		Promotion of project performance	Incentive initiator aims to improve project performance/make the project's performance better than expected	Bresnen and Marshall (2000)
		Long-term commitment	Further relationship investment to enhance dependency	Suprapto et al. (2015)

incentive schemes was achieved through a combination of motivational and commercial objectives (Richmond-Coggan, 2001). In fact, commitment to deliver the agreed incentivization is a necessary condition for the successful use of the scheme (Dulaimi et al., 2003). Accordingly, the first hypothesis of the study is as follows:

H1: Effective construction incentivization (CI) improves project performance (PP).

4 The Behavioural Dimensions of Construction Incentivization

The primary purpose of CI is to solicit 'extra effort' from contracting parties to deliver better performance. It should also be noted that the CI should also befit the needs of the contractor. However, this meeting of minds may not be attained because of the singular use of quantitative targets that are unilaterally set by the incentive initiator. Goal commitment and expectation alignment therefore can hardly be achieved (Meng, 2012). Why is outcome-based CI not delivering, as many motivation theories have suggested? Eisenhardt (1988) highlighted that outcome-based incentive arrangements only work for highly programmed tasks where outcome targets can be set with reasonable accuracy. When projects are full of uncertainties, as in the case of complex infrastructure developments, the incentivizing targets are somewhat difficult to project. In this regard, the ability to master unforeseen eventualities and the concerted efforts of the project team are needed. This approach eliminates the need to deploy behaviour-based performance drivers (Meng, 2012). Regarding performance targets, Eisenhardt (1988) also claimed that behaviour-based criteria that reflect the ways the parties behave should be installed. Stack (2006) summarized that behaviour shaping is an effective method of accounting for responsibilities and promoting progress in complex engineering projects.

The evaluation of construction incentivization should therefore not only be confined to the degree of attainment of hard project targets, such as time, cost, and quality. For example, Rose and Manley (2011) found the critical roles of **project relationships** and **equitable contract conditions** in raising the effectiveness of incentivization arrangements in Australian projects. Zhu et al. (2020a, 2020b) also identified the incentivizing function of the behaviour monitoring system that was applied in a record-breaking mega project. This empirical evidence points to the development of relationism as proposed by Suprapto et al. (2015). In essence, project incentivization should foster cooperative contracting behaviours. It is therefore proposed that to optimize the effect of incentivization (Hughes et al., 2007), behaviour-based arrangements cannot be ignored. In this regard, it is necessary to investigate why contracting parties are not making their utmost efforts. Two forms of attitudinal issues are proposed: (i) equity gap (EG) and (ii) interorganizational relationship (IOR) between the contracting parties.

4.1 Equity Gap Between Contracting Parties

Adams (1963) suggested that whether one abides by a contract depends not only on what one gets but also on whether one's counterpart is getting more. Equity theory explains that a person always compares his or her outcomes-to-inputs ratio with that of the counterpart. Unfair treatment is a prime cause of opportunistic behaviours and disputes (ARCADIS, 2018). Lindenberg (2000) stated that unfair payment packages, power asymmetry and risk differentiation hamper trust among contracting parties. These disparities between the developer and the contractor are collectively described as the equity gap. Four main elements of the EG have been summarized by Zhu and Cheung (2022a): information asymmetry, risk differential, power asymmetry and expected return misalignment. Table 4 gives the details of the EG.

Can CI also be used to reduce uncertainties and balance information asymmetry through additional payments for the enhanced observability of the behaviour of the agent? Boukendour and Hughes (2014) found that project participants make an extra effort only if they feel that they are being fairly treated. In this regard, CI can be used to achieve a more equitable allocation of benefits and risks (Fu et al., 2015b). When the reward is commensurate with the risks involved, contractors can be expected to exert greater effort. CI can also be used to reduce uncertainties and balance information asymmetry through additional payments to raise the observability of the behaviour of the agent (Holmstrom, 1979). The second hypothesis of the study is as follows.

Table 4 Elements of EG on project participants (Zhu & Cheung, 2021)

No	Elements	Description	Key references
1	Information asymmetry	Agent behaviour cannot easily be evaluated during the project's duration	Ross (1973), Chen et al. (2020)
2		The principal may withhold information to avoid additional disputes or risks	
3	Risks differential	Environmental risk differential refers to unforeseeable physical conditions and cost fluctuations because of the market. These risks should be shared by both parties as deemed equitable but was shifted by contractual terms	Fang et al. (2004)
4		Behavioural risks related to the unanticipated contracting behaviour of the contracting parties. Examples are delayed payment and delayed instructions by the principals	
6	Power asymmetry	Sanction power asymmetry refers to the unilateral levy of damages and ordering contract changes between two parties	Chang and Ive (2007)
7		Bargaining power asymmetry is commonly exercised during negotiation. One party with a power advantage can deprive the value of the counterparts' belongings	
8	Expected return misalignment	Contracting parties expect equitable sharing based on their contributions. One party's profit may be squeezed, or it may have more unforeseeable losses	Chang and Ive (2007)

H2: Effective project incentivization should address *ex post* the equity gap that was created *ex ante* to improve project performance (PP).

4.2 Interorganizational Relationship

A conducive interorganizational relationship (IOR hereafter) refers to the conditions whereby organizations can pursue mutual interests (Cropper et al., 2008). Based on transaction costs theory (Williamson, 1985), the formation of IORs is prompted by an organization's desire to improve efficiency. In this chapter, Zhu and Cheung (2022b) summarized the core elements of IORs as interdependency, reciprocity, trust, and relationship continuity. Table 5 provides further details of these IOR elements.

How can project incentivization be utilized to develop interorganizational relationships between contracting parties? Several studies have found that IORs can be enhanced by bridging equity gaps to embrace equalizing power (Cook & Emerson, 1978), establishing distributive justice (Rose & Manley, 2011) and harvesting mutual trust (Suprapto et al., 2016). From the psychological point of view, a bridged equity gap relieves the tension between the contracting parties and serves as a lubricant for cooperation (Smyth & Edkins, 2007). Transaction cost theory further highlights that project participants are interdependent (Williamson, 1979). Dependence asymmetry may also give rise to a power differential (Emerson, 1962). The sense of equity should therefore be addressed as commitment to delivery be envisaged. The potential for using incentivization to develop IORs for project performance improvement has also been reported (Cropper et al., 2008; Kwawu & Laryea, 2014; Oliver, 1990). CI is

Table 5 Elements of IORs

No	Elements	Descriptions	Key references
1	Interdependency	Contractual parties thus rely heavily on each other. The termination of contracts or switching of a partner halfway causes great losses to both parties	Williamson (1985), Cheung et al. (2018)
2	Reciprocity	In reference to exchange theory, motivates reciprocity and emphasizes cooperation, collaboration, and coordination among organizations. It is the key point and the basis for interorganizational relationship development	Emerson (1976), Rose and Manley (2011)
3	Trust	For organizations, trust is seen as a substitute for contractual control. It is central to every transaction that demands contributions from the parties involved and has been identified as the key driver in fostering cooperation	Güth et al. (2000)
4	Relationship continuity	It refers to the stability of the relationship and long-term cooperation. The perceptions of a collaborative working environment and a long-term relationship are important for developing an IOR	Bock et al. (2005)

considered a starting point to enhance relationship quality in project management (Jelodar et al., 2016). It is an important way of reinforcing collaboration and building trust between project participants (Ceric, 2013). Rose and Manley (2011) highlighted the use of CI to foster cooperation and enhance communication (Kwawu & Laryea, 2014). The implications of the EG and IOR on the use of CI are presented as H3a and H3b, respectively.

H3a: Effective project incentivization should address *ex post* the equity gap (EG) that was created *ex ante* to develop a conducive interorganizational relationship (IOR).

H3b: Effective project incentivization should enhance interorganizational relationships (IORs) to improve project performance (PP).

To summarize the conceptual bases and hypotheses derived therefrom, a CI–EG–IOR–PP relationship framework (RF hereafter) is proposed and presented in Fig. 1.

5 Testing of Hypotheses

The RF (Fig. 1) was empirically tested. A data collection questionnaire was developed to solicit input from practising construction professionals in Hong Kong. The questionnaire had 5 parts. Part 1 introduced the personal particulars; Parts 2, 3, 4 and 5 contained questions about CI, EG, IOR and PP, respectively. The measurement items were developed from the theoretical deliberations of the constructs as summarized in Appendix. Respondents were asked to select a rating on a Likert scale (1–7) that was the most indicative of the project happening. Two methods were used to analyse the data: structural equation modelling and importance-performance map analysis.

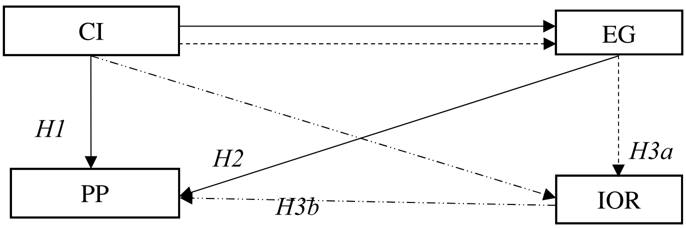

Fig. 1 A CI–EG–IOR–PP relationship framework

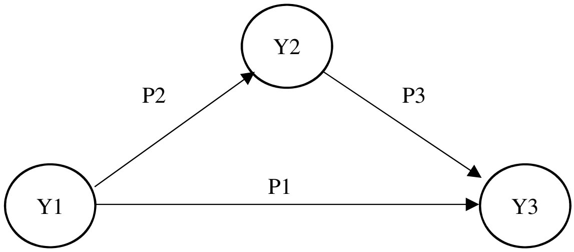

Fig. 2 Mediating variable in SEM

5.1 *Structural Equation Modelling*

Structural equation modelling (SEM hereafter) was used to examine the structure of the interrelationships expressed in a series of equations, such as a series of multiple regression equations (Hair et al., 2010). For this study, partial least squares SEM (PLS-SEM hereafter) was considered suitable for its ability to analyse complex models (Hair et al., 2010). The software Smart PLS 3 (Ringle et al., 2018) was used.

SEM analysis has two stages. First, the underlying components of each construct need to be verified. All hierarchical component models (HCMs) of CI, EG, IOR and PP were examined (Kuppelwieser & Sarstedt, 2014). Collinearity and redundant variables should be addressed. The second stage is to test the hypotheses. For this part, the mediating analysis in PLS-SEM was also applied. Mediation occurs when a third mediating variable intervenes between two other related constructs (Hair et al., 2014). The general structure of the mediating effect analysis in SEM is shown in Fig. 2.

In Fig. 2, Y1 represents the independent variable, Y2 represents the mediating variable, and Y3 represents the dependent variable. As a result, P1, P2 and P3 are the coefficients between the variables. As presented, P1 shows a direct effect of Y1 on Y3. The mediating effect of Y2 is assessed by P2*P3.

5.2 *Importance-Performance Map Analysis*

Important performance map analysis (IPMA hereafter) was used to identify key behavioural incentivizing agents. IPMA is an extension of the PLS-SEM analysis. It has been used to study customer services, marketing strategies, information management and better allocation of organizational resources (Magal & Levenburg, 2005). IPMA is a matrix-based technique and evaluates the factors in two dimensions: **importance** and **performance** (Eskildsen & Kristensen, 2006). For this study, the word “performance” in IPMA is like another key construct—project performance (PP). To avoid confusion, the word “**performance**” in the IPMA analysis is replaced by “**satisfaction**”. In this way, the importance-performance map analysis is identified as “the importance-satisfaction map analysis” (ISMA).

The ISMA is particularly useful in enriching the interpretation of PLS-SEM results (Hair et al., 2014). It extends the standard reporting of the path coefficient estimates by adding an extra dimension that considers the average values of the latent variable scores (Ringle & Sarstedt, 2016). For the traditional quadrant approach, the total effects represent the predecessor constructs' **importance** in shaping the target construct (e.g., PP), while the average scores collected from respondents represent their **satisfaction** for each factor (Hair et al., 2014). In an ISMA, factors found to have high importance and a low satisfaction score should receive prioritized action by management (Martilla and James, 2019). To avoid the possible discontinuity in the inferred priorities caused by minor changes, the diagonal line approach is further suggested as a supporting approach (Bacon, 2003). The diagonal line approach in essence is a gap analysis where any factor below an upwards sloping 45° line in the ISMA is of high improvement priority.

Moreover, Matzler et al. (2003) found that for some factors, a change in factor satisfaction can be associated with a change in factor importance. The three-factor approach is elaborated on to make up for these defects and to help develop corresponding management strategies in different scenarios. In this study, a three-factor approach was adopted to determine whether the relationship between factor satisfaction and overall satisfaction is linear and symmetric (Matzler et al., 2003). Planning directions for project incentivization are developed as informed by the findings from both the quadrant and diagonal line approaches.

6 Data Analysis

6.1 Data Description

A total of 483 questionnaires were distributed, and 142 valid responses were received. The response rate was 30%, which is considered acceptable, as it is close to the median rate (35.7%) of a survey conducted in the United States with 1,607 organizational academic studies. It is also noted that the response rate of questionnaire surveys for studies conducted in the construction industry usually ranges from 25 to 30% (Easterby-Smith et al., 1991). Table 6 shows the distribution of project nature and type.

In general, the projects by type are quite well represented. Parts 2, 3, 4 and 5 contain questions about CI, EG, IOR and PP, respectively. Respondents were asked to indicate using a Likert scale of 1 (Strongly disagree) to 7 (Strongly agree) how accurate the statement represented the situation of the reference project. The descriptive statistics of the dataset are presented in Appendix.

In Part 2, it can be found that all the factors regarding the use of CI have scores above 4 (midpoint) on a scale of 1 to 7. This suggests that all these arrangements were included in the CI used in the reference projects. Q2.2 and Q2.5 have the highest scores. The standard derivation of these two questions is 0.84 and 0.83, which are

Table 6 The distribution of project nature and type

Q1	Project nature	Num	%
1	Residential	50	35
2	Commercial	27	19
3	Civil/Infrastructure	35	25
4	Composite	30	21
Q2	Project type		
1	Government project	40	28
2	Institutional project	21	15
3	Private project	81	57

also the lowest among the other items in Part 2, indicating that the respondents agreed that achievable common goals were set through CI. Part 3 is about the EG situations of the projects. It was found that all the mean scores were approximately 4 and range from 3 (slightly disagree) to 5 (slightly agree), demonstrating that these gaps may not be notable or might not have been addressed during the construction period. Part 4 and Part 5 show the distributions of IOR and PP. The mean scores for most of the questions regarding IOR are all above 5 (slightly agree), suggesting that basically all the projects that incorporated CI achieved satisfying outcomes regarding IOR. For PP, the most satisfactory result is for project quality (Q5.5). The least satisfied is for project time (Q5.6).

6.2 The Results of PLS-SEM Analysis

To detect collinearity among variables, Pearson's correlation test was conducted (Hair et al., 2010). After analysing the correlation for each part, it was found that Q3.1 is negatively correlated with the other variables listed in Part 3. Q3.1 is about collaborative effort to set common goals for the project. Hair et al. (2014) advised that these types of variables should be removed. The composite reliability and AVE of these factors are summarized in Table 7. For this study, all of the composite reliability indices are above 0.70, indicating inclusion for further analysis (Davcik, 2014). The average variance extracted (AVE) is over 0.4, which is considered adequate when the composite reliability is higher than 0.6 (Fornell & Laecker, 1981).

For the measurement of the structural model, an assessment of collinearity was conducted through a variance inflation factor (VIF) test. The results show that all VIF values are below 5, which indicates that there is no potential collinearity issue (Hair et al., 2014). The R^2, f^2 and Q^2 values of the overall model are also examined and summarized in Table 8.

The R^2 and adjusted R^2 in Table 8 are all greater than 0.10, suggesting an acceptable predictive accuracy of the model (Hair et al., 2014). The effect size (f^2) is also tested to evaluate whether the omitted construct has a substantive impact on the

Table 7 Average variance extracted (AVE)

Factor	Composite reliability	Average variance extracted (AVE)
CI	0.93	0.43
Goal commitment	0.88	0.71
Expectation alignment	0.79	0.57
Risk efficiency	0.85	0.59
Information exchangeability	0.85	0.66
Relationship investment	0.87	0.62
EG	0.89	0.41
Information	0.74	0.42
Power	0.89	0.50
Expected return	0.92	0.78
Risk	0.82	0.46
IOR	0.94	0.50
Interdependency	0.94	0.89
Reciprocity	0.86	0.67
Relationship Continuity	0.89	0.73
Trust	0.92	0.60
PP	0.92	0.48
Contractual Safeguards	0.92	0.61
Value creation	0.84	0.51

endogenous constructs. Table 8 shows that most f^2 values are over 0.02, so they are considered to have significant effects (Cohen, 1988). For the model fit, Stone-Geisser's Q^2 value should also be examined by a blindfolding procedure (Hair et al., 2014). Generally, the PLS-SEM data analysis results fit all these criteria. Figure 3 shows the path coefficients and significance with bootstrapping applied for 5000 samples. All the standard path coefficients are statistically significant.

All the path coefficients (t values for direct effects) of the CI–PP relationship framework are also summarized in Table 9. A negative correlation relationship is obtained between the EG and the other three constructs (CI, IOR and PP). It is also noted that CI is positively correlated with IOR and PP at a 100% significance level.

With the dataset of 142 projects with CI and applying a 5% significance level, the PLS-SEM analysis results support the general framework presented in Fig. 1. The mediating effects of the constructs were further examined in the SEM analysis. Table10 summarizes the path significance analysis of the relationship framework.

Table 8 R^2, effect size f^2 and Q^2 values of the framework

Factors	R^2	R^2adjusted	Effect size f^2				Q^2 (=1−SSE/SSO)
			CI	EG	IOR	PP	
CI	–	–					
Goal Commitment	0.66	0.66	1.95				0.45
Expectation alignment	0.62	0.61	1.6				0.33
Information exchangeability	0.66	0.65	1.91				0.39
Relationship investment	0.78	0.78	2.64				0.4
Risk efficiency	0.73	0.72	3.53				0.45
Equity gap	0.11	0.10	0.12				0.15
Information	0.34	0.33		0.51			0.18
Power	0.84	0.84		5.33			0.39
Expected return	0.54	0.54		1.17			0.39
Risk	0.52	0.51		1.07			0.19
IOR	0.64	0.63	1.25	0.19			0.3
Interdependency	0.25	0.24			0.33		0.2
Reciprocity	0.66	0.65			4.61		0.41
Relationship continuity	0.82	0.82			1.91		0.56
Trust	0.95	0.95			19.61		0.53
PP	0.59	0.59	0.11	0.04	0.15		0.26
Contractual safeguards	0.92	0.92				11.53	0.52
Value creation	0.72	0.72				2.56	0.34

At a 5% significance level, all the relationships in the structural model are significant. The empirical results support the mediating role of the EG and IOR on PP. To summarize, the relationship between CI and PP is verified (H1). The P values reflect the significance of the indirect effects. The mediating effects are further verified at a 5% significance level. Hypotheses H1, H2, H3a and H3b are thus supported.

7 The Results of ISMA

The ISMA results are used to identify the key behaviour-based performance-incentivizing agent. First, reverse scaling of the EG is applied for interpretation consistency (Ringle & Sarstedt, 2016) (e.g., on a 7-point Likert scale, 7 becomes

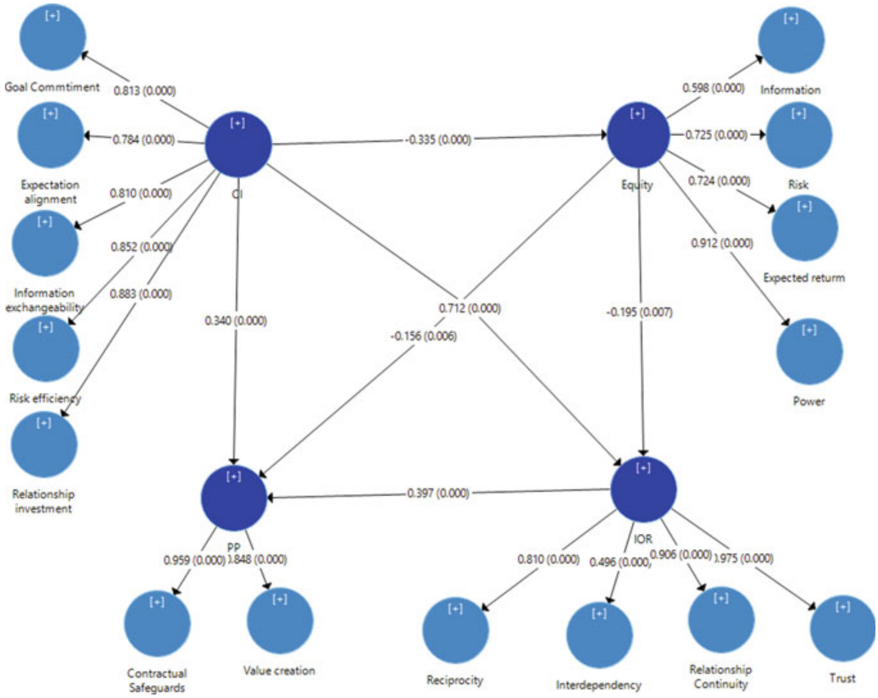

Fig. 3 The PLS-SEM analysis of the relationship framework

Table 9 Path coefficients and significance of the key construct relationships

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T Statistics (|O/STDEV|)	P values
CI -> EG	−0.340	−0.340	0.090	3.720	0.000*
CI -> IOR	0.710	0.710	0.060	12.790	0.000*
CI -> PP	0.340	0.340	0.090	3.750	0.000*
EG -> IOR	−0.190	−0.200	0.070	2.710	0.010*
EG -> PP	−0.160	−0.160	0.060	2.740	0.010*
IOR -> PP	0.400	0.400	0.100	3.990	0.000*

Note "*" denotes significance at the 5% level

1, 6 becomes 2, 5 becomes 3 and 4 remains unchanged). After that, the satisfaction and importance values are computed. The means indicate the respective construct's satisfaction score, with 0 and 100 representing the lowest and the highest satisfaction. For importance values, the total effects (the overall value of the direct and indirect effects) of all the constructs towards the target construct (PP) are calculated. The

Table 10 Significance analysis of the direct and indirect effects for the overall framework

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T Statistics (|O/STDEV|)	P values	Hypothesis
Direct effects						
CI -> IOR	0.710	0.710	0.060	12.790	0.000*	
CI -> PP	0.340	0.340	0.090	3.750	0.000*	H1
Indirect effects						
CI -> EG -> PP	0.050	0.060	0.030	1.960	0.050*	H2
CI -> EG -> IOR	0.070	0.060	0.030	2.540	0.010*	H3a
CI -> IOR -> PP	0.280	0.280	0.080	3.710	0.000*	H3b

Note "*" means significant at the 5% level

three-factor approach is used to estimate the relative impact of each factor for high and low satisfaction. In this regard, the analysis involves the following steps.

(1) The target factor (PP) satisfaction score must be recoded. To distinguish the high/low PP satisfaction score, the mean score is calculated for each sample. As all the questions about PP are measured on a 1–7 Likert scale. An average score lower than 5 (slightly agree) is considered "low satisfaction", while others are considered "high satisfaction". After recording the PP scores, the 142 responses are separated into two groups. Seventy cases have high PP, while the other 72 cases have low PP.
(2) The second step is then to conduct PLS-SEM separately for a heterogeneity assessment (Rigdon et al., 2011). Table 11 shows the importance and satisfaction scores for the two PP groups.

To highlight the differences between high PP and low PP, two separate ISMs are drawn. The quadrant approach and diagonal line approach are both applied for a more holistic analysis. Figures 4 and 5 present the ISM changes to the three main constructs.

Figure 4 shows the location of the three factors in the low PP group. Based on the quadrant approach, grand means have been used to locate the factors in four

Table 11 Heterogeneity assessment results based on different project performance levels

	Low PP		High PP	
	Importance	Satisfaction	Importance	Satisfaction
CI	0.66	58.38	0.55	72.86
EG	0.29	41.79	0.02	51.48
IOR	0.26	67.65	0.46	49.73

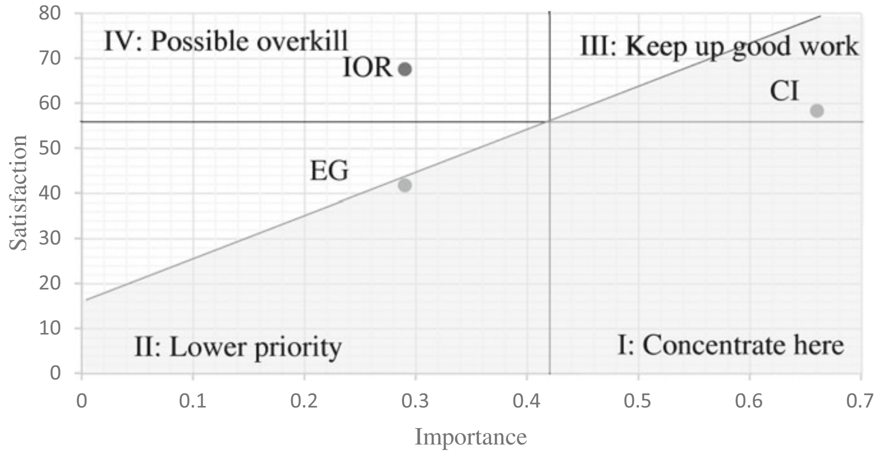

Fig. 4 ISM for the low PP group

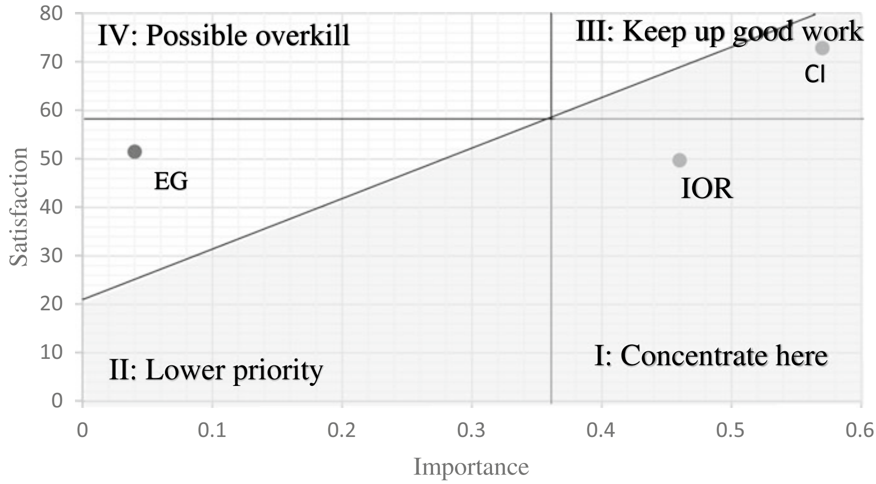

Fig. 5 ISM for the high PP group

quadrants and plot the mean values for the indices on the resulting matrix (Kristensen, 1999). Management should take priority actions for the important factors that affect satisfaction *(Concentrate here),* followed by "keep up good work" and "less priority". Less attention should be given to quadrant IV, "possible overkill" (Martilla and James, 2019). For this group, CI has the highest importance score and satisfaction score on PP. Developing IORs is found to be less important. Factors falling into the shaded parts of the figure are those requiring management attention according to the diagonal line method. The EG and CI are considered "opportunities", while the IOR is considered "satiated needs". The results are consistent with the quadrant

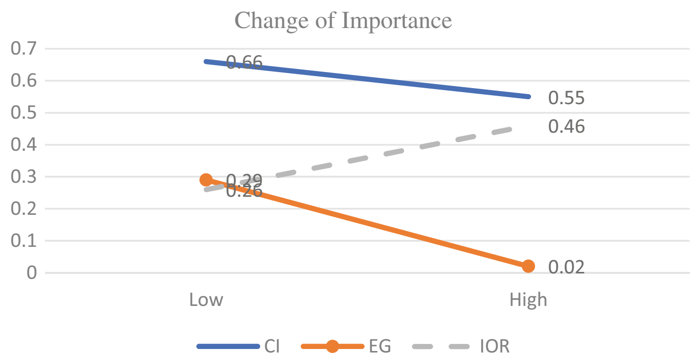

Fig. 6 Changes in importance

approach, suggesting that improving IORs is comparatively less important when project performance is low.

Similarly, Fig. 5 shows the ISMA results for the high PP group. There is a slight change for CI. In contrast, the IOR has moved from Quadrant IV to Quadrant I, "concentrate here," and is considered an "opportunity". This means that for projects that have above average performance scores, improving IORs significantly enhances project performance. There is also a change in the significance of the EG. The management of the EG is much less urgent for the high PP group. To further compare the differences between these two groups, Fig. 6 presents the changes in attribute importance depending on low/high satisfaction of PP:

The observations from Figs. 4, 5 and 6 are listed as follows:

(1) A slight change is found for both the importance and satisfaction scores of CI. Keeping up good work is suggested. According to the third factor approach, these factors are performers that lead to ideal ratings if fulfilled or exceeded all the time. Performers have linear and symmetric relationships with overall satisfaction (Matzler et al., 2003). Thus, CI has been viewed by the respondents as an instrumental tool as far as managing the EG and IOR are concerned.

(2) The impact of the EG on PP differs between the high and low satisfaction score groups. The EG was comparatively higher in the low PP group (higher than the IOR). However, a significant drop occurs when the PP satisfaction score is high. The EG is therefore classified as a basic factor (Matzler et al., 2003) regarded as a prerequisite (Hair et al., 2014). This result shows that the EG causes damage if not bridged (Ceric, 2013; Laffont & Tirole, 1988), and special attention is needed for projects with difficulties.

(3) The IOR can be interpreted as an excitement factor (Matzler et al., 2003) that can raise the overall satisfaction if delivered but does not cause low satisfaction otherwise. In other words, the positive enhancement of these factors has a greater impact on overall satisfaction (Matzler et al., 2003). Promoting IORs through CI is thus important, especially in pursuing exceptional PP.

Based on the aforementioned ISMA results, the key behaviour-based performance incentivizing agents (objective 3) EG and IOR are found to be instrumental for CI planning towards PP enhancement. Furthermore, CI acts as a performer, the EG is a basic factor and the IOR acts as an excitement factor (Matzler et al., 2003).

8 Implications for the Planning of Behaviour-Based CI

The key findings of the study are as follows: (i) effective CI can improve project performance and (ii) the effect of CI can be enhanced by bridging the equity gap to improve interorganizational relationships. This study offers empirical support for the usefulness of having strong IORs to deal with tasks of programmability because of the inherently high level of uncertainty. The following planning directions for CI are suggested:

(1) *Aligning power and expected return*

EG mitigation arrangements could be installed in CI to capitalize on the opportunity ex post when CI is planned. Power can be adjusted in view of the extent of the risks involved (Zhu & Cheung, 2021). To balance the power differential, the ex-ante, more powerful party should share decision-making authority to deal with unforeseen contingencies. The risk–reward reallocation strategy is also instrumental in addressing the return differential (Development Bureau of Hong Kong, 2016). It is important to reward contractors' contributions for their additional work, and setting financial bonuses is commonly suggested as an attractive reward. For mega projects with multiple goals, some nonfinancial rewards, such as early payments and appreciation rewards, can be considered. The promotion of a win–win partnership helps match expectations of return. For projects with high asset specificity, future working opportunities are suggested as incentive rewards to materialize the vision of long-term relationships. This helps both parties change the focus from short-term gain to long-term development. Status recognition is also a suggested method. The weaker party feels better recognized when it is more often engaged in project decisions. In contrast to stringent management styles, greater flexibility should also be given to contractors, especially those in specialist trades.

(2) *Enabling a risk management system*

For risk management, CI can be formulated to (1) prevent excessive risk premiums and (2) develop pain share/gain share working ethos. Traditional thinking suggests that offering risk premiums is a way to restore fairness when contractors assume more risks (Zhang et al., 2016). However, contractors rarely allow for sufficient risk premiums in their tenders due to intense competition. An overly generous risk premium weakens the perception of fairness and thereby hampers interorganizational relationships. Reallocation of risk ex post is therefore suggested when additional information becomes available. The main idea is to manage risks equitably.

Most mega infrastructure projects are complex and full of uncertainties. If risks are identified with the input of the contractor after the award of a contract, the impact analysis can be much more realistic. The situation is more acute for highly nonprogrammable tasks that can only be approached with innovative efforts. In such situations, the inputs of contractors are imperative. This study suggests that CI offers the unique opportunity to tap into the wealth of knowledge and skills of contractors ex post because they are likely to have better information with which to address unanticipated contingencies. Contractors are also more willing to contribute when they are also beneficiaries.

(3) *Aligning goals and expectations*

The effects of any CI depend on the commitments of the parties. Having common goals is the starting point. In addition, these goals should be agreed upon by the contracting parties and with mutual benefits. In addition, the goals must be clearly defined to avoid the possibility of unnecessary disputes. Moreover, this study also points out that aligning contractual parties' expectations of return with respect to the goals is of equal importance. A contractor's motivation can only be maximized when 1) the agent believes that the performance at the desired level is possible; 2) the agent believes that performance improvement efforts will lead to certain positive outcomes; and 3) the outcomes attract the agent. This means that the rewards are attractive enough to engender extra effort (Richmond-Coggan, 2001). Ultimately, the goals of CI must be practically achievable with reasonable effort.

(4) *Promoting interorganizational relationships*

It is further found that when exceptional PP is envisaged, more resources should be devoted to enhancing IORs during construction. Trust and reciprocity are the pivotal IOR drivers (Table 11 refers). A spirit of mutual trust and cooperation would generate interorganizational bounding (Zhang et al., 2021). If a party enters a CI arrangement but believes that his counterpart is going to be self-serving, he is unlikely to conform to the CI. Indeed, CI should remove this scepticism by including trust as a behavioural requirement (Rowlinson, 2012). Recognition is also conducive to fostering trust and upkeeping IORs. The enhancement of collaborative work is the focus of reciprocity.

In sum, it is advocated that CI can be planned to make ex post adjustments to power and risk. Having common goals could foster joint effort. These goals are to be agreed upon ex post and be coupled with behavioural commitments. Accordingly, CI should be planned with both behaviour-based and outcome-based targets.

9 Summary

The project performance of resource-intensive infrastructure developments is of serious concern to investors, be they government or private. The outcome of mega projects has not been satisfactory despite using project incentives that aim to raise performance. It is found that the prevailing use of outcome-based incentive schemes is not effective. The complex physical construction tasks are subject to uncertainties that render a reasonable determination of incentivizing targets. A more reasonable approach is to devise ways that could engender the committed efforts of the whole project team to tackle problems when they arise. The planning of project incentivization should therefore have both outcome-based and behaviour-based components. This study advocates that project incentivization should aim to balance the equity gap (EG) and maintain interorganizational relationships (IORs) to canvass contractors' commitment to raise project performance. Accordingly, a relationship framework is proposed and tested by partial least squares structural equation modelling (PLS-SEM) with 142 sets of project data collected from construction professionals. The study provided empirical support for effective CI offering the unique opportunity ex post to bridge the equity gap to improve interorganizational relationships should improvements in performance be targeted. Furthermore, important-satisfaction map analysis (ISMA) was conducted to confirm that bridging the EG should be an integral part of the management of an IOR. The findings suggested the following planning considerations of CI: (i) aligning power and expected return; (ii) enabling a risk management system; (iii) aligning goals and expectations; and (iv) promoting interorganizational relationships. This study contributes to the planning of CI by proposing behaviour-based components to complement the orthodox outcome-based design.

Acknowledgements The development of equity gap has been quoted from the paper "Toward an Equity-Based Analysis of Construction Incentivization" of the Journal of Construction Engineering and Management. The work described in this chapter was fully supported by an HKSAR RGC project (number 11202722).

Appendix: Data Collection Form and Descriptions

No	Description		Min	Max	Mean	Std	Cronbach(α)
Part 2	**PICI**						0.896
Q2.1	Goal Commitment	Collaborative effort was made between two parties to set common goals for the project	1	7	5.08	1.58	0.490
Q2.2		The incentive plan includes common goals agreed by the contracting parties	4	7	5.76	0.83	
Q2.3		Notable efforts have been directed to fulfil the common goals	3	7	5.72	0.86	

(continued)

(continued)

No	Description		Min	Max	Mean	Std	Cronbach(α)
Q2.4		Extra efforts had been used to fulfil the common goals when confronted with difficulties	3	7	5.70	0.89	
Q2.5	Expectation alignment	The expected performance was achievable for project participants	3	7	5.80	0.84	0.730
Q2.6		Reasonable financial bonus was set to for expected performance	2	7	5.46	1.19	
Q2.7		The performance exceeding expectation led to certain level of rewards	1	7	5.20	1.34	
Q2.8	Information exchangeability	Project information was easier to access than expected under PICI	2	7	5.01	1.08	0.612
Q2.9		Project information was exchanged smoothly under PICI during the whole project	3	7	5.40	0.93	
Q2.10		The project participants' unobserved behaviours were now monitored under of PICI	1	7	4.84	1.11	
Q2.11	Risk efficiency	The tender documents revealed a risk allocation pattern that was more balanced than market norm	1	7	5.00	1.21	0.761
Q2.12		The PICI enabled a risk allocation pattern more equitable than the pattern displaced in the tender documents	2	7	5.03	1.17	
Q2.13		Sufficient resources were provided to promote innovation	2	7	5.04	1.18	
Q2.14		Sufficient resources were provided to prevent project failure	2	7	5.32	1.07	

(continued)

(continued)

No	Description		Min	Max	Mean	Std	Cronbach(α)
Q2.15	Relationship investment	The spiCIrit of partnership was promoted to pursue mutual benefits for the project	2	7	5.57	1.16	0.790
Q2.16		Provisions are included in the construction incentivisation to compensate works due to unforeseen events	2	7	5.26	1.21	
Q2.17		The compensation for item Q3.16 was based on the principle of deriving win–win situation	3	7	5.57	1.04	
Q2.18		The CI focused more on long-term returns instead of short-term gain	1	7	5.25	1.05	
Part 3	**Equity Gap**						0.872
Q3.1.1	Information	At the bidding stage, the developer had an information advantage about the project details	1	6	3.78	1.09	0.561
Q3.1.2		At the bidding stage, the developer had an information disadvantage about the contractor's ability	1	7	3.76	1.32	
Q3.1.3		At the construction stage, the contractor had an information advantage relating to market changes	2	6	4.13	1.02	
Q3.1.4		At the construction stage, the developer could not monitor comprehensively the Contractor's behaviour relating project performance	1	7	3.89	1.20	
Q3.2.1	Risk (Environmental)	Unforeseeable physical conditions	1	7	4.23	1.37	0.792
Q3.2.2		Cost fluctuation (inflation of prices)	1	7	3.76	1.30	

(continued)

(continued)

No	Description		Min	Max	Mean	Std	Cronbach(α)
Q3.2.3		Unforeseeable loss because of adverse climatic conditions	1	7	3.80	1.27	
Q3.2.4	Risk (behaviour risk)	Unforeseeable loss because of defective design	1	7	3.53	1.50	
Q3.2.5		Time for payment	1	6	3.83	1.10	
Q3.2.6		Time for providing information/instructions	1	7	3.83	1.33	
Q3.3.1	Expected return	At the bidding stage, price competition was fully leveraged to drive down contractor's profit	1	6	4.12	1.33	0.859
Q3.3.2		The return for one of the parties was not commensurate to his contribution in resources to the project according to the contract	1	6	3.81	1.09	
Q3.3.3		At the construction stage, return for changes was not commensurate to his contribution in resources to the project	1	6	3.90	1.19	
Q3.4.1	Sanction power	At the construction stage, unilateral termination by the contractor presented greater threat than the developer	1	6	3.81	1.36	0.855
Q3.4.2		Unilateral decision authority over project dispute had been the major weapon used by the developer to achieve his own goals	1	6	3.51	1.39	
Q3.4.3		At the construction stage, the developer was unwilling to cooperate for events which are critical to the contractor	1	6	3.15	1.28	
Q3.4.4		At the construction stage, the contractor was unwilling to cooperate for events which are critical to the developer	1	6	3.18	1.18	

(continued)

(continued)

No	Description		Min	Max	Mean	Std	Cronbach(α)
Q3.4.5	Bargaining power	At the bidding stage, the contractor felt more constrained and sacrificed in negotiating contract terms in relation to compensation for foreseeable losses	1	7	4.20	1.26	
Q3.4.6		At the construction stage, the developer felt more constrained and sacrificed in renegotiation of contract terms in relation to compensation for foreseeable losses or disputes	1	6	3.94	1.29	
Q3.4.7		The developer felt being forced to settle claims below his entitlements for change of work	1	6	3.70	1.13	
Q3.4.8		Making compromise was needed for the developer in view of the time pressure in switching contractor	1	6	4.31	1.24	
Part 4	**IOR**						0.909
Q4.1	Interdependency	The loss of transaction cost was unrecoverable when switching to another counterpart	3	7	5.13	1.08	0.679
Q4.2		The loss of time was unrecoverable when switching to another counterpart	3	7	5.12	1.18	
Q4.3		The loss of project information and data was unrecoverable in switching to another counterpart	1	7	4.30	1.15	
Q4.4	Reciprocity	Shared norms were developed between the two senior management teams	3	7	4.96	1.00	0.762

(continued)

(continued)

No	Description		Min	Max	Mean	Std	Cronbach(α)
Q4.5		Project participants felt being fairly treated when putting efforts towards the attainment of the common goals	1	7	5.05	1.20	
Q4.6		A no-blame culture was established between the two contracting parties	1	7	4.48	1.25	
Q4.7	Trust	A good management system was established to reinforce goal achievement such as continual improvement, profit making and business expanding	3	7	5.27	0.95	0.901
Q4.8		Misunderstandings were avoided by open communication	4	7	5.63	0.95	
Q4.9		Information in the contract document was explained to the affected parties	3	7	5.35	1.01	
Q4.10		Project participants had a good interaction to obtain more information from the other party	3	7	5.55	0.86	
Q4.11		It is believed that one of the parties had confidence to work with the other if they are honest	4	7	5.64	0.75	
Q4.12		Both parties were considerate to understand the other parties' needs and feelings at work	2	7	5.20	0.98	
Q4.13		Being considerate had enhanced the working capacity of the counterpart	3	7	5.26	0.99	
Q4.14		A good inter-organizational relationship was built between two parties	3	7	5.40	0.98	

(continued)

(continued)

No	Description		Min	Max	Mean	Std	Cronbach(α)
Q4.15	Relationship continuity	Both parties perceived that the working environment was collaborative	3	7	5.51	0.96	0.814
Q4.16		Both parties perceived those future working opportunities were likely	3	7	5.44	0.98	
Q4.17		Both parties were willing to accept short-term dislocation believing that it will balance out in the long run	3	7	5.32	0.96	
Part 5	**Project performance**						0.897
Q5.1	Contractual safeguards	The contractor's behaviour could readily be evaluated during the whole project procedure	3	7	5.24	1.07	0.896
Q5.2		Programmable tasks were achieved on each stage during the whole project procedure	3	7	5.09	1.14	
Q5.3		Unexpected situations and difficulties encountered were well-handled	2	7	5.09	1.10	
Q5.4		The project cost was within overall budget	1	7	5.10	1.36	
Q5.5		This project achieved satisfying project quality	3	7	5.41	1.10	
Q5.6		This project finished on time	1	7	4.49	1.65	
Q5.7		The volume of disputes was controlled within a reasonable range	2	7	5.25	1.09	
Q5.8		The amount in dispute was controlled within a reasonable range	2	7	5.20	1.14	
Q5.9	Value creation	Both parties worked together to maximize mutual benefits instead of their own benefits	1	7	5.07	1.24	0.758
Q5.10		Innovations were generated by the developer in this project	1	7	4.53	1.47	

(continued)

(continued)

No	Description		Min	Max	Mean	Std	Cronbach(α)
Q5.11		Innovations were generated by the contractor in this project	2	7	4.63	1.50	
Q5.12		There are promotions of project performance (e.g., cost-saving, shorten the construction period and quality improvements) that are beyond expectations	1	7	4.76	1.42	
Q5.13		Both parties had confirmed a commitment to seek mutual benefits and cooperation in the future	2	7	5.15	1.14	
Valid N		142					

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