PRACTICE BRIEFING

Incentivising project performance in the construction of new facilities

Utilising the earned value-based method

David James Bryde
School of Management, Faculty of Business and Law, Liverpool JM University, Liverpool, UK, and
Roger Joby
1to1to1, Pamber Heath, UK

Abstract

Purpose – The purpose of the paper is to outline a method for reporting project performance that can be used to provide incentives to both clients and contractors to share risks and opportunities.

Design/methodology/approach – The conceptual foundation of the paper is two-fold: firstly, a review of the literature highlights the limitations of fixed price, fixed unit price and variable (fee for service) type contracts and hence the need for contracts that incentivise project clients and contractors to act in mutually beneficial ways; secondly, the earned-value method (EVM) is discussed as a means of reporting project progress via a single value-based metric that is applicable to both client and contractor. The integrating of these two elements provides the basis for the method for reporting project performance described in this paper.

Findings – The paper presents the co-operative incentivised negotiation budget (COIN). The COIN budget uses the concept of the variable (fee for service) type contract. In addition, it utilises the EVM to report project progress in a simple, easy-to-understand manner that enables both parties to share in the beneficial outcomes of better than planned performance and to share in the negative results of under-performance.

Research limitations/implications – This paper is conceptual and, although reporting elements of best practice, further research is needed in the following areas: firstly, the benefits, costs and limitations of, and the barriers to, using EVM-based approaches in projects in general, and facilities projects in particular; secondly, the effectiveness of incentivising contracts in terms of addressing issues that lead to poor performance, such as poor communication and lack of trust between the parties.

Practical implications – The COIN budget is a means by which the client and contractor can easily monitor performance in terms of the value earned in providing the agreed project deliverables. Whilst enabling the contractor to earn a cost plus margin, it enables both parties to have a common goal through the sharing of the positive and negative consequences associated with project opportunities and risks.

Originality/value – The paper makes an original contribution by integrating elements of best practice in the areas of contract selection and monitoring of project performance.

Keywords Project evaluation, Facilities, Contracts, Incentive schemes

Paper type Conceptual paper

Introduction

When constructing new facilities, the client organisation may typically outsource the both the work and the management of the work (Hassanien and Losekoot, 2002; Hui and Tsang, 2004). This presents the client with a number of challenges, which include:

Journal of Facilities Management
Vol. 5 No. 2, 2007
pp. 143-149

1472-5967
DOI 10.1108/14725960710751889

establishing effective contracts; implementing relationship management; managing contractor performance; ensuring delivery; obtaining value for money; controlling costs. Of these challenges, much attention has been paid to the issue of contracts and the influence of contract selection on project success (Nguyen *et al.*, 2004). Typical types of contract are fixed price, fixed unit price, variable (fee for service or cost plus). Each has perceived advantages and disadvantages of different types of contracts.

The fixed priced contract has the perceived advantage, from the client's perspective, of transferring the risk of project overruns to the contractor, so fixed priced contracts and competitive bidding rapidly became common practice. It was hoped that fixed priced contracts would deliver value for money with predictable costs. The contractor could also benefit from being able to predict its revenue and, if it could deliver the facility more efficiently than the contract, then it could also increase its margin. Unfortunately this type of contract emphasises the differences between the two parties. Clients and contractors have different goals, the former to successfully establish the new facility and the latter to make a profit on the hours worked by their staff on the project. The fixed priced contract is not designed to bring the parties together and at it worst it results in further divergence of aims. Of course, in reality fixed priced contracts are rarely completely fixed and renegotiation is common. This may be due to client-led scope changes or under-pricing by the contractor. The latter point is exacerbated when the contractor is given inadequate time to conduct feasibility and to prepare and deliver a fully priced proposal. Competitive bidding can also result in deliberate under pricing by the contractor to win the business. In such a case, renegotiation would be a high priority for a contractor following the award of the contract. If this strategy was unsuccessful then the contract may well be losing money for the contractor, which could result in the project becoming low priority for the contractor, which then becomes a problem for the client. Competitive bidding also negates against risk analysis. There is no incentive for the contractor to perform risk analysis and recommend mitigation or contingency strategies, as this will make their bids less competitive. All of the above scenarios may increase the original price of the contract and they will certainly increased transaction costs associated with the renegotiation. It also increases the likelihood of confrontation unless the renegotiation is part of a clearly defined scope change. Unless the scope of work has been meticulously defined there will always be tasks where it is difficult to decide whether they are covered by the original contract or not. The danger for the contractor is that they constitute "scope creep" which eats into their profit. The alternative is countless contract modification with their associated transaction costs.

The requirement for the contractor to make a profit will also result in the project team being subjected to and responsible for the financial health of the project. The contractor project manager may well feel it is in his or her best interests to compromise on key performance indicators like timeline and quality to make sure that this is a profitable contract for the contractor: a further divergence from the client organisation's objectives. There is also no incentive to share information about progress or cost. Successful contractors may be good at managing their resources across several projects with different clients and maximising the utilisation of their staff. The priorities of projects from other clients may well impinge upon the short time progress achieved in another client's project. This is not the sort of information that is

likely to be shared by the contractor or welcomed by the client. In a similar way, utilisation of less expensive resources is obviously an advantage to a contractor with a fixed priced contract, but the sharing of this information would not necessarily be well received.

Fixed unit priced contracts are a determined effort to address some of these questions. The units are defined as deliverables that are small and repeatable. Each type of unit has an agreed fixed price. The client pays only for the units completed. If less than the planned number of units are used the client pays less, and if more than planned are used the client pays more. This type of contract is still competitively bid and suffers from the same problems as fixed contacts, e.g. the unit price may not be correctly priced; competitive bidding does not encourage risk analysis, etc. Furthermore, although this form of arrangement has become more popular, in practice it is often badly applied. Units are often activities rather than deliverables and clients, still wary of the variable nature of the contract, may seek to employ caps to the number of units, which contradicts one of the fundamental principles of the system.

Variable budgets (fee for service or cost plus) have obvious advantages to the client. These include: only paying for the hours worked (so benefiting from any contractor efficiencies), picking a contractor on quality not price, planned for scope change is easy, start-up can be rapid, and contractor's project team will not be distracted by the need to make a profit. From the contractor point of view, there is a guaranteed margin and a neutral payment schedule. However, these potential benefits are negated by the fear that variable contracts are uncontrolled and equivalent to issuing a blank cheque. As such they are only used in exceptional circumstances, i.e. due to the nature of the project it is impossible to estimate a fixed or fixed unit price.

All the contracts discussed above are typical of principal/agent relationships, where the principal (client) hands responsibility for the delivery of the new facility to the agent (contractors). All such relationships are vulnerable to the "principal/agent problem" where the two parties act in their own best interest (Lovallo and Sibomy, 2006). Academics and practitioners have sought solutions to this problem. For example, Müller and Turner (2005) proposed approaches that emphasise communication between client and contractor. In the contract types described above, the level of communication is often high especially if there are problems, however, much of this communication is centred on contractual issues, e.g. is this in the original scope of work? Do we need a contract modification? Or it is focused on the reporting of inappropriate metrics. Contracts that focus on the project deliverables, it is suggested, would result in more effective communication. Another strand of enquiry has been to develop approaches to contract selection and subsequent project management that incentivise the parties to act in ways that are mutually beneficial.

In the remainder of this paper, we describe a method for communicating project performance that focuses on report a single-value-based metric: the earned value (EV). The method also includes a way to incentivise both client and contractor to work together by sharing both the beneficial outcomes associated with exploiting opportunities and the negative outcomes associated with threats. The method distils elements of best practice in the management of projects, including projects to introduce new facilities. Before describing the method, which is labelled as a the co-operative incentivised negotiation (COIN) budget, the theory of the earned-value method (EVM) is briefly discussed.

The earned-value method

One approach to the management of project of performance, which specifically allows for different perspectives, such as client and contractor, to be taken into account, has been the development of multi-dimensional frameworks, such as the balanced scorecard (BSC) (Kaplan and Norton, 1992). Such frameworks evolved in response to a growing dissatisfaction with traditional performance measurement frameworks that focused on a narrow range of mainly financial-based measures, such as profit and return on investment. Limitations identified included a failure to focus on continuous improvement and the sub-optimisation of performance (Ghalayini and Noble, 1996) and it was to address such limitations, and integrate different perspectives, that "balanced/multi-dimensional" frameworks (Bourne *et al.*, 2000) were developed. The frameworks typically include a range of financial and non-financial-based measures used by different stakeholders to assess project performance.

An alternative approach to the BSC has been to focus on methods that provide a single, value-based measure that can be used to measure performance (O'Hanlon and Peasnell, 1998), such as the "economic-value added" (EVA) (Stern *et al.*, 1996). Some advocates of this single-measure approach, whilst recognising that multi-dimensional frameworks provide new metrics and integrate perspectives, argue that the measures are often isolated and not linked, either with other measures or with the main financial metric of the company (O'Hanlon and Peasnell, 1998; Strack and Villis, 2002).

The EVM is conceptually rooted in this desire to provide single value-based performance measures. In the case of EVM, it is achieved through the integration of methods for measuring performance against the time and cost project objectives into a single measure of value (Fleming and Koppelman, 2000). The usefulness of EVM-based approaches has been documented in various project contexts, including construction projects (Willoughby, 1995), design projects in general (Chang, 2001) and engineering activities in the US industrial construction sector (Georgy *et al.*, 2005).

The EV is calculated as the percentage of the work complete (preferably in terms of providing a project deliverable, such as an element of the new facility) at a particular point in time, multiplied by the baseline costs that were budgeted for up to that point in time. (The EV is alternatively called the budgeted cost of work performed (BCWP)). Therefore, to calculate the EV, it is necessary to calculate the budgeted for cost at a monitoring point in time or budgeted cost of work scheduled (BCWS). The EVM also includes the calculation of the actual cost incurred for work already carried out in relation to providing a deliverable, or actual cost of work performed (ACWP). Having made the calculations varies metrics can be performed, including: schedule variance (Cost) = BCWP−BCWS, cost variance = BCWP−ACWP, cost performance index (CPI) (efficiency) = BCWP/ACWP, schedule performance index (SPI) (cost) = BCWP/BCWS. Metrics are reported over time and negative variances and indices with a values < 1.0 indicate areas requiring attention. Forecasts can be made by calculated the estimated cost at completion as original budget (for deliverable)/CPI and estimate time to complete as original time estimate/SPI. The calculations made at the individual deliverable level can be consolidated to report progress at higher levels, i.e. work package – groups of deliverables.

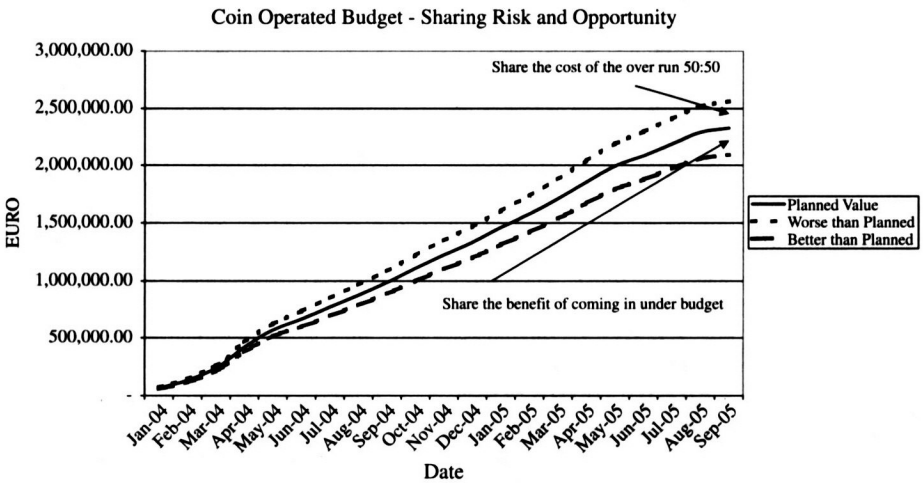
The co-operative incentivised negotiation budget

The COIN budget involves the establishment of a variable (fee for service) contract that allows the contractors to earn a cost plus margin. A guide budget is jointly agreed between the client and the contractor. This budget should be based on deliverables, realistic and include sensible measures and corresponding costs for identified risks. Progress is monitored by the EVM allowing accurate forecasting for cost to complete and time to complete. Scope changes and problem solving does not require contract modifications with their extra costs, delays and opportunities for conflict. If the final cost is less than the guide budget then the client and the contractor share the benefit. Both parties have a common goal to run the project as efficiently as possible leading to cooperation on risk analysis and management, joint problem solving, better communications, greater team sprit and flexible working practices. If the contract works effectively team members can be selected on merit not price. Of course, this is the acid test and in order to utilise the method effectively there needs to be cooperation in fixing the price and the timeline and the budgeted for values must be realistic. Furthermore, sensible mitigation and contingency must be built into the scope of work. In terms of incentives, EVM budget overruns can be shared 50:50 between client and contractor and the benefit of coming under budget is also shared 50:50. The method is shown graphically in Figure 1.

Figure 2 shows the conclusion of a successful project originally planned to cost €2,326,452 with an actual cost of €2,200,000. The difference of €126,452 is shared between the client and the contractor.

Conclusions

The construction of a COIN budget provides a means of sharing risks and opportunities through incentivised contracts. By establishing agreed baseline values,



DATA

Date	Jan-04	Feb-04	Mar-04	Apr-04	May-04	Jun-04	Jul-04	Aug-04	Sep-04	Oct-04	Nov-04	Dec-04
Guide Budget (Planned Value)	66,897.76	65,423.90	102,991.64	184,772.73	153,282.29	98,941.76	102,412.72	102,412.72	110,970.64	120,798.13	116,901.41	108,936.57
Planned Value	66,897.76	132,321.66	235,313.30	420,086.03	573,368.32	672,310.08	774,722.80	877,135.51	988,106.15	1,108,904.28	1,225,805.69	1,334,742.26
Worse than Planned	73,587.54	145,553.83	258,844.63	462,094.63	630,705.15	739,541.09	852,195.08	964,849.06	1,086,916.76	1,219,794.70	1,348,386.26	1,468,216.49
Better than Planned	60,207.99	119,089.49	211,781.97	378,077.42	516,031.49	605,079.07	697,250.52	789,421.96	889,295.53	998,013.85	1,103,225.12	1,201,268.04

Figure 1.
COIN budget – example

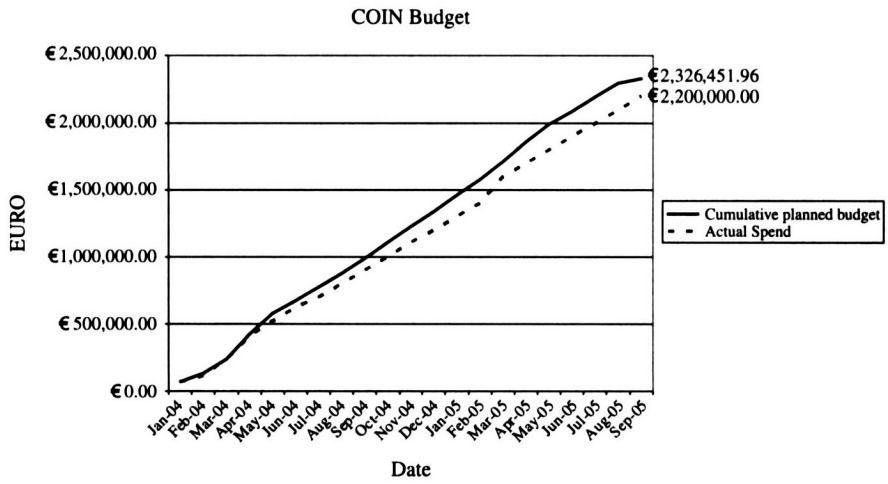


Figure 2.
Incentivising client and contractor – example

there is an incentive for both the client and the contractor to match or better the budgeted-for-values-leading to a better relationship, as the mistrust inherent in the principal/agent problem can be addressed through mutually beneficial aims. Agreeing to the budgeted-for-values can also result in better up front planning and a commitment on the part of both parties to meet the deliverables.

References

Bourne, M., Mills, J., Wilcox, M., Neely, A. and Platts, K. (2000), "Designing, implementing and updating performance measurement systems", *International Journal of Operations & Production Management*, Vol. 20 No. 7, pp. 754-71.

Chang, A.S. (2001), "Defining cost/schedule performance indices and their ranges for design projects", *Journal of Management in Engineering*, April, pp. 122-30.

Fleming, Q.W. and Koppelman, J.M. (2000), *Earned Value Project Management*, Project Management Institute, Newtown Square, PA.

Georgy, M.E., Luh-Maan, C. and Zhang, L. (2005), "Engineering performance in the US industrial construction sector", *Cost Engineering*, Vol. 47 No. 1, pp. 27-36.

Ghalayini, A.G. and Noble, J.S. (1996), "The changing basis of performance measurement", *International Journal of Operations & Production Management*, Vol. 16 No. 8, pp. 63-80.

Hassanien, A. and Losekoot, E. (2002), "The application of facilities management expertise to the hotel renovation process", *Facilities*, Vol. 20 Nos 7/8.

Hui, E.Y.Y. and Tsang, A.H.C. (2004), "Sourcing strategies of facilities management", *Journal of Quality in Maintenance Engineering*, Vol. 10 No. 2, pp. 85-92.

Kaplan, R.S. and Norton, D.P. (1992), "The balanced scorecard – measures that drive performance", *Harvard Business Review*, Vol. 40 No. 1, pp. 7-9.

Lovallo, D.P. and Sibony, O. (2006), "Distortions and deceptions in strategic decisions", *McKinsey Quarterly*, Vol. 1, pp. 18-29.

Muller, R. and Turner, J.R. (2005), "The impact of principal-agent relationship and contract type on communication between project owner and manager", *International Journal of Project Management*, Vol. 23 No. 5, pp. 398-403.

Nguyen, L.D., Ogunlana, S.O. and Xuan Lan, D.T. (2004), "A study on project success factors in large construction projects in Vietnam", *Engineering, Construction and Architectural Management*, Vol. 11 No. 6, pp. 404-13.

O'Hanlon, J. and Peasnell, K. (1998), "*Wall Street's* contribution to management accounting: the Stern Stewart EVA financial management system", *Management Accounting Research*, Vol. 9 No. 4, pp. 421-44.

Stern, J.M., Stewart, G.B. III and Chew, D.H. Jr (1996), "EVA: an integrated financial management system", *European Financial Management*, Vol. 2 No. 2, pp. 223-45.

Strack, R. and Villis, U. (2002), "RAVE: integrated value management for customer human, supplier and invested capital", *European Management Journal*, Vol. 20 No. 2, pp. 147-58.

Willoughby, T.J. (1995), "Managing design under lump-sum contract", *Journal of Management in Engineering*, March/April, pp. 21-5.

Corresponding author
David James Bryde can be contacted at: D.J.Bryde@livjm.ac.uk