INCENTIVE CONTRACTING IN CONSTRUCTION

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The question of how best to incentivize the parties in a construction contract, particularly contractors, to deliver maximum possible outputs and thus help reduce costs and risk in contracts has been of constant interest to construction researchers and practitioners. There is thus a significant body of literature around incentive contracting but this needs to be critically evaluated for perspectives and future directions. Although the evolving nature, merits and use of incentive contracts within the construction industry has been considerably discussed by practitioners and researchers over several years, there seems to be a lack of critical review of the incentive contracts literature that contextualises and critiques the various perspectives, directions and applications in the construction industry. More importantly it is important to discover what we do not know yet about incentive contracting in construction to provide a means for further scientific enquiry into those aspects. This paper seeks to offer an evaluation and critical review of the current literature on the theory and practice of incentive contacts. Based on articles published in highly rated built environment journals, the issues and challenges of balancing risks, cost incentives and performance incentives that minimise or maximise the effectiveness and performance of incentive contracts are systematically reviewed and critically evaluated. The paper identifies trends in incentive contracting and concludes that the underlying needs of a client and the motivations of a contractor can be jointly put at the heart of the design and structuring of contract mechanisms and incentives to provide an appropriate infrastructure for incentivising innovative and sustainable delivery of contracts. The paper offers new directions for incentive contracting research and its application in construction

Keywords: contracting, incentive contracting, literature review, procurement.

INTRODUCTION

In an increasingly competitive construction procurement environment, there is a growing interest in the use of incentive contracts to efficiently balance risks between the client and contractor. Since the mid 1960s, attention has been directed towards the need to use incentive contracts that motivate contractors to improve project performance and balance risks appropriately wherever possible in theory and practice (Baron 1972, Laffont and Martimort 2002). Much of the incentive contracting literature suggests that incentive contracts can foster a balance of risk between clients

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Kwawu W and Laryea S (2013) Incentive contracting in construction *In:* Smith, S.D and Ahiaga-Dagbui, D.D (Eds) *Procs 29th Annual ARCOM Conference,* 2-4 September 2013, Reading, UK, Association of Researchers in Construction Management, 729-738.

and contractors, leading to cost reductions, increased contractor performance and the alignment of objectives of the contract parties (Bower *et al.* 2002, Meng and Gallagher 2012). Accordingly, much of the studies and articles have been investigating incentive factors, mechanisms and measures in terms of performance (Gruneberg *et al.* 2007, Kaarbøe and Olsen 2008, Kauhanen and Napari 2012, Meng and Gallagher 2012). However, some of the literature disagree and suggest that incentive contracts can create distorted incentives due to the implicit nature of contracts and the subjective nature of some performance measurements (Baker *et al.* 1994, Baker 2000, 2002, Gibbons 2005, Kaarbøe and Olsen 2008). Furthermore, all contracts are incomplete mainly due to difficulty in interpretation of its implicit and explicit components.

Bresnen and Marshall (2000a, 2000b) suggest the debate within construction management literature has remained at a largely prescriptive level. It is difficult to prove that any monitored improvement in performance, in terms of cost, time, quality, fit for purpose and other criteria are solely due to the incentive contracts (Gruneberg *et al.* 2007). There seems to be a lack of critical review of the literature that contextualises and critiques the various perspectives and applications in the construction industry. .Consequently there is still a need for more in-depth studies of the nature and form of incentives incorporated into contracts and their likelihood of incentivising contractors to improve performance, reduce cost and suitably allocate risks. Structuring an effective incentive scheme can be complex due to the consequences of variation in organizational and environmental contexts that cannot be controlled by the parties to the contract. Arguably, understanding the behavioural outcome of explicit incentives, where the client pays for objectively measured performance, and of implicit incentives, where the contractor gains repeat business from the client is key to structuring and administering incentive contracts successfully.

The aim of this review is to explore some of the critical issues and debates about incentive contracting. Our objectives are to offer an evaluation and critical review of the current literature on incentive contracting, drawing on the integration of the theories of incentives and motivation used in organisational economics. Thus the review seeks to contribute new understandings of the relationship between academic theory and practical action and address the different assumptions underlying incentive contracting. It concentrates on enquiring into what makes organisations perform well in the long term rather than individual contracts. Thus while there numerous aspects of incentive contracts; we focus our review on the alignment of goals, balancing risks, cost incentives, performance incentives, delivery incentives as a starting point.

In the next sections we provide a systematic and critical review of the specific areas of alignment of goals, balancing risks, cost incentives, performance incentives, delivery incentives, types of incentive contracts and administration incentive contracts. Prior to discussing these main concerns, the review begins with the concept of incentive contracting.

INCENTIVE CONTRACTING

Contracting, often regarded as an important aspect of all business relationship, is going through significant changes in theory and practice (Williamson 1979, Macneil 1980). The changes address existing and desirable structures and functions of contracts. An important focus in the continuing movement from classical contracting (where contracts are typically fixed-price and parties to the contract have competing goals) to neoclassical (modern) contracting (where contracts are used to improve joint

welfare of the parties to contract by efficiently shifting risk from one party to another through collaboration and long-term relationships) is the use of incentives to motivate and improve performance and allocate risk appropriately in the contractual relationship.

The important role of implicit and explicit incentives in contractual relationships has long been acknowledged in several economics and organizational fields of studies (Scherer 1964, Weitzman 1980, Bresnen and Marshall 2000a, Laffont and Martimort 2002). Much of the literature is underpinned by neoclassical theories of uncertainty, risk, asymmetric information and incentives such as the Principal-Agent framework (Laffont and Martimort 2002), Agency theory (Eisenhardt 1989), Transaction Cost Economics (Williamson 1979, 1996). Although these theoretical issues are fairly understood, Weitzman (1980) points out that "results are at a rather high level of abstraction, somewhat removed from the realm of practical application".

Incentive theory

Much of the literature on Incentive Contracting suggests that the main purpose of incentive contracts is to appeal to a contractor's (agent) self-interest to perform in a particular way to maximize its profit by adopting the client's (principal) objectives to an extent (Meng and Gallagher 2012). Stukhart (1984) suggests that "contract incentives are the means by which an owner intends to secure certain project goals through the contracting process" and advocates that incentive contracting is designed primarily to reduce cost in negotiated contracts through profit sharing ratios. Building on the work of Blyth (1969), Bower *et al* (2002) state that the basic principle of incentive contracting is simply to take advantage of a contractor's general objective to maximize his profits by giving him the opportunity to earn a greater profit if he performs the contract efficiently. In the process of incentive contracting, financial risk and control are shared by the client and contractor, according to a ratio which is established in the early stages of contract design. Once the targets and formula for earning fees or reward are known, the incentive contract becomes self managed to a certain extent (Stukhart 1984). However, as pointed out by Baker (1992, 2000), the principal's (client) objectives are not always contractible performance measures and therefore a need for a delicate balance of the various types of incentives for success.

Bower *et al* (2002), in a study of incentive mechanisms for project success, define incentivisation as 'a process by which a provider is motivated to achieve extra 'value-added' services over those specified originally and which are of material benefit to the user. These should be assessable against predefined criteria.' This definition emphasises the need for a clear and precise objective of what is to be achieved and therefore the establishment of performance targets for the contractor. However, Bresnen and Marshall (2000a, 2000b) and other researchers, argue that implicit incentives were equally important for project success. Using six case studies from the UK construction industry and based on interviews and documentary sources, Bresnen and Marshall (2000a, 2000b) show that there are important limitations to the use of explicit incentives. Rose and Manley (2011), in a case study of using financial incentives as promoters of motivation and commitment on projects, concluded that financial incentives were less important to motivation and performance than relationship enhancement initiatives. Clearly, explicit incentives alone will not improve performance, rather appropriate combinations of explicit and implicit contracts will do.

Consistent with the predictions of self-interest based incentive theory, empirical studies of incentive contracting often show that incentive contracts encourage more effective work from contractors and suppliers (Jaraiedi *et al.* 1995, Arditi *et al.* 1997, Arditi and Yasamis 1998, Bubshait 2003, Meng and Gallagher 2012). Nevertheless, a large body of literature also suggests that due to the incompleteness of contracts in reality, incentives may be overused or underused, giving contractors opportunities to act in ways that may impair performance and efficiency (Baker 2002) . As incentive contracts appeal to self-interest, parties to the contract might become more selfish. This has important implications for the design, implementation and monitoring of incentive contracts.

Actor-network theory perspective

Drawing upon the Actor-Network Theory (ANT) (Latour, 2005); some authors suggest that incentives can be treated as actants (material and immaterial) and artifacts that act an intermediary to stimulate social action. Even though the ANT perspectives on contractual relationships are growing in significance, it is not clear how artifacts as intermediaries and mediators affect and interact with the performance. Importantly, how are networks of action related to networks of actants (human and non-human, material and non-material)? Furthermore, according to the objective and subjective performance evaluation become a major problem for the actants and artifacts. Further research is required to understand whether and how actants and artifacts in incentive contracts and their specific properties motivate contractors to focus on certain activities and dimensions of performance. Recent reviews of the incentive contract literature indicate that incentives do not have disparity effects on task performance due the complexity of task. However some research suggest that monetary incentives may reduce intrinsic motivation (effort) and performance on tasks viewed as complex and involving some level of innovation.

Monitoring and administering of incentive contracts

Evidence from the wider literature also suggests that monitoring and administering incentive contracts is time consuming and expensive (Larbi 2001, Piñero and Garza 2003, Fernandez 2009, Hughes and Gruneberg 2009). In reality, clients (principals) are rarely in a position to monitor all the real and monitored outputs of the contractor perfectly at all times. Hence, the risk of the contractor is increased whether the gap between the real and monitored output is intentional or not. This might have an effect on contractor's profits or efforts. Similarly, the incentive criteria may not even be related to the critical procurement issues of cost, delivery schedule, or performance objectives, thus giving contractors either opportunities to receive undeserved fees or awards for effort, or getting underpaid for efforts.

While there is a broad agreement about the overall principles of incentive contracting as a trade-off between risk sharing and incentives, if used appropriately, there are nevertheless varying views on a number of its features such as balancing or sharing risks, types of incentives and performance measurement depending on the context of the contractual relationship. Contractors are paid based on their handling of risks, cost, delivery schedule, and general performance. Arguably incentives operate on different emotional mechanisms and the contracts communicate signals that appeal to these mechanisms in different ways.

BALANCING RISKS IN INCENTIVE CONTRACTS

The importance of allocating risks in contracts is well established in the literature. Drawing upon the principal-agent framework, the incentive contact literate shows that when a client (principal) contracts out the work to the contractor (agent). The risks inherent in doing the work are transferred to the contractor. Thus while the client has no motive to minimise the risk, the contractor has strong motives to reduce the risk in order to make a profit Other scholars however disagree arguing that the client bears the risk of not having direct control of how and when the work is done.

Incentive contracting is about tradeoffs between sharing risks and incentives. Much of the literature tends to suggest that risks should be carefully defined and allocated to the party that is in the best position to manage it is fairly well understood, but is often ignored (Chapman and Ward 1994, Arditi and Yasamis 1998).. For example, in a survey contractors and owners perception of incentive and disincentive provisions in a sample of Illinois DOT highway contracts that included I/D provisions, Arditi and Yasamis (1998) found that the contractors experienced higher frequency and magnitude of change orders were challenging.. Often in practice, the party with the strongest bargaining position gets to allocate the risk in the contract.. Well known scholars in the field like Baker (1994, 2000, 2002) believe that the relationship between risk and incentives is an important topic that is still not fully understood as incentive structures for balancing the risks can lead to both increased and decreased risk-taking among the parties to the contract. .

Among all the contractual risk issues and their corresponding incentive, financial (cost), technical or quality and delivery times have been argued extensively to be the most important in risk allocation and sharing in incentive contracting (Weitzman 1980, Chapman and Ward 1994, Aggarwal 2007, Marques and Berg 2011). Table 1 shows a summary literature reviewed and the selected incentive issues addressed (these issues are not coded or classifications but rather issues that were reviewed). Financial or Cost risk refers to uncertainty in final costs to the contractor and uncertainty in final financial commitment of the client. Most incentive contracts focus on cost as it is often the biggest element of risk in contracting. Technical or quality risk refers to quality issues and compliance with the technical specifications of the contract. Delivery risk relates to whether the deliverables of the contract will be met within the specified time.

Due to the complexity of risks and incentives in operation, often multiple incentives such as cost and performance incentives are incorporated into an incentive contract. For example, due to asymmetry of information, high incentive contracts can tempt contractors to take more risk and reduce performance in the long term. There is ample evidence that contractors respond to risks and incentives, and adjust their actions accordingly. Hence incentive contract are often designed to adjust the balance of risks between the client and contractor using a defined sharing ration (Weitzman 1980, Stukhart 1984). Often, the balance of risk is dependent on such features as uncertainty, risk aversion, and the contractor's ability to control costs (Weitzman 1980, Stukhart 1984) .

Table 1: Summary of literature reviewed

	Balancing risks	**Cost incentive**	**Performance incentive**	**Alignment of goals**	**Delivery incentive**
Fernandez, S. (2009).	✓	✓	✓		
Hague, D. J. (1985).	✓	✓	✓		✓
Hansen, S. J. and J. C. Weisman (1998).	✓	✓	✓	✓	✓
Hensher, D. A. and J. Stanley (2003)..	✓	✓	✓	✓	✓
Hosseinian, S. and D. Carmichael (2011).	✓	✓	✓		✓
Hughes, W. and S. Gruneberg (2009).	✓	✓	✓		✓
Ibbs, W. C. (1991).	✓	✓	✓		✓
Jaraiedi, M., R. Plummer, et al. (1995).	✓	✓	✓		✓
Kaarbøe, O. M. and T. E. Olsen (2008)	✓	✓	✓		✓
Meng, D. and G. Tian (2013).	✓	✓	✓		✓
Meng, X. and B. Gallagher (2012).	✓	✓	✓	✓	✓
Murdock, K. (2002)..	✓	✓	✓		
Richmond-Coggan, D. (2001).	✓	✓	✓		
Rose, T. and K. Manley (2011).	✓	✓	✓		✓
Rosenfeld, Y. and D. Geltner (1991).	✓	✓	✓		✓
Sommer, S. C. and C. H. Loch (2009).	✓	✓	✓	✓	
Sprinkle, G. B. (2000).	✓	✓	✓	✓	
Stenbeck, T. (2008).	✓	✓	✓	✓	
Stukhart, G. (1984).	✓	✓	✓	✓	
Abu-Hijleh, S. and C. Ibbs (1989).		✓	✓		
Aggarwal, R. M. (2007).	✓	✓	✓	✓	
Al-Subhi Al-Harbi, K. M. (1998).	✓		✓		
Ang, G., M. Groosman, et al. (2005).	✓	✓	✓		
Arditi, D. and F. Yasamis (1998).		✓	✓		
Arditi, D., C. Khisty, et al. (1997).	✓		✓		
Ashley, D. B. and B. W. Workman (1986).	✓	✓	✓	✓	
Bachmann, J. and A. Novoseltsev (2004)	✓	✓	✓		✓
Baker, G. (1992, 2000, 2002),.	✓		✓	✓	
Baker, G., R. Gibbon, et al. (1994).	✓		✓		
Berends, T. C. (2000).	✓	✓			
Bower, D., G. Ashby, et al. (2002).		✓	✓	✓	
Bresnen, M. and N. Marshall (2000).	✓	✓	✓	✓	
Bubshait, A. A. (2003).	✓	✓	✓	✓	
Chapman, C. B. and S. C. Ward (1994).	✓	✓			
Griffis, F. and F. Butler (1988).	✓	✓	✓	✓	✓
Gruneberg, S., W. Hughes, et al. (2007).	✓		✓	✓	
Hiller, J. R. and R. D. Tollison (1978).	✓	✓	✓	✓	✓
Jaafari, A. (1996).	✓	✓		✓	✓

INCENTIVE CONTRACT TYPES IN CONSTRUCTION

Within the literature the two main types of incentive contracts are the Fixed-Price Incentive contract and Cost-Reimbursable Incentive Contracts. The various variations decribed below are adapted from (Weitzman 1980, Stukhart 1984, Burleson *et al.* 2007, American Society of Mechanical Engineers 2010)

***Fixed-Price Incentive Contracts*:** a strong incentive is created to reduce project cost. However Contractors bearing all the risk must be compensated by a fee representing on average a high nominal profit rate. Thus most efficient where overall risk is low. Risk is shifted to the contractor. Variations of these contracts include (a) Firm-Target Fixed-Price Incentive Contracts (b) Successive Targets Fixed-Price Incentive Contracts (c) Fixed-Price Award-Fee Contracts

***Cost-Reimbursable Incentive Contracts*:** The contractor has only committed to best effort on the contract, and the client. Thus the contractor assumes a relational share of the risk with an incentive-fee structure, and is rewarded with a greater share of fee, when the risk is mitigated or avoided

Cost-Plus-Incentive-Fee Contracts (CPIF): Relates fee to performance and provides contractor with incentives to control cost and schedule. It allows alignment of owner and contractor objectives. However, it is difficult to establish incentive goals that differentiate outstanding performance from good/ normal performance. The scope changes impact on incentives requires. Thus contractor will "push back" on item affecting their fee and very good negotiating skills required.

Incentive must relate to key project objective (never to both budget and schedule, for example)

***Cost-Plus-Award-Fee Contracts (*Cost Reimbursement + % Fee):** Maximum contracting flexibility and can be fast tracked easily. Best for development/ changing scope as it is easier to insert proprietary needs. However, it required financial controls; highest owner staffing; many interfaces to manage; limited incentive by contractor to contain cost; owner assumes all risks. Thus rework is profitable for contractors. While this incentive contract encourages collaborative working, the owner can substantially influence contractor decisions; assumes more responsibility for results. It is often used where market place is saturated with work; when the scope is poorly defined and the contractor is known and trusted

Other types of incentive contracts are Subjective Risk-Sharing Contracts, Objective Risk-Sharing Contracts on Technical or Delivery Performance and Performance based contracting

RELATIONSHIP BETWEEN INCENTIVE CONTRACTING AND STANDARD FORM CONTRACTS IN CONSTRUCTION

Standard form contracts are used widely in the construction sector for various reasons and purposes (Hughes and Greenwood, 2005). The implementation of incentive contracting in construction requires some kind of connection to standard (or non-standard) forms of contract. Contract is the vehicle that actually sets up the commercial relationship between the contracting parties. Various standard form contracts are used in different countries. It would clearly not be possible to enumerate all of them here. However, the paper authors are based in the UK and South Africa where similar standard form contracts seem to be used. These include JCT Forms, ICE Forms, NEC Family of Contracts, GC/Works Contracts, PC/Works Forms,

Association of Consultant Architects, Other Standard Forms of Contract, Non Standard Forms, Partnering Arrangements (see RICS Survey of Building Contracts in Use during 2010). In South Africa the JBCC standard form contracts is widely used in building projects similar to the use of JCT contracts in the UK. A common form of incentive contracting approaches in use in construction is target cost contracts. A target cost contract provides a mechanism where the financial risks of a project are shared between the employer and contractor in agreed proportions (Watermeyer, 2010). Target cost arrangements have been argued to help align the objectives of the parties, and thus create a partnering and collaborative working environment (Bresnen and Marshall, 2000).

From examination of the options offered in various standard form contracts, the NEC was found to have two options for setting up an incentive contract. These are Option C (Target Cost contract with activity schedule) and Option D (Target Cost contract with bill of quantities). In Option C, the Contractor tenders (or negotiates) a target price using an activity schedule. Each activity is priced as a lump sum and a Fee is also tendered as a percentage for subcontract work and for the Contractor's own direct work. The initial target price is the sum of the activity prices and the fee. During the course of the contract, the target price is adjusted to cater for compensation events that are set out in the contract. Payment is made on the basis of actual costs with an incentive mechanism for the Contractor to minimise costs. Savings and over-runs are shared between the parties. The sharing of risk in the target cost approach is likely to reduce the occurrence of disputes. In Option D, the target price is established by means of a bill of quantities rather than an activity schedule. During the course of the contract, the target price is adjusted to allow for changes of quantities as well as for compensation events. Thus, the Employer carries a rather greater risk in Option D than is the case with Option C.

DISCUSSION AND CONCLUSION

The relationship between theory and practice has been discussed in construction management for generations. The divide between theory and practice in terms of the theoretical challenges of taking practice seriously needs to be addressed. Going forward, further research is needed to explore the relationship between incentive contracting theory and form of contract. A number of innovative procurement approaches have evolved in recent years and clients are constantly in need of new mechanisms for achieving best value for money (see UK Government Construction Strategy, 2011). The recent developments in client goals and the fact that incentive contracting is argued to enhance alignment of objectives between the parties in a contract (Bresnen and Marshall, 2000) suggest that more innovative ways of applying the theory of incentive contracting in construction need to be developed.

The review indicated that empirical and anecdotal evidence show that contractual incentives have widely varying effects on performance improvement. As discussed earlier, incentive contracts studies examining the effects of incentives on performance have reported mixed results with regard to their effectiveness. From the various theoretical perspectives, there are many activity variables that could interact with incentives to affect task performance.

Clearly within construction management research and practice, further research into incentive contracts has significant implications for numerous directions for future research in construction management. This would provide important insights into the effectiveness and efficiency of incentive contracts. Future research could examine

whether increasing the level of rewards induce risk taking behavior. Similarly, future research should investigate organization and person variables such as skills and task variables. The main barriers to relevance being the lack of overlap between the questions that academics ask and the problems and questions that practitioners face in incentive contracts. Clearly what is needed is bringing together multiple perspectives, knowledge bases, and methodologies to address the complex problems of incentive contracts.

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