Chapter 1
A Primer of Incentivization in Construction

Sai On Cheung and Liuying Zhu

Abstract Many construction projects end with cost overrun, delay and defects. These undesirable outcomes are particularly disheartening with mega projects. The construction industry has been seeking ways to improve project performance and inter alia, incentive schemes have been used widely as one of the means to induce extra efforts from contracting organisations. In 2007, the Hong Kong Government announced the construction of ten mega projects. Notwithstanding these mega projects have all incorporated certain forms of incentive, delay, substantial cost overruns and quality issues have been reported. The authors observed the following pattern of use of construction incentivization (CI): (i) Most of the CI have targets set on time, cost, quality, and safety, (ii) No clear pattern of how CI are developed, (iii) 'Carrots' are used far more often than 'sticks', (iv) The use of CI is far more common in public projects than private projects, (v) Most targets are quantitative, and (vi) Choice of CI is rather incidental. Apparently, there are two major shortcomings of the prevailing CI arrangements. First, CI is anchored on motivation theories that are mostly related to individuals; Second, the targets are outcome based and mainly tied with developers' goals. This outcome-based approach is useful for tasks of high programmability with outcome that can be accurately projected. However, construction tasks, especially those that need innovation, are typically of low programmability with loose outcome predictability. To overcome these shortcomings, this primer suggests that incentivization should aim for effort greater than mere competence and go beyond carrot and stick should be used. It is advocated that integrative incentive should be used and have five functions: (1) Goal Commitment; (2) Expectation Alignment; (3) Information Exchangeability; (4) Risk Efficiency; and (5) Relationship Investment.

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1 Introduction

Modern construction projects are characterized by high value, long duration, complex design, and technically sophisticated. Flyvbjerg (2017) summarized from his study on major worldwide mega projects and offered his iron law of mega projects as "over budget, over time, under benefits". 70% of the projects he studied recorded cost overrun of no less than 50% of the respective budget. In Hong Kong, similar project problems are found in the large-scale developments, especially the infrastructural projects initiated by the government. The Hong Kong Development Bureau (Hong Kong Development Bureau, 2018) reported that many of these projects are having extensive delay, substantial cost overrun and embarrassing quality issues. Need for improvement is self-evident. Construction incentivisation (CI) is the primary tool used to motivate contracting organisations to perform. CI is used in this study as a collective term to cover the range of incentive schemes that can be used in construction contracting to engender project performance improvement. Most construction projects, especially those identified as mega, are installed with CI. Moreover, the effectiveness of CI in enhancing performance is not as forthcoming as expected. For example, the projects under the 2017 Hong Kong Ten Mega Program (HKSAR, 2017) have installed various forms of CI, still delay, cost overrun, and huge claims have been reported.

A pilot literature review by the authors on the use of incentive found that there is no standard pattern of how construction incentive schemes are organised. Moreover, typically cost, schedule and quality outcomes are used as targets for sanctioning awards (incentive) or activating the penalisation (disincentive). These targets are sometimes linked to form composite incentive for complex tasks. In cost-plus contracts, schedule incentive scheme often goes hand in hand with cost-incentive scheme (Abu-Hijleh & Ibbs, 1989a). Quality, safety, overall productivity performance, or a combination thereof together with behaviour modification is used as an integrative incentive scheme for complex projects. To deepen the understanding of the implementation of CI in Hong Kong, views from construction professionals was conducted (Zhu & Cheung, 2018). The interviewees include senior professionals with immense experience coming from the government, private developer, leading contractor, and consultant. The interviewees provided the following observations that are quite in line with the findings in the pilot literature review:

- The use of CI is far more common in public projects than private projects.
- Most of the CI have targets set on time, cost, quality, and safety.
- Most targets are quantitative.
- 'Carrot' is used far more often than 'stick'.
- Choice of CI is rather incidental.

- No clear pattern of how CI is developed.

It can be summarised that though the use of CI in construction contracting is not new, the unsatisfactory record suggest that there are some notable knowledge gaps to be filled for the planning and implementation of CI. For example, motivation theories that portrait individual's behaviour have been the primary theoretical explanation of the value of CI. However, individual effort may not be transcended to organisational level. Furthermore, prevailingly used CI are mostly outcome-based with targets imposed by the offering party. This arrangement is not conductive to harvest performance enhancement, in particular for tasks that demand efforts beyond mere competence. This study aims to critically review the conceptual bases of CI. It is advocated that CI should be designed contingent to the task characteristics. As afore stated, using metric CI targets facilitates discrete determination of attainment or otherwise of the outcome targets. Nevertheless, this outcome-based arrangement gives no regard to the fact that construction project performance is a matter of team effort and credits should also be allowed for the efforts expended irrespective of the outcome. Furthermore, the fact that the estimation of the target outcome may not be accurate.

Many construction-industry reviews (Latham, 1994; Egan, 1998; CIRC, 2001) have advocated that project teams should work cooperatively for the good of the project. There have been voluminous studies on how to make construction contracting more cooperative. Trust building is the most notable recommendation (Zuppa et al., 2016). Cheung et al. (2011) analysed 163 responses from construction professionals in Hong Kong and found that trusting partners communicate much better. Zuppa et al. (2016) added that trust is the catalyst in promoting leadership, building team and information sharing between construction project participants in the US. In fact, from a case study of a record-breaking project that generated 450 patents, Zhu et al. (2020) found that singular use of monetary reward cannot deal with complex and technically challenging operations. Instead, embracing commitment through enhanced Inter-organizational relationship (IoR) was instrumental in driving exceptional efforts and fostering innovations. This neatly points to the need to have tailored CI for innovation developments. Furthermore, Eisenhardt (1985) highlighted that outcome-based incentive arrangements will only work for highly programmable tasks where targets can be set with reasonable accuracy. While uncertainty remains one of the key challenges faced by major engineering and construction projects, construction activities, especially those requiring extensive on-site execution are not highly programmable. Behaviour-based incentives would provide the stimulation for conducive behaviours to meet with the challenges as the project unfolds. This has been proved invaluable when innovative ideas are solicited. This study proposes the use of task programmability and outcome predictability to guide the mapping of procurement options with incentive arrangement.

2 The Study

CI is used as the vehicle to motivate performance. Motivation is the urge to perform an act, to obtain a certain object, or to produce a desired outcome (Satinoff and Teitelbaum, 1983). Bootzin et al. (1991) described motivation as a process that energizes, maintains, and directs behaviour towards certain goals. The force can drive decisions and behaviours that are consistent with the pursuit of the goal (Baron, 1995). Another common view of CI is its ability to align goals between developers and contractors. Incorporating CI in parallel with the formal contract is believed to inspire, drive, and direct one's resources for the attainment of the project goals. For example, target cost contracts have been used to link the interests of the contracting parties. There is strong support that CI can be used as a quasi-contractual tool to gauge performance (Zhu & Cheung, 2021). To enhance the instrumentality of CI, the functions of construction incentivization are first to be identified in this section. Analogically, CI functions are the deoxyribonucleic acid (DNA) of any incentive arrangements. Macneil (1974) describes performance, risk and dispute resolution are the three pillars of contract planning. As such, all contracts are built through systematic planning of the three pillars. For this study, CI functions are those indispensable elements of successful incentive arrangements. The search for CI functions starts with review of literature on motivation theories, outcome targets and project performance.

2.1 Motivation Theories

Motivation is what prompts individuals, teams, and organizations to act in a certain way, or develop an inclination for specific behaviour (Kast and Rosenzweig, 1985). Most motivation theories are addressing individuals instead of organizations. Construction project participants are seldom individuals but are complex commercial organizations (Bresnen & Marshall, 2000). The literatures on CI almost implicitly treat organizational and individual goals as more or less the same (Arditi & Yasamis, 1998). A review of motivation theories is presented here-follows.

Maslow's Hierarchy of Needs Theory

Maslow's needs hierarchy is often applied as a maturity model that describes how individuals move up the hierarchy as they develop (Pardee, 1990). Maslow et al. (1987) believed that individuals who possess a constantly growing inner drive would have great potential. Five sources of motivation are suggested: Physiological, Safety, Socialisation; Esteem, and Self-actualisation (Maslow et al., 1987). Two major postulates are developed to present the progressive relationships of these five sources. Firstly, motivation comes from unsatisfied needs. Secondly, when the lower-ordered needs are satisfied, the next higher level of needs then becomes significant determinants of behavior (Acquah et al., 2021). Thus management can match their staff development level by addressing the needs that would most motivate their effort.

McClelland's Need Theory

McClelland's need theory is more employee oriented. The theory proposes that when a need is strong, its effect is to motivate the person to use behavior which would satisfy that need (McClelland, 1965). Three core needs are Affiliation, Achievement, and Power (Pardee, 1990). McClelland further developed the descriptive set of factors that reflect the high need of achievement (McClelland and Johnson, 1984): (1) preference for personal responsibility; (2) tendency of taking moderate goals and calculated risks; and (3) expectation of performance feedbacks. For project management, project leaders should position their team members to capitalise on the respective motivating effect.

Incentive Theory

The incentive theory proposes that individuals will practice certain behaviours in response to specific task requirement or for a reward (Killeen, 1981). It has been useful to describe behaviour under the control of concurrent chained schedules of reinforcement (Killeen, 1985). People may display certain behaviours to achieve a specific result, incite a particular action or receive a reward (Locke et al., 1988). The motivators can be reinforcement, recognition, and rewards. Moreover, these motivators need to be meaningful, specific, challenging, and acceptable to those who are attempting to achieve them. Typical rewards in organisational setting include bonus, praise, opportunity, promotion, salary and improved fringe benefits (Rose & Manley, 2011).

Expectancy Theory

Expectancy theory explains why one's choice of behaviour is influenced by his assessment of the outcome (Oliver, 1974). Behaviours will be directed towards those that would achieve the desired outcome (Wigfield & Eccles, 2002). It is therefore imperative that the outcome to be realistic and achievable (Bandura, 1982). Caveat against bias of overconfidence should also not be underestimated. Expectancy theory projects that motivation is a function of three main factors: the subjective value placed on the reward ('valence'); 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 ('instrumentality') (Vroom et al., 2005). Management strategies are therefore needed to raise at least one of these factors to enhance motivation. Motivation can therefore be expressed as:

$$\text{Motivation} = \text{Valence} * \text{Expectancy} * \text{Instrumentality}.$$

Herzberg's Hygiene Factors

Herzberg's motivation-hygiene theory argues that there are separate sets of mutually exclusive factors in the workplace that either cause job satisfaction or dissatisfaction

(Herzberg, 1966). Hygiene factors are those that remove hazards from the environment (Herzberg, 1970). Hygiene factors cannot motivate, but may cause negative effects if not satisfied. The motivating factors: like achievement, recognition, responsibility, and advancement, are satisfiers and promote further improvements (Herzberg, 1974).

Competence Theory

Competence theory identifies that individuals' behaviours are guided by the motives of displaying their skills, intelligence and abilities (Mulder, 2017). The desire to demonstrate these qualities would motivate them to feel competent in a particular area. The confidence of ability exert control over individual's motivation and behavior (Bandura, 1978). Competence underpins enhancement in productivity and efficiency. Competent staff are more confident and willing to share with their peers in return for greater recognition. Table 1 summarizes the motivators suggested by the afore-listed motivation theories. Individuals/organizations can be motivated should appropriate carrot be offered. Conceptually, these motivators can be materialistic, hygienic, and aspirational. Materialistic motivators are extrinsic and can be in the form of reward or deterrence. Hygienic factors are mostly extrinsic with the aim of embracing a conducive environment for performance. Aspirational motivators are primarily intrinsic with the aim of stimulating the self-determination/drive to excel. When aspirational motivators are at work, the need for monitoring diminishes.

With reference to the review of motivators presented in the preceding paragraphs, deterrence against non-performance appears not the mainstream performance motivator. Moreover, in construction, penalty for non-performance is extensively used, primarily as a baseline safety net for the principal. In other words, penalty is stipulated against non-compliance of contract requirements. Typical example is the inclusion of liquidated damages clause to deter late completion. In this connection, the main aim is not searching for extra efforts but to keep the project under control.

2.2 Outcome Targets

The main purpose of incentivisation is to derive efforts to attain certain targets (Meng & Gallagher, 2012a). In practice, incentive targets are inevitably related to cost, time, and quality (Herten & Peeters, 1986). Bayliss et al. (2004) described these as hard targets. In a study of a partnering project, Bayliss et al. (2004) found that behaviour-based soft targets were having even greater impact on project performance. The section discusses three forms of outcome targets: hard, soft, and innovation.

2.2.1 Hard Targets

- ***Cost***

Table 1 The motivators suggested by motivation theories

	Maslow's need theory	McClelland's need theory	Incentive theory	Expectancy theory	Herzberg's hygiene factors	Competence theory
Motivators	Physiological	Affiliation	Reinforcement	Valence	Achievement	Competence
	Safety	Achievement	Recognition	Desired outcome	Recognition	Confidence
	Socialization	Power	Reward	Expectancy	The task	
	Esteem			Instrumentality	Responsibility	
	Self-actualization				Advancement	

Cost is one of the most significant outcome targets because almost all CI has a cost-saving/minimising motive. The major differences between these incentives are in the payment method and risk allocation. Some examples include: (1) Fixed-Price Incentive (firm target) Contract that allows adjusting profit and establishing the final contract price by application of a formula based on the relationship of total final negotiated cost to total target cost. The final price is also subject to a price ceiling; (2) Cost reimbursable contract, the contractor is reimbursed the actual costs they incur in carrying out the works, plus an additional fee; (3) Cost-Plus Incentive-Fee contract (CPIF) uses a banded calculation of pain/gain share system is accumulated in this type of contract to incentivise contractors to reduce cost; (4) Cost-Plus-fixed fee contract (CPFF), it provides for a fee consisting of an award amount that the contractor may earn for cost saving (Chan et al., 2010; Kwawu & Laryea, 2014; Perry et al., 2000; Savio et al., 2013).

- ***Schedule***

Schedule incentive scheme entails a premium being offered to the contractor for the early completion of the project (Abu-Hijleh & Ibbs, 1989b; Richmond-Coggan, 2001). The key motive behind schedule incentive scheme is to reward directly to contractors for early completion of work and, otherwise, to penalize them for late completion. The design and implementation of schedule-based incentivisation are relatively straight forward. Schedule targets can be further divided into: (1) final project completion date; (2) intermediate milestone periods; (3) intermediate physical completion milestones; or (4) a combination of final and milestone assessments (Abu-Hijleh & Ibbs, 1989b).

- ***Quality***

Quality performance can be applied to a wide range of non-cost/time targets such as functionality, defects, and safety. Quality incentive is used for achieving zero or minor defects. Safety incentive scheme seeks to ensure compliance with safety rules and standards (Meng & Gallagher, 2012b). Different from cost or schedule incentive schemes, the assessment for technical performance is more complex.

Time, cost, and quality targets are the three most used outcome targets (Zhu & Cheung, 2018). Using these 'hard' targets are often described as outcome-based approach. Moreover, Boukendour and Hughes (2014) pointed out that one of the major and recurring problems in designing cost incentive contracts is the setting of the cost target and the risk sharing ratio. This challenge equally applies to the setting of time and quality targets.

2.2.2 Soft Targets

Apart from having hard outcome targets, Eisenhardt (1988) advocated that behaviour-based criteria that reflect the ways the parties behave should also be used. For example, developing innovative solutions may have more far-reaching effect than

reaching pre-determined hard targets. Every project can be a testing ground for both technical and managerial innovations. Examples of improved project performance include the attainment of: (i) outcome (hard) targets; (ii) behavioural (soft) outcomes; (iii) value creation (technical and managerial innovations); and (iv) efficient dispute resolution.

Soft targets aim for behaviour modification. Intrinsic motivators are believed to have greater influence as far as shaping behaviour is concerned. The basic "law of behaviour" is that higher incentives will lead to greater effort and higher performance. Extrinsic incentive has been tried to motivate employees. Behaviour intervention incentives have been tried to improve school attendance. Gneezy et al. (2011) used 'intervention' to describe the effect of these behaviour-based incentive because of the potential conflicts over use of monetary incentive. The authors argues that this form of "crowding out effect" has been considered quite common in principal-agent relation. Essentially, behaviour-based incentives work on the prosocial desire of the subject. When this is installed together with monetary reward, the effect of intrinsic motivator would diminish. Moreover, the illustrations used by Gneezy et al. (2011) are primarily related to education, contributions to public goods, and developing habits. The reputational desired outcomes may not directly bring tangible benefits. For signature projects, this was however found to be an intrinsic motivator (Zhu et al., 2020). Reputational enhancement will also bring future job opportunities.

The use of soft targets has also been found in safety incentive plans (Yeow & Goomas, 2014). Likewise, Sims (2002) summarised ten forms of safety incentives: stock ownership, special assignments, training and education, recognition, time off, advancement, social gatherings, increased autonomy, prizes, and money. Sparer and Dennertien (2013) classified safety incentive programs (SIP) into leading (behaviour-based) and lagging (outcome-based) safety performance metric programs. Leading SIP include metrics that could predict the future safety performance such as percentage of safety adult, inspection and walkthrough compliance. Lagging SIP make use of past safety performance metrics to reward workers. It was argued that using leading SIP is based on the assumption that reward being contingent on future performance result, behaviour modification for the sake of performance can be effected. Outcome based SIP reward workers for their individual safety performance. Apparently, behaviour-based SIP requires collective efforts of the workers. As such, the motivators should have elements common to the workers whereby a sense of interdependency can be induced. Achieving construction project objectives obviously need the concerted efforts of the team members, behaviour-based incentive should be the logical choice. Nevertheless, the contractual arrangements take no account of interdependency as all contracts are stand alone legal instrument. In this regard, mechanism like integrated project delivery may offer the vital vehicle to work with behaviour-based incentive.

Yeow and Goomas (2014) proposed a hybrid model called Outcome-Behaviour Based Safety Incentive Program (OBBSIP). There are two principles of OBBSIP. Principle One: outcome-based approach through tiered incentive awarded when meeting safety outcome. The award can be team based and related to periodical performance record. Principle Two: behaviour-based approach through a set of

expected safety precautions and safety behaviours. There is no need to have performance record to support the effectiveness of the behaviour because the behaviours are selected based on their proven effect in the long run.

In a principal-agent relation, Murdock (2002) argued that implicit contracts and intrinsic motivation are complements. The idea behind this argument is that people value and therefore derive utility from characteristics of the output of their work in addition to how much they are paid for work. The importance is what characteristics would drive the utility. It would be logical to link these characteristics to the high-level needs suggested by Maslow (1984). Zhu et al. (2020) found that the successful use of a project reputation evaluation system had engendered 'extra' effort of the contractors in a record-breaking mega project. The very fact that the project attracted worldwide attention was sufficient to drive the commitment because they considered non-performance was 'face-losing'. Thus, the type of project at stake would have deterministic effect of the reward, be it incentive or disincentive. The potential gains do not exist when the contractor responds only to extrinsic incentives. The obvious gains would be the interests of the contractors per se. These can be profits, recognition and/or future business opportunities. This study therefore does not support the dichotomy of extrinsic and intrinsic motivation, instead, if the prospective gain stimulates intrinsic motivation, both motivators can work and complement each other. In practice, separate rewards should be used respective to the two forms of motivation.

2.2.3 Innovation

Wang et al. (2018) explored the antecedents of an organization's absorptive capacity by examining the role of innovation incentive. In essence, it was found that innovation incentive enhances absorptive capacity through promoting employees' learning. The implication on the study of incentive is how to mobilize employees' appetite for innovation. Innovation can be identified as something new or not used before. This would require overcoming risk averse attitude. If penalty is attached to innovative attempts, it would be hard to solicit novel ideas that are deemed untested. In this study, it was found that teamwork will help building absorptive capacity, seemingly because of the collective wisdom as well as peer pressure. Interestingly, this study found that transformative leadership reduces the functionality of innovation incentive on absorptive capacity. Transformational leaders influence employees by developing close and individualized relationships with them (Carter & Armenakis, 2013). The potential of injustice hampers the trust of employees on the leader. In construction, what should be the role of the employer who is often the incentive initiator. Micro-management by employer would signal distrust. It is therefore suggested that autonomy is key to innovation incentive.

The study of Surapto et al. (2016) affirms the significance of owner-contractor collaboration to accomplish project goals. The findings may not be unexpected, moreover, the implication on procurement approach is far-reaching. When relational attitude and teamwork are the keys to success, appropriate contractual framework is paramount. The authors suggested that partnering/alliance contracts are likely to

perform better than lump sum and reimbursement contracts. In essence, principals and contractors should move away from the conventional principal-agent relationship. In terms of linking procurement with types of incentive, it can be projected that incentive featuring both outcome and behavior target would suit procurement methods that emphasize teamwork and collective efforts. This argument can be extended to solicitation of innovation that shares the same success prerequisites.

2.3 Performance

Project Performance (PP) means the degree of accomplishment of project goals. Typically, PP is measured by the attainment of time, cost, quality, and safety. For example, quality incentive schemes are used to discourage substandard works (Meng & Gallagher, 2012b). Cost incentive will be accorded should the project being completed within cost target. Likewise, schedule incentive is used to enable acceleration to mitigate delay.

It is not new knowledge that the success of incentive plans depends on the performance measures that are used. Kauhanen and Napari (2012) also found that performance measurement is difficult because it is hard to reliably measure an employee's contribution to the objective of the firm. Thus, boarder measures that may not be individual specific are used. The incentive plan for construction project also faces similar challenge should the incentive targets require the collective efforts of the participating organizations. Kauhanen and Napari (2012) also found that due to the nature of their jobs, incentive plans for blue- and white- collar employees are quite different. White-collar employees' performance is often tied to the organizational objectives with a longer time span for assessment. For blue-collar employees, their incentive must be assessed more frequently and with discrete targets to make award decision ambivalent.

Gibbs et al. (2009) also opined that performance measurement is perhaps the most difficult challenge in the design and implementation of incentive systems. It is acknowledged that performance may be affected by factors beyond the employee's control. As such, performance under an incentive scheme should be qualified by controllable and uncontrollable risk, distort and manipulation.

Likewise, reward can be tied to performance under the respective conditions. The term 'Bonus' was proposed to be used for performance evaluated ex post. There are merits to have composite incentive arrangements so that different aspects of performance can be targeted. Moreover, the giving of extra bonus ex post may well be nullifying the original arrangement.

Pillars of Performance

The overriding goal of contractual incentive is to achieve better project performance (Richmond-Coggan, 2001). Goal commitment between both parties is considered the first and foremost function of any incentive plan (Locke et al., 1988). According to goal-setting theory (Locke and Latham, 1984), goals need to be meaningful, specific,

challenging, and acceptable to those who are attempting to achieve them. When incentives and rewards are contingent on goal attainment, a performer's goal acceptance increases in proportion to the perceived benefits of attaining the goal (Locke & Latham, 1990). The function of goal commitment is to iron out "discrepancy", the difference or mismatch between present state and ideal state. Two types of discrepancies exist (Bandura, 1993). The first is discrepancy creation due to intrinsic motivation of pursuing better performance, one party sets a future, higher goal in an ideal state generate in mind. The second is discrepancy reduction which is the effort people may pay to narrow the gap between existing facts and requirements or feedbacks such as results of previous project evaluations (Locke et al., 1988).These two features direct that the goals of incentive schemes are affected by subjective requirements and objective facts. The major reflections in incentive planning are contractual safeguards and value creation. Contractual safeguards are provisions to facilitate accomplishment of project objectives. For example, quality incentive schemes are used for meeting performance targets. A performance bonus arrangement can be applied to a wide range of performance areas such as quality, functionality, and safety (Meng & Gallagher, 2012b). Value creation refers to the extra project value such as cost-saving, innovations and long-term cooperation. In some projects, bonus was set for contractors to generate technical innovations. Some incentive plans also act as the bridge to link contracting parties to engender common interests and in turn provide the platform for long-term collaborative working (Cheung et al., 2018). On this point, it is well noted that cooperation is central to the wellbeing of a project. Can CI be used as a vehicle for this purpose? To tease out the central issues underpinning the use of CI, it is necessary to distinguish between interpersonal relationships and role relationships. Guitot (1963) advocates that the ways in which individuals make attributions about others' intentions and behaviours will vary significantly if the other is viewed as acting within a "role" as opposed to "qua persona." It is advocated that behaviour may change when individuals were behaving in a role context. Even though individuals may rely on trust in their "qua persona" relationships, they may be unable to do so when acting as agents for their organizations. Accordingly, adopting conducive contracting behaviours by the organization is thus fundamental to project performance**.**

Conducive contracting behaviours (CCB) are therefore performance enabling. Several categories of behaviours have been reported and well proven to have positive influence on project performance. Behaviours exemplifying trust (Cheung et al., 2011; Wong et al., 2008), open communication (Cheung et al., 2013; Wang et al., 2020), best endeavour (Pang et al., 2015; Williamson, 1985), joint effort (Bayliss et al., 2004; Hetemi et al., 2020) and crest for innovation (Cheung & Chan, 2014), are previously used manifestations CCB.

It is advocated that if contracting parties are working at arm's length, the overall project performance would be hampered. Oliver (1990) offered six Interorganizational relationship (IoR) determinants: efficiency, asymmetry, reciprocity, necessity, stability, and legitimacy. These determinants shall be further developed into IoR measurements. Zhu and Cheung (2021) used efficiency, asymmetry, and reciprocity to measure the level of IoR of construction organizations. Based on transaction

cost economics theory (Williamson, 1985), the formation of IoR is prompted by an organization's desire to improve efficiency. Working together would result in higher efficiency (Oliver, 1990) and with less contractual safeguards (Mellewigt et al., 2007). Asymmetry between organisations can be expressed by the power or control one organisation has over another (Oliver, 1990). Power asymmetry can be caused by information differential (Holmstrom, 1979). Thus, power asymmetry can indicate both equity gap and IoR but in opposite scale. Exchange theory (Oliver, 1990) projected that reciprocity would engender cooperation through stimulating interdependency. This would command more enduring cooperation through internalisation.

Barriers against performance

Equity Theory (Adams & Freedman, 1976) advocates that comparing input with output is part of human nature. Adams (1963, 1965) further suggested that whether one will abide a contract depends not only on what he gets, but also on whether his counterpart is getting more than him. If the output/input ratios of the contracting parties are far apart, the party with the lower ratio will feel unfairly treated. He would find ways to reduce this imbalance. In construction, Lindenberg (2000) stated that unfair payment packages, power asymmetry and risk differentiation would hamper trust among the contracting parties. These disparities between the developer and the contractor are collectively described as equity gap (EG). Four main elements of equity gap have been proposed by Zhu and Cheung (2021): risk ownership (Cheung et al., 2014), information, expected return and power (Adams, 1965).

2.4 Implication on Design of Incentive in Construction

2.4.1 *Conceptual Forms of Motivators*

An ideal CI therefore should trigger the motivators to engender performance. This section discusses the three conceptual forms of motivators.

Materialistic Motivators

Materialistic motivators are those that would satisfy the basic needs of the stakeholders. Monetary reward is a classic example. Principals tend to believe the sole concern of contracting organisations is profit. Thus, monetary reward should be the most welcome incentive reward. Moreover, the attainment of same must be a realistic one. In this regard, parties to an incentive arrangement must be involved to agree on the goals and expectations. Post-contract CI arrangement provides a unique opportunity for the contracting parties to establish common goals. The associated expectations can be elaborated so that the CI parties can express their expectations. Another important function of CI is the improvement in information exchange through more conducive environment that has no bearing on the award of the contract.

Hygienic Motivators

The common law principle of non-prevention requires parties to a contract not to do anything that will prevent others from performing their contract. The civil law principle of good faith expects contracting parties to use their best endeavours to perform their contract. Nevertheless, there is no such legal backing for parties to develop conducive environment for the completion of the project goals. The original contract has already set out the responsibilities and rights of the parties. What can be the consideration for 'extra' efforts? CI offers the valuable avenue. Hygiene factors are those that remove hazards from the environment (Herzberg, 1970). Hygiene factors may not directly motivate, but may cause negative effects if not satisfied. The motivating effect may come from factors like achievement, recognition, responsibility and advancement. CI therefore can provide these though delegation of responsibility, freedom to innovate as well as balanced risk ownership. According to Herzberg (1974), the creation of these satisfiers would facilitate performance.

Aspirational Motivators

In can be said that most of the motivators listed in Table 1 belong to this group. The central belief is that one would figure out ways to improve once they have aspiration to do better. Intrinsic motivation is the answer. Recognition is key to derive the self-motivation. Esteem, self-actualisation, and competence are notable examples of aspirational self-motivators. Nonetheless, applications to construction projects are not that straightforward because change of behaviours is needed. It is advocated that CI can be deployed to solicit relationship investment.

2.4.2 Motivators and Functions of Incentivization

Incentive plans can be useful management tool (Herten & Peeters, 1986) to bring out the best of the contractors (Korlen et al., 2017). Hard targets are indispensably used as the meeting of time, cost and quality expectations remains fundamental for every construction project. When extra is desired, moving away from a confrontation mode of contracting may offer the necessary breakthrough. In this connection, Zhu and Cheung (2021) suggested the use of incentive contract ex post to address the inequity created ex ante. Generically, behavior-based incentive would be an appropriate candidate to foster conducive contracting behavior. Where innovations are being solicited, the risk aversion attitude must be removed. Composite form of incentive should be considered. To operationalize the conceptual underpinnings of motivation, it is suggested that CI should have five functions with due regard to the motivators listed in Table 1. The five functions are: (1) Goal commitment; (2) Expectation Alignment; (3) Information Exchange; (4) Risk Efficiency; and (5) Relationship Investment. The conceptual framework for the design of CI is presented in Fig. 1.

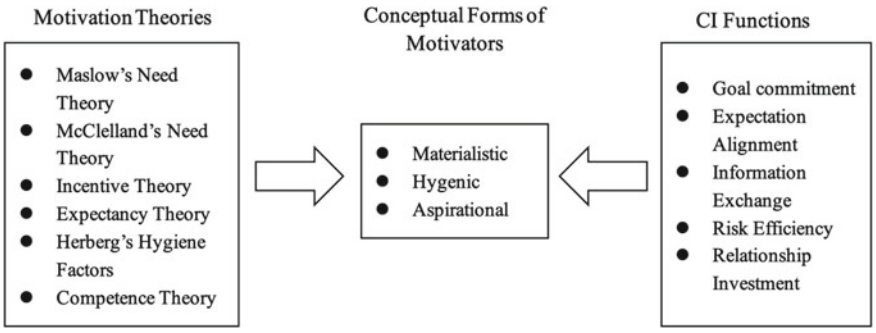

Fig. 1 Motivators and incentivisation

3 A Mapping Framework for Procurement Options and Incentive Arrangement

Most reported studies on incentivisation recommend the need to have aligned goals of the participating parties (Locke et al., 1988). This is not easy to be achieved. In fact, the goals of CI are mostly those of the developers and the interest of the contractors are often secondary (Eisenhardt, 1988). For example, green construction is among the top agenda items of the construction industry across the world. Many governments have used incentive to promote green building practices. Nonetheless, these incentives plans mostly reward or compensatory in nature and participation is voluntary. Saka et al. (2021) also found that apart from incentive that could generate real benefits to the developer like extra construction floor area, there is insufficient evidence to support that developers will adopt green construction to enshrine their reputation. The effect of green labelling on sale enhancement has also yet been demonstrated. This study aptly showed the limitation of pure prosocial approach to incentivize green construction should the interest of the stakeholders are not aligned.

Another challenge is the reliability of the targets. Eisenhardt (1988) argued that realistic target outcomes are only possible for highly programmable tasks. In other words, when the tasks are repetitive and outcome can be predicted with reasonable accuracy like factory production, then using outcome-based incentive is appropriate. However, when the outcome certainty is not high like tasks of low programmability, certain flexibility should be accorded. It is proposed that in formulating a CI, an approach that takes into account of project characteristics and the various forms of outcome targets should be taken. As an illustration, a mapping framework of procurement options with incentive arrangements is proposed (Fig. 2 refers). Since realistic targets are central to the acceptability of a CI, two parameters related CI targets are used.

Task Programmability

Task programmability refers to the extent the tasks can be broken down into discrete work activities for production planning. Task programmability can be assessed by

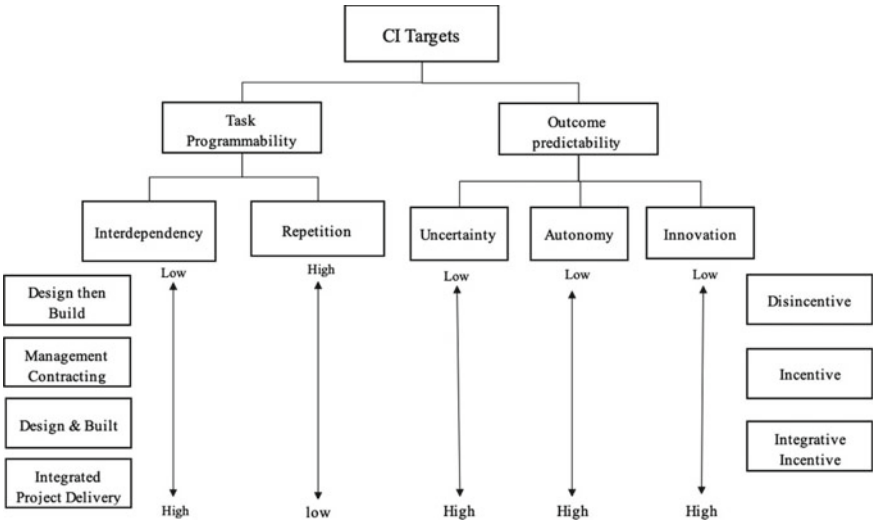

Fig. 2 Mapping Procurement options with Incentive Arrangements

the level of interdependency and repetition. Repetition itself shall warrant ease of programming in terms of scale and learning effect. When tasks are highly interdependent, programming become complex because the uncertainty associated with the outcome.

Outcome Predictability

Outcome predictability is linked somewhat with task programmability. Moreover, predictability is also influenced by the uncertainty associated with the task. Other factors affecting outcome predictability include the degree of contractual autonomy and extent of innovation. Contractual flexibility is typically low when tasks are less complex. For example, in public housing and private residential developments, the tasks are well defined and contractual flexibility is not necessary. Moreover, when innovations are needed to tackle unprecedented challenges, the tasks are undefined, and a flexible contract governance is required to cope with the inevitable ex post adjustments.

Based on the discussion on motivators and task characteristics, it is proposed that the conventional design then build type of construction, disincentive arrangement is appropriate. This form of procurement is used for unsophisticated development where reasonable time is allowed for the design before commencing construction. For more complex projects, detailed design is not possible. On-site decisions are commonly exercised. Response to contingencies must be facilitated for the input of all parties at stake. Incentive is valuable to solicit such inputs. In recent years, the rise in use of building information modelling has led to rethink of procurement approach. To capitalise on the expertise of all contracting parties and advance in information technology. Use of integrative project delivery has gathered momentum.

This form of procurement, however, must be served with collaborative contracting behaviour. It is suggested that integrative incentive would offer the trigger for behaviour modification.

4 Incentivization in Construction

It is well noted that cooperation is central to the wellbeing of a project. Can CI be used as a vehicle for this purpose? To tease out the central issues underpinning the use of CI, it is necessary to distinguish between interpersonal relationships and role relationships. Adams, (1963) advocated that the ways in which individuals make attributions about others' intentions and behaviours will vary significantly if the other is viewed as acting within a "role" as opposed to "qua persona". Behaviour may change when individuals were behaving in a role context. Even though individuals may rely on trust in their "qua persona" relationships, they may be unable to do so when acting as agents for their organizations. Accordingly, adopting conducive contracting behaviours by the organization is thus fundamental to project performance**.** Back et al., (2013) described incentive plans as predetermined contract strategies that had been designed to motivate project personnel and/or organizations to achieve prescribed project performance objectives. With 90 project data, they found that the level of effectiveness of incentive varied widely. It was suggested that there is no guarantee that incentives will work out as planned. They found using quantified targets for time, cost and quality are less controversial. When qualitative measurement for softer project issues, disagreement over attainment of target is not uncommon because of the subjective nature. Bayliss et al. (2004) proposed the use of longitudinal evaluation to overcome the subjectivity issue of final-shot evaluation. Contingent to the project characteristics, Back et al. (2013) and Ibbs (1991) offered the followings guides for the formulation of construction incentive plans:

- Unilateral versus Negotiated Incentive Plan
- End of project Determination versus Incremental Milestone Determinations
- Quantitative Measures versus Qualitative Measures
- Offsite Determination versus Onsite Determinations
- Win/Lose Bonus
- Carry Over (Retention) Bonus
- Flow Down Structure

Back et al. (2013) also reminded that although there is no empirical evidence to support incentive will bring improved performance. It is still prudent to make sure commitment to perform is in place. In other words, the people involved must be willing to give extra effort. Incentives cannot overcome poor performance of participants due to their inability, unpreparedness, or lack of professional judgment/focus. To summarize, when extra efforts are expected, an integrative approach of incentivization should be adopted. That means on top of using hard targets to keep

the baseline performance, behavior-based targets should also be used for behavior modification.

5 Summary

A pragmatic approach is taken for the development of a primer of incentivization in construction. First, motivation theories are reviewed to identify the bases of motivation. It is acknowledged that most of the motivation theories are directed to individuals, their use should therefore be taken with care. In this regard, use of the conceptual forms is proposed. These are: materialistic, hygienic, and aspirational. Five functions of CI are also proposed to trigger these motivators: Goal Commitment, Expectation Alignment, Information Exchange, Risk Efficiency and Relationship Investment. To operationalise this conception, a mapping framework of procurement option with incentive arrangements is used as illustration. The novelty of the framework is the use of task programmability and outcome predictability as the control parameters.

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