

PROCUREMENT AND RISK SHARING

Case Study

A CONCEPTUAL FRAMEWORK TO INVESTIGATE THE PERFORMANCE 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. This section outlines the psychological and economic streams of motivational theory, as the key contributors to our understanding of motivation. It then discusses current efforts to integrate these theories.

Maehr and Braskamp (1986) define motivation as a process where an individual or group uses resources such as their time, talent and energy, and allocates them as they see fit. If motivation is a representation of effort, incentives aim to energise, focus and sustain motivation, leading to increased effort and enhanced direction of effort.

Motivation indirectly influences performance. Mullins (1996) argues that ability and motivation determine performance. Also, performance is influenced by external factors such as market fluctuations. These factors are referred to as 'noise' elements in the organisational management literature (eg. Moers, 2000(b)). Combining these ideas,

contract agent performance is determined by ability, motivation (effort) and external factors.

CONTRIBUTIONS FROM PSYCHOLOGICAL RESEARCH

The motivational effect of incentive mechanisms on individuals and semi autonomous groups in the psychological literature is based on the cognitive 'process' motivational theories. Prominent process theories include expectancy theory, equity theory, goal setting theory and attitude theory.

Expectancy theory (Vroom, 1964) is based on the principle that contract agents will adapt their behaviour to achieve a desired outcome and will select the behavioural option with the greatest motivational force. Expectancy theory states that when an individual determines the motivational force (MF) of the behavioural option, they consider three perceptions. These perceptions are Expectancy (E), Instrumentality (I) and Valence (V).

$$MF = E \times I \times V$$

If any of the perceptions equal zero, then the whole equation equals zero because the motivation force is the product of all three perceptions (Vroom, 1964). '*Expectancy*' is the perceived probability that one's effort will attain desired performance goals. '*Instrumentality*' is the perceived probability that, if performance goals are met, the reward will be received. '*Valance*' is the perception of relative attractiveness or value an individual places on the desired outcome or reward. This perception depends on the individual's values, goals, needs, and preferences.

The basis of equity theory, originally developed by Adams (1963), is that individuals/groups are motivated by their need for fair treatment and will develop comparisons between one another in determining what is fair, just and reasonable. For incentive systems, the valance of the reward is determined by how fairly inputs are balanced against outcomes (e.g. money), and how this compares to the inputs/outcomes of others. If the input/outcome balance is not equal, it will lead to a loss of motivation, resulting in a potential loss of productivity.

Attitude theory states that an individual's motivation will depend on their attitudes (or their perceived beliefs) towards their environment (Ajzen and Fishbein, 2000). In a work environment, an individual who has favourable attitudes towards their work and their organisational setting will be more highly motivated to perform (Katzell and Thompson, 1990). Major work-related attitudes include job involvement (the importance of the job to the employee) and job satisfaction. Beliefs and values are major elements of an individual's self-concept (Katzell and Thompson, 1990). The principles of this theory suggest that an agent's motivation is partly influenced by their belief system and intrinsic job satisfaction.

Goal setting theory argues that goal commitment is a central determinant of motivation (Locke and Latham, 1984). For an individual or group to be committed to set goals, the goals must be challenging but realistic, clearly understood and meaningful. The theory

also states that for goals to promote effort, timely and accurate feedback is required at appropriate intervals. Feedback will inform an individual that progressive goals have been attained, thus maintaining effort levels (Locke and Latham, 1990). Under certain conditions, specific but difficult goals can lead to higher levels of motivation than vague or easy goals.

A major conclusion from psychological theories of motivation is that it is very important to understand the perceived limits of financial incentives to motivate groups and individuals and to be aware that financial incentives may only reinforce calculative trust, through financial gain. The use of other intrinsic motivational drivers, such as tools to foster close inter-personal relationships and cooperation between principal/agents can complement financial rewards, leading to increased levels of motivation and individual/team performance.

CONTRIBUTIONS FROM ECONOMIC RESEARCH

From an economic perspective, incentives are founded in principal-agent theory, which is characterised by a principal (employer or client) who hires a contract agent (employee or contractor) to undertake actions on behalf of the principal (Jensen and Meckling, 1976). There are three assumptions in principal-agent theory; the agent is self-interested, the agent is risk-averse, and the agent possesses knowledge and information that is not available to the principal. These three assumptions lead to what principal-agent theorists call 'moral hazard'.

Agent self-interest is based on the assumption that agents only do what they perceive to be in their interest, and that they may be immoral in their undertaking to fulfil their personal gain (Howard *et al.*, 1997). Fehr and Falk (2002), argue that this is a narrow and empirically questionable view of human motivation.

The second assumption of principal-agent theory is that agents are risk-averse. Therefore, the agent will expect additional financial compensation if they are to retain the principal's risk. The agent will try to minimise risk and maximise compensation. It is also assumed that if compensation does not equal the level of risk retained by the agent, they will attempt to balance this inequity, to the potential detriment of performance (Jensen and Meckling, 1976). For example, if a contractor is allocated the full risk of cost overruns in a construction project, they will attempt to minimise, or avoid if possible, these risks, to the potential detriment of other project attributes such as quality and workmanship.

The final assumption of principal-agent theory is that irregularity of information can occur in the principal-agent relationship. The agent possesses knowledge and information that is not possessed by the principal. Therefore, the principal has limited information on their agent's actions, and the level of their effort. This theory argues that under conditions of uncertainty and incomplete information (a characteristic of all contracts), problems arise from the agent's self-interested behaviour.

Reciprocity theory and the acknowledgement of 'social preferences' in the economic literature have been used to challenge the 'self-interest' principle of principal-agent

theory (Fehr and Falk, 2002). Reciprocity theory states that agents prefer a condition of fairness in the exchange relationship with the principal. Depending on the behaviour of the principal, the agent perceives the value of the material incentive as positive or negative (Fehr and Falk, 2002). If the agent views the incentive as 'calculative' or hostile, their commitment to the principal's goals may be affected.

Other motivational theories do not completely discount principal-agent theory principles as they are, to a degree, prevalent within all principal-agent transactions. However, even the founders of principal-agent theory now acknowledge the importance of considering the psychological influences on behaviour when designing incentive contracts (Jensen, 1994).

INTEGRATION OF MOTIVATIONAL THEORY PRINCIPALS

Recently, attempts have been made to cross-pollinate the theoretical concepts to fully determine the effect of incentive systems on effort in the experimental organisation management literature. For example, Van Herpen *et al.* (2002) used principal-agent theory and cognitive evaluation theories to study the motivational effect of a compensation system in a Dutch manufacturing company. Fehr & Falk (2002) combined principal-agent theory and intrinsic motivation principles to identify the non-financial motives in the economic environment, such as the desire to reciprocate.

Kunz & Pfaff (2002) identified an urgent need to incorporate intrinsic motivational principles into principal-agent theory. Although they acknowledged the difficulties in defining and measuring the effect of intrinsic motivation on financial reward, their investigation argued that financial rewards do impact on intrinsic motivation and voluntary cooperation.

To fully explore the role that financial incentives play in motivating individuals and organisations, it is clear that both psychological and economic principles should be taken into consideration. As discussed, there have been moves in this direction in recent empirical studies in organisation management research (e.g. Van Herpen *et al.*, 2002). However, such efforts are in early stages of development, and there is a need to extend the work, particularly in relation 'project' environments, with their attendant challenges. In the construction industry environment, motivation is influenced by both economic gain and the psychological intrinsic drivers of semi-autonomous project teams.

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 performance of financial incentive mechanisms in Australian commercial

building projects and to guide the exploration of the contextual drivers that are influencing the performance of financial incentive mechanisms.

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 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.

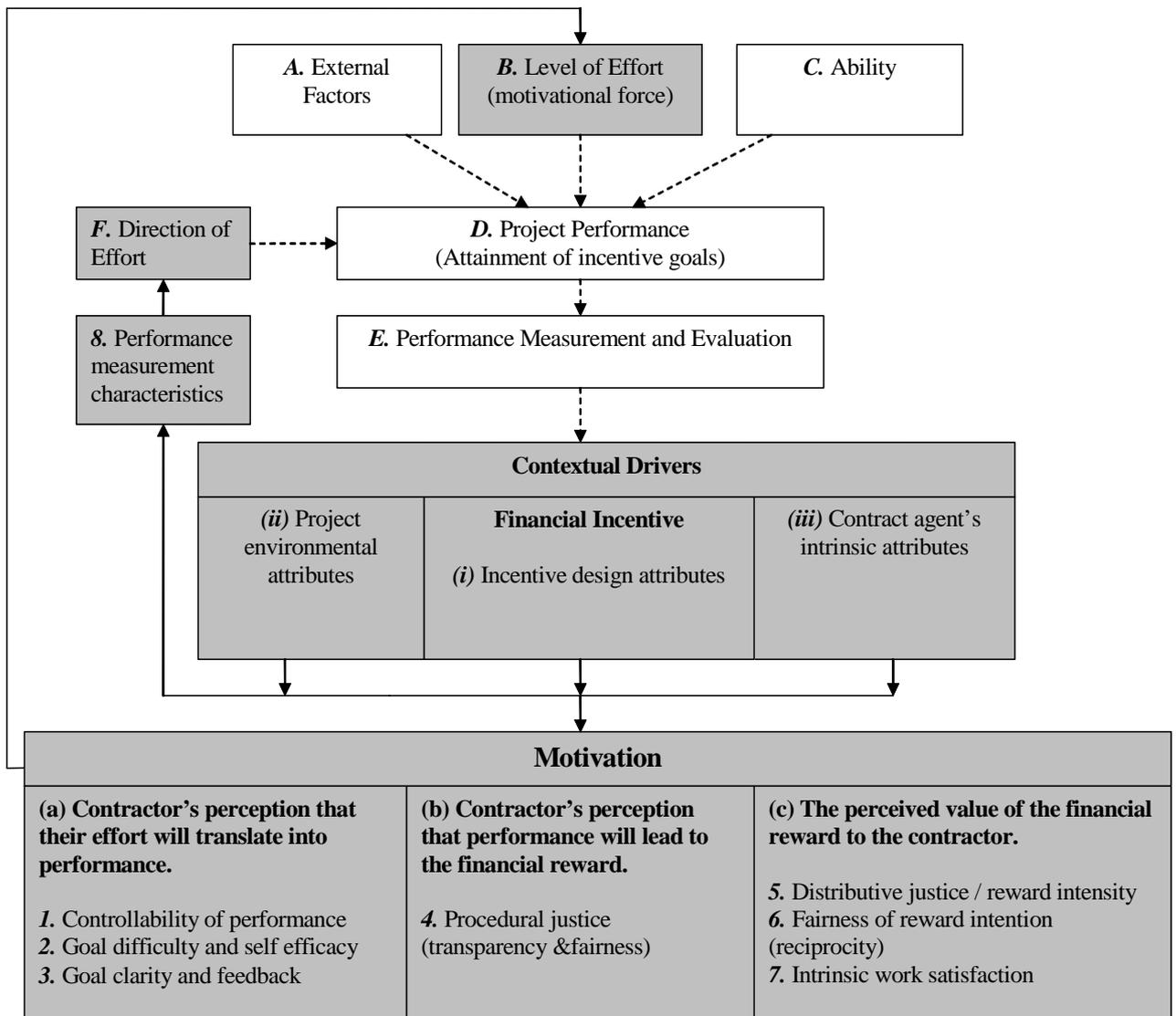


Figure 1: Conceptual Framework - Interrelationships between financial incentives and their contextual attributes, level and direction of effort, performance and the theoretical motivational variables influencing contractor effort under financial incentive mechanisms.

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.

REFERENCES

- Adams, J. S. (1963). Toward an understanding of inequity. *Journal of Abnormal and Social Psychology*, 67, 422-436.
- Ajzen, I. and Fishbein, M. (2000) 'The prediction of behavior from attitudinal and normative variables', In: Higgins, E., Kruglanski, A., (eds) *Motivational science: Social and personality perspectives*, Psychology Press, Philadelphia, PA, pp. 177-190.
- Arditi, D. and Yasamis, F. (1998). Incentive/disincentive contracts: Perceptions of owners and contractors. *Journal of Construction Engineering and Management*, 124, 361-373.
- Baker, G. (2002). Distortion and risk in optimal incentive contracts. *The Journal of Human Resources*, 37, 728-751.
- Bennett, J. and Jayes, S. (1995) *Trusting the team: The best practice guide to partnering in construction*. Centre for Strategic Studies in Construction/ Reading Construction Forum: Reading.
- Berends, T. C. (2000). Cost plus fee contracting - experiences and structuring. *International Journal of Project Management*, 18, 165-171.
- Bower, D., Ashby, G., Gerald, K. and Smyk, W. (2002). Incentive mechanisms for project success. *Journal of Management in Engineering*, 18, 37-43.
- Bresnen, M. and Marshall, N. (2000). Motivation, commitment and the use of incentives in partnerships and alliances. *Construction Management and Economics*, 18, 587-598.
- Broome, J. and Perry, J. (2002). How practioners share fractions in target cost contracts. *International Journal of Project Management*, 20, 59-66.

- Cheung, S., Ng, T., Wong, S. and Suen, H. (2003). Behavioral aspects in construction partnering. *International Journal of Project Management*, 21, 333-343.
- Deci, E. (1971). Effects of externally mediated rewards on intrinsic motivation. *Journal of Personality and Social Psychology*, 18, 105-115.
- Fehr, E. and Falk, A. (2002). Psychological foundations of incentives. *European Economic Review*, 46, 687-724.
- Frey, B. S. (1997) *Not just for the money. A economic theory of personal motivation*. Edward Elgar Publishing Ltd: Cheltenham, UK.
- Hampson, K. D., Peters, R. J., Walker, D. H., Tucker, S. N., Mohamed, S., Ambrose, M. and Johnston, D. (2001) *Case study of the Acton Peninsula Development.*, Dept of Industry, Science and Resources, Commonwealth of Australia Government, Canberra.
- HMTreasury (1991) *Guidance No. 58: Incentivisation*. London, UK: Her Majesty's Stationary Office.
- Holmstrom, B. and Milgrom, P. (1991). Multitask principal agent analyses: Incentive contracts, asset ownership, and job design. *Journal of Law, Economics and Organization*, 7, 24-52.
- Howard, W. E., Bell, L. C. and McCormick, R. E. (1997). Economic principals of contractor compensation. *Journal of Management in Engineering*, 13, 81-89.
- Jensen, M. C. and Meckling, W. H. (1976). Theory of the firm: managerial behaviour, agency costs and ownership. *Journal of Financial Economics*, 3, 305--360.
- Kadefors, A. Trust in project relationships--inside the black box. *International Journal of Project Management*, In Press, Corrected Proof.
- Katzell, R. and Thompson, D. (1990). Work motivation: Theory and practice. *American Psychologist*, 45, 144-153.
- Kausal, B. A. (1996, March-April). Peace Shield - A study in motivation. *Program Manager*, 22-24.
- Kumaraswamy, M. and Dulaimi, M. (2001). Empowering innovative improvements through creative construction procurement. *Engineering, Construction and Architectural Management*, 8, 325-334.
- Kunz, A. H. and Pfaff, D. (2002). Agency theory, performance evaluation, and the hypothetical construct of intrinsic motivation. *Accounting, Organizations and Society*, 27, 275-295.
- Lahdenpera, P. and Koppinen, T. (2003) 'Charting of incentive payment bases for multiobjective construction projects', In: *Joint International Symposium of CIB Working Commissions*, 22-24 October 2003, International Council for Research and Innovation in Building and Construction, Singapore, Vol. 1 pp. 481-493.

Locke, E. A. and Latham, G. P. (1984) *Goal setting: A motivational technique that works!* Prentice-Hall: Englewood Cliffs, NJ.

Locke, E. A. and Latham, G. P. (1990) *A theory of goal setting and task performance.* Prentice Hall: Englewood Cliffs, NJ.

Maehr, M. L. and Braskamp, L. A. (1986) *The motivation factor: A theory of personal investment.* Lexington Books: Lexington, MA.

Merchant, K. A. (1989) *Rewarding Results: Motivating Profit Center Managers.* Harvard Business School Press: Boston.

Moers, F. (2000(a)). *Financial and non-financial performance measures and managerial short-term orientation: The interactive effect of performance targets* (Working Paper No. 21). METEOR, Maastricht Research School of Economics of Technology and Organization, Maastricht.

Moers, F. (2000(b)). *The role of performance measure characteristics in the design of incentive systems: An empirical analysis* (Working Paper No. 20). METEOR, Maastricht Research School of Economics of Technology and Organization, Maastricht.

Mullins, L. J. (1996) *Management and organisational behaviour*, Pitman Publishing: London, UK.

Tam, C. M., Deng, Z. M., Zeng, S. X. and Ho, C. S. (2000). Performance assessment scoring system of public housing construction for quality improvement in Hong Kong. *International Journal of Quality & Reliability Management*, 17, 467-478.

Turner, J. R. and Simister, S. J. (2001). Project contract management and a theory of organization. *International Journal of Project Management*, 19, 457-464.

Van Herpen, M., Van Praag, M. and Cools, K. (2002). *The effects of performance measurement and compensation on motivation* (Discussion Paper # 03-048/3). Tinbergen Institute, Tinbergen.

Vroom, V. H. (1964) *Work and motivation*, Wiley: New York.

Walker, D., Hampson, K. and Ashton, S. (2003) 'Developing an innovative culture through relationship-based procurement systems', In: Walker, D., Hampson, K., (eds) *Procurement Strategies - A Relationship-based Approach*, Blackwell Publishing, pp. 236-257.

Washington, W. N. (1997). Some new approaches to "reward contracting" *Acquisition Review Quarterly*, Vol. 4, pp. 253-261.

Zaghloul, R. and Hartman, F. (2003). Construction contracts: the cost of mistrust. *International Journal of Project Management*, 21, 419-424.

ACKNOWLEDGEMENTS

We would like to thank the Australian Cooperative Research Centre for Construction Innovation for supporting this research. The research described in this paper was funded by the Australian Cooperative Research Centre for Construction Innovation.