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# A CONCEPTUAL FRAMEWORK TO INVESTIGATE THE OPTIMISATION OF FINANCIAL INCENTIVE MECHANISMS IN CONSTRUCTION PROJECTS.

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## ABSTRACT

Implementation of financial incentive mechanisms in the contractual arrangements of a construction project can impact significantly on the motivation of contractors and hence project performance. Positive incentives (as a component of the project delivery strategy) aim to motivate contractors to align their goals with those of the client, via a financial reward.

These incentive mechanisms take many forms in construction contracts, including: profit sharing in cost plus incentive contracts, bonus performance provisions attached to various lump sum and cost reimbursable contracts, and multiple financial incentive mixes.

The optimisation of financial incentive mechanisms depends greatly on how they are designed in the context of specific project environments. For example, if the client/contractor relationship is poor, the contractor may perceive the financial incentive as calculative and hostile, and therefore will be less committed to the client's goals than the incentives intended.

In order to establish a starting point for further research into this topic area, this paper outlines the results of an international review of the literature on financial incentive contract types and the factors that influence the motivation of contract agents under these arrangements. The paper then goes on to propose an analytical framework that is to be used in the evaluation of optimal financial incentive mechanisms in construction projects, drawing on economic and psychological motivational theories. The findings of this review provide a sound basis for the empirical work to follow in a PhD project investigating the optimisation of financial incentive mechanisms in the Australian commercial building industry.

Keywords: **financial incentives, construction, contracts, motivation, effort.**

## INTRODUCTION

Use of financial incentive mechanisms within construction contracts is common. They aim to reduce contract cost, minimise contract duration; and achieve performance standards in

areas such as quality, program efficiency and productivity, safety and innovation. The optimal performance of a financial incentive mechanism is determined by its ability to increase and direct the contractor's effort to achieve above minimum standard levels, based on the client's project goals. It is argued in this paper that although incentives are commonly employed, they often do not operate effectively due to lack of information about the factors that shape their performance (Bresnen & Marshall, 2000). The value of such incentives is not questioned here, however, there is a need for further definition and understanding of the motivational environment when designing and implementing appropriate mechanisms.

Against this background a large-scale research project is being undertaken to evaluate the performance of financial incentive mechanisms in Australian commercial building projects and explore the contextual attributes that influence motivation in various project configurations. This paper is the result of the first stage of this project, involving a comprehensive literature review and development of a conceptual framework that will be used to guide the case study fieldwork. This paper proposes a set of eight generic motivational variables, established from the integration of psychological and economic motivational theory principles that can be used to guide the performance evaluation of financial incentive contracts. The framework can also be employed to reveal the specific contextual attributes that influence the optimal implementation of such incentives in construction projects.

## **FINANCIAL INCENTIVE DESIGN IN CONSTRUCTION CONTRACTS**

### **Contract strategy and financial incentives**

The standard lump sum and cost reimbursable contract types have significant problems in promoting motivation to attain client specified goals that are above 'business as usual' levels. Despite incentive for cost-reduction efforts, the restrictive nature of the price in lump sum contracts increases the contractor's risks and thus increases their price contingency. This can lead to compromises in other areas of the project such as quality (Howard *et al.*, 1997). On the other hand, standard cost reimbursable contracts fail to motivate the contractor to minimise project costs and achieve other project goals above minimum standards (Berends, 2000). Financial incentive mechanisms built into standard contract conditions aim to alleviate these problems and direct and sustain contractor motivation towards achieving goals above 'business as usual' standards.

Many contractual arrangements between construction clients and contractors are confrontational, reflecting considerable mistrust and leading to increases in contractors' premiums to avert significant risk levels (Zaghloul and Hartman, 2002). According to Turner and Simister (2001), a significant issue that must be considered when formulating an appropriate contract strategy is achieving goal alignment between the client and

contractor. Improved use of contracting options such as incentive mechanisms can balance the risk allocation between project parties and reward goal alignment.

HM Treasury's (UK) Central Unit on Procurements (1991) devised a set of benefits that can be achieved through the incentivisation of a construction contract. These benefits include lower cost through the appropriate allocation of risk and greater price stability; timely delivery of service without compromising quality of workmanship; enhanced achievement of desired outcomes; and improved management, control and monitoring of contract deliverables.

The primary aim of financial incentives is to “simply take advantage of a contractor's general objective to maximise their profits by giving them the opportunity to earn a greater profit if they perform the contract efficiently” (Bower *et al.*, 2002, 43). This can be achieved when the contractor shares in the client's success. Financial incentive mechanisms can be applied to either fixed price or cost reimbursable contract variations, depending on the incentives structure.

In cost plus incentive contracts, the client's target cost is introduced into a reimbursable contract, and acts as the basis for the incentive mechanism. A cost under- or over-run is split between the contractor and client in predetermined portions (Broome and Perry, 2002). The contractor and client work together to minimise actual costs– the contractor is motivated to maximise their profit margin above their specified fee, and the client is motivated to minimise the total cost paid out (Broome and Perry, 2002). Thus, the contractor is motivated to take a share of the benefits of reduced project costs.

The second primary type of incentive mechanism used in construction contracts is the bonus/penalty performance incentive. These can be used in fixed price and cost plus contract types. The main purpose of bonus performance incentives is to motivate the contract agent with a financial bonus that is additional to their prescribed fee for meeting or exceeding minimum acceptable levels of performance (Washington, 1997). This award is based upon evaluations undertaken during and/or after the project to determine the amount of reward to be applied (Washington, 1997).

'Bonus' financial incentives can be used to motivate the contractor in many areas of the project other than cost, which is primarily managed in the cost plus incentive contract mechanism. Important to the success of bonus incentives are specific, mutually agreed and measurable performance targets (HM Treasury, 1991). However, such targets can be time consuming and difficult to apply due to the potentially subjective nature of assessment (Washington, 1997). 'Bonus' incentives include schedule incentives and technical incentives, which can include operation, non-disturbance, safety, quality and design integrity.

Schedule bonus incentives are being used more often in construction contracts, offering a bonus to the contractor for completion earlier than the target dates. Schedule performance incentives are usually based on a day unit rate of measurement, such as an predetermined amount paid for each day of early completion, and are very closely linked to project costs, since schedule delays usually increase costs (Arditi and Yasamis, 1998). Therefore,

schedule incentives should be negotiated concurrently with cost incentives, as incentives encouraging early completion will reduce construction costs.

Technical bonus incentives may also be applied. These pertain to:

- Operation – A bonus incentive for efficient operation, based on the premise that improved operational performance would increase the chances for project success. Operation rewards can include site and project management, subcontractor management, quality and timeliness of reporting; cooperation and problem solving skills (Lahdenpera and Koppinen, 2003).
- Non-Disturbance – A bonus incentive for minimising the disturbance caused by the project. This may include minimising the disturbance to clients, third parties, the environment or existing buildings. Assessment criteria can be subjective and may include the number of interruptions to operations; noise levels; the use of surrounding spaces during construction; external impact of traffic (Lahdenpera and Koppinen, 2003).
- Safety – A bonus to minimise the risk of accidents on the construction site, as the direct and indirect cost of accidents to the contractor and client can be major (Lahdenpera and Koppinen, 2003).
- Quality – A quality performance bonus works on the premise that contractors are offered additional profit if they are able to achieve predetermined performance levels (Bower *et al.*, 2002). When assessing product quality, standardised systems should be used, and should be applied selectively to the most important aspects of the work (Lahdenpera and Koppinen, 2003). However, a major problem with quality assessment is that it is subjective and can be difficult to measure.

Quality performance measurement tools have been developed by public clients with a high level of repeat construction, such as those used by Singapore's Construction Quality Assessment System (CONQAS) and Hong Kong's Performance Assessment Scoring System (PASS) for public housing (see Tam *et al.*, 2000). Criteria may include quality of workmanship, flaws and defects; functioning of design and implementation and amount of rework (Lahdenpera and Koppinen, 2003). The aim of the bonus is to reward the contractor for outstanding quality, and not to penalise them for work that is less than outstanding, yet still satisfactory. Important to the success of the bonus incentive is that the definitions of performance, levels of the bonus, and units of measurement are agreed at the beginning of a project (Washington, 1997).

- Design Integrity – Bonus incentives can be provided for maintaining design integrity on a project, and are especially suited when major changes are to be made to the design throughout the project (eg. Hampson *et al.*, 2001). Design integrity means the honourable representation of the original design intentions.

A major argument outlined in the construction literature is the combined use of multiple financial incentive mechanisms, to counteract any imbalance in the contractor's priorities, and to attain all incentive goals (eg. Arditi and Yasamis, 1998; Lahdenpera and Koppinen, 2003). For example, if the incentive contract is purely focused on motivating the contractor to meet objectives within a fixed or target price, this may lead to poor performance against the client's other goals, such as quality.

### **Financial incentives and the project environment**

The optimisation of a financial incentive mechanism relates to its ability to motivate a contract agent to increase and direct their effort towards attaining project goals that are above minimum standards.

It has been argued that incentive mechanism motivation is influenced by its integration with the construction project environment (Bresnen and Marshall, 2000). Thus, the context in which the incentive is implemented directly influences its effectiveness. For example, if incentives are implemented in a project relationship that is plagued by underlying suspicions, the incentives are unlikely to induce a deep level of motivation and commitment, and could be seen as exploitation (a psychological response), causing their effectiveness to suffer significantly.

The construction management literature has argued the importance of a project environment that fosters cooperation and trust (e.g. Walker *et al.*, 2003). Traditional procurement methods, characterised by inappropriate risk allocation between project participants and the failure to develop a cooperative relationship which aligns participants' goals, have discouraged innovation and resulted in poor project performance (Kumaraswamy and Dulaimi, 2001).

The use of incentive contracts in 'relationship-based' environments such as under partnering or alliancing which are open in their dealings with risk, reward and project goals, can improve their chances of success. Relationship-based procurement attempts to achieve project outcomes that are acceptable to all parties involved. These methods have addressed the adversarial culture of traditional construction procurement, replacing it with strategies aimed at fostering cooperation and trust (Bennett and Jayes, 1995; Kadefors, 2003; Cheung *et al.*, 2003).

### **Individual and organisational financial incentives**

The level at which the financial incentive is administered (i.e. individual or group) influences the level of effort and output performance and should be considered when designing optimal solutions. Goals sought by individuals and goals sought by an organisation may not always be closely correlated (Bresnen and Marshall, 2000). Therefore, despite consensus within a project team on how it responds to an incentive, there may not always be a direct relationship between the organisational and individual response, which can lead to unachieved outcomes. Financial incentives should be applied

to individuals and organisations to ensure that the motivational effects are harnessed at all levels. However, this may be dependent on the characteristics of the team's outputs.

Client-driven incentives for individuals and/or subcontractors 'on the ground' in construction projects have been limited. Bresnen and Marshall (2000) found that project staff had very little direct connection with project incentives, rewards and appraisal systems. In the past, decision-makers in construction industries have presumed that individual reward systems are unnecessary, which is in contrast to the attitudes of other industrial sectors in promoting motivation at all organisational levels (Bresnen and Marshall, 2000).

An example of the success in 'driving down' organisational financial incentives was the US Air Force's Peace Shield Project. The Hughes Aircraft company was awarded the ground/air defence systems contract, which was based on a mixed cost plus incentive/fixed price incentive contract, with cost (profit sharing arrangement) and schedule 'bonus' incentives built in (Kausal, 1996). Due to the scheduling pressures of the contract, Hughes decided to set aside 20% of the contract's incentives for the workers and subcontractors, which would then be distributed pro rata down the supply chain. The results for the client were significant, including a final product of extremely high quality, which was delivered more than six months ahead of schedule, and below cost. This success was closely attributed to the distribution of financial incentives down to the individual workers (Kausal, 1996). Incentives need to be tactical and strategic to motivate individual workers, and may include short-term incentives to meet interim milestones, and long-term completion bonuses.

In summary, there are many powerful financial incentive options available to a client to motivate the contractor to achieve goals above 'business as usual' standards and alleviate the motivational problems that are encountered with standard contract types. However, there is inadequate guidance for clients on selecting and implementing optimal arrangements. The next section discusses the motivational literature, which provides the basis for appropriate design of financial incentive mechanisms.

## **MOTIVATIONAL THEORY AND FINANCIAL INCENTIVES**

It has been established in the construction management literature that financial incentive mechanisms can promote motivation and commitment to clients' goals. It is argued that their ability to motivate is founded in the principles of economic and psychological motivational theories. Due to space constraints it has not been possible to go into these theories in detail. The original report (Rose, 2004) outlines the psychological and economic streams of motivational theory, as the key contributors to our understanding of motivation and discusses current efforts to integrate these theories. The integration of motivational theory principals establish a foundation for this research and define the motivational variables that follow.

## **MOTIVATIONAL VARIABLES INFLUENCING EFFORT IN FINANCIAL INCENTIVE CONTRACTS**

This section outlines the generic motivational variables derived from the economic and psychological streams of motivational theory literature. These variables have been incorporated into a conceptual framework outlining the key factors that influence the level and direction of effort (as a proxy of motivation) and their relationship with performance. This conceptual framework will be used in empirical work to follow, evaluating the impact of financial incentives on motivation in Australian commercial building projects and exploring the contextual drivers that influence incentive motivation.

Figure 1 illustrates the theoretical relationships that are argued to influence motivation in a construction project, focusing on the impact of financial incentive rewards on effort. This includes the level of effort (motivational force) and the direction of effort.

As illustrated in Figure 1, the motivational variables are broken down into expectancy theory categories (see Vroom, 1964) including: (a) the contractor's perception that their effort will translate into performance (b) the contractor's perception that performance will lead to the financial reward and; (c) the perceived value of the financial reward to the contractor.

The 'level of effort' motivational variables are:

### **Motivational variable 1: Controllability of Performance**

The ability of an agent to control their performance in an incentive contract will affect their level of effort (Baker, 2002).

If the agent believes that a performance goal is risky and they have limited control over whether they can achieve it, they will be less motivated to attain the goal. This is based on the concept from principal-agent theory that an agent will attempt to minimise risk to attain maximum profitability. Moers (2000(b)) shows that an agent's perceived ability to control his/her performance is dependent on the degree of 'sensitivity' (the effect the agent has on performance) and the level of 'noise' (the environmental uncertainties outside the control of the agent that effect performance). The greater the noise, the less control the agent has on performance. Performance objectives that can be adequately controlled by the agent should be the target of financial incentive mechanisms, so the agent perceives their increased effort will translate into performance.

### **Motivational Variable 2: Goal Difficulty and Self-efficacy**

The perception of goal difficulty and personal competence influences an agent's motivation. If the incentive target is perceived to be too hard, this will lower the contractor's self-efficacy (perceived competence to attain the target), leading to a low expectancy level, and low motivational levels.

This variable is based on goal setting theory and argues that incentive targets must be realistic to attain in consideration of the agent's perceptions of their competency to attain them. As agents are risk-averse (according to principal-agent theory), incentive targets that are set too high will lead to decreased effort because the increased costs of reaching the target exceed the benefit gained (Howard *et al.*, 1997). Financial incentive targets should be set in accordance with the perceived competence of the contractor and the reward intensity (see variable 5).

### **Motivational variable 3: Goal Clarity and Feedback**

Goal clarity influences the perceived controllability of performance. If the goal is vague, the agent may believe that they do not have control over its performance, and will limit their effort. Goal setting theory states that performance targets must be clearly understood to induce motivation and increase the agent's perception that their effort will translate into performance. Thus, financial incentive mechanisms should have clearly set goals. The theory also suggests that timely and accurate feedback at appropriate intervals is useful in maintaining effort (Locke and Latham, 1990). Similarly, Spinkle (2000) (cited by Moers, 2000(b), 10) states that feedback on performance goal achievements facilitates learning, which 'makes performance more effort-sensitive', thus increasing motivation.

### **Motivational variable 4: Procedural Justice**

Van Herpen *et al.* (2001) identified two aspects that influence the effectiveness of an incentive contract's performance measurement system. These are transparency and fairness of the procedures. These elements affect the agent's perception of procedural justice. Procedural justice reinforces the agent's perception that their performance will ultimately lead to the financial reward, thus influencing motivation, according to expectancy theory.

The transparency of the performance measurement system relates to the agent's understanding of the methodologies and measures that are implemented to assess performance. If the contract agent does not fully understand the performance measurement procedures, they will be less likely to be committed to its goals (Van Herpen *et al.*, 2001). Therefore, a clear understanding by all parties of the financial incentive methodologies will assist in maintaining equity in the process.

The second aspect is fairness. The economic predictions of fairness and trust are not well developed. However, from the psychological perspective, perceived fairness and trust in the assessment procedures of a compensation system influence the level of effort exerted by the contract agent (Van Herpen *et al.*, 2001). Merchant (1989) identified the

importance of measurement accuracy to the perception of fairness. Measurement accuracy depends on verifiability (it can be duplicated and confirmed) and objectivity (free from bias or external influence). If the agent believes the measurement procedures are inaccurate, it can decrease their motivation due to the uncertainty that performance will translate into the desired financial reward (Moers, 2000(b)).

### **Motivational variable 5: Distributive Justice – Reward Intensity**

Financial incentives should be set at an appropriate intensity to compensate for the agent's risk and promote effort. Incentive intensity, according to economic principal-agent theory, is the main determinant of an agent's level of effort in an incentive contract. This is because higher intensity increases the agent's margin in response to their increased effort. The reward must be significant enough to motivate the agent but should not exceed the value of the benefits to the principal. This is also supported by equity theory from the psychological literature (Adams, 1963), where, if the size of the incentive mechanism does not fairly equate with the desired level of performance, it will fail to motivate. Washington (1997) recommended allowing the agent to significantly contribute to the development of appropriate rewards for goals. This ensures the principal establishes the reward at a level that is perceived as worthy.

### **Motivational variable 6: Fairness of the Reward Intention (Reciprocity)**

According to the psychological motivational ideals, the perceived honesty of the principal has significant impact on an agent's motivation. This variable is based on reciprocity theory, which states that the agent prefers an environment of fairness, where the principal's incentive intention is perceived to be honourable. If an agent perceives the financial incentive to be 'calculative' and hostile, they will be less committed to the incentive and will fail to increase effort (Fehr and Falk, 2002). This variable depends on the agent's perception of the reward intention in relation to the environment in which it is administered. If there is a lack of trust and cooperation in the working environment and the agent is questioning the principal's honesty, they will be likely to perceive the reward as hostile.

### **Motivational variable 7: Intrinsic Work Satisfaction**

Intrinsic work motivation refers to when individuals or groups undertake behaviour because of the enjoyment or the self-gratification of that behaviour. The behaviour itself is the motivational force. Intrinsic motivation is a psychological concept and is driven by human values such as decency, honour and dignity (Frey, 1997). Intrinsic work satisfaction is argued to have significant impact on the optimisation of financial incentives. Despite the arguments of the 'crowding out' effect of financial rewards on intrinsic motivation (see Deci, 1971), intrinsic work satisfaction has been argued to influence the level of effort, alongside extrinsic motivation (Kunz & Pfaff, 2002). Intrinsic

work satisfaction should be taken into consideration when evaluating the worth of incentives in construction projects (Bresnen and Marshall, 2000).

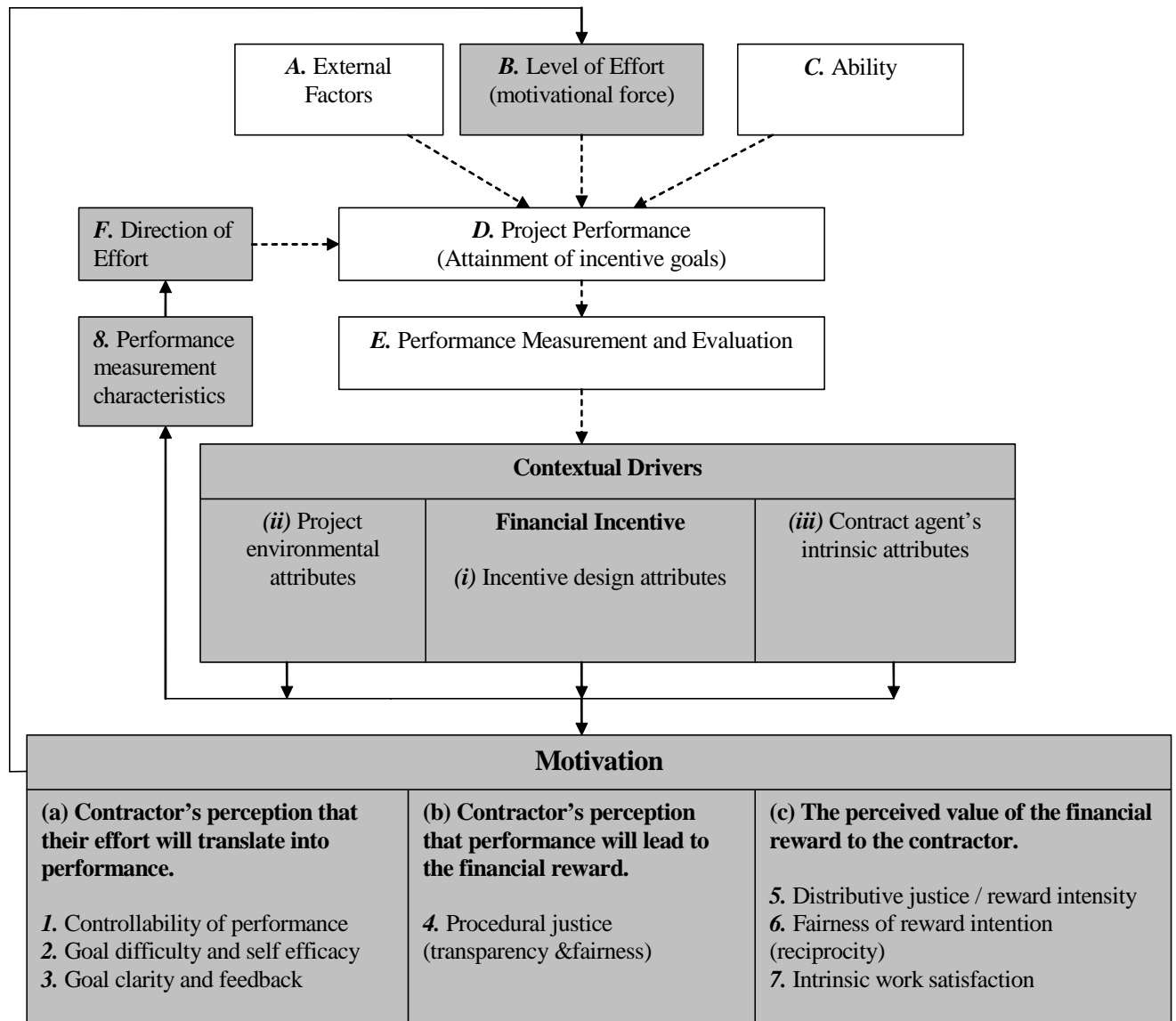
### **Motivational variable 8: Performance Measurement Characteristics (Direction of Effort)**

The characteristics of performance measures used in an incentive contract determine the direction of effort, according to the principal-agent relationship (Moers, 2000(a)). The assumption underlying the direction of effort in an incentive contract is that the agent will direct the majority of attention to the areas of the job that are being measured (Holmstrom and Milgrom, 1991). The agent may manipulate the effort to maximise their incentive reward, possibly to the detriment of unmeasured areas, thus ‘what you measure is what you get’ (Moers, 2000(a), 4). The empirical evidence shows that financial incentive mechanisms should be designed to ensure that there is a proper balance between cost, schedule and performance incentives, according to the priorities of the principal (Arditi and Yasamis, 1998).

The selection of appropriate performance measures is dependent on the level of information asymmetry. If the principal cannot directly observe all of the agent’s actions, they should implement comprehensive performance measures to align the agent’s goals with their own. There is also the potential for ‘distortion’ of the performance measures, that is, they can be manipulated to promote the wrong behaviour (Baker, 2002). The distortion of a performance measure depends on the types of measurements used. A diverse range of performance measures including subjective and objective measures can prevent distortion.

Also, illustrated in Figure 1 are the contextual drivers that influence the performance of the motivational variables, to be fully explored in the empirical work to follow this paper. These include: (i) Financial incentive mechanism design attributes, (ii) Project environmental attributes, (iii) Contract agent’s intrinsic attributes.

Factors influencing incentive project performance (attainment of client’s incentive goals) are also shown in the conceptual framework. As discussed previously in this paper, the optimal level and direction of effort (B and F), as the primary objective of an incentive mechanism, is a major contributing factor in the attainment of the client’s incentive goals (D). The achievement of incentive targets is then evaluated according to the performance measurement system (E). Effort is accompanied by ability (C) and the external project performance factors (A) such as weather and market prices.



**Figure 1: Conceptual Framework** - Interrelationships between financial incentives and their contextual attributes, level and direction of effort, performance and the theoretical motivational variables influencing contractor effort under financial incentive mechanisms.

**Legend**

- Relationships being explored
- - -> Relationships outside scope of study
- Elements being explored

## CONCLUSION

With guidance from the construction management and organisation management literature, and drawing from motivational theory literature, this paper has identified a number of motivational variables which are argued to influence the motivation of contractors in financial incentive contracts in construction projects. These variables are integrated into a conceptual framework that outlines the relationships to be explored in an up-coming empirical study of Australian commercial building projects.

The conceptual framework developed from the review of related literature contributes significantly to the construction management research. There has been very little research identified that has comprehensively investigated the performance of financial incentives in a construction project, particularly from an integrated motivational theory approach. This work extends early attempts to guide the implementation of optimal incentive arrangements in construction projects, by combining economic and psychological motivational theory principals to evaluate incentive performance. It also provides a basis for the further exploration of the contextual drivers influencing their performance. It is anticipated that the performance results derived from the future empirical work will shed new light on the motivational environment of construction projects and provide recommendations for optimising the impact of financial incentive mechanisms in future projects.

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