

FEASIBILITY OF COLLABORATIVE WORKING AT THE SECOND TIER SUBCONTRACTOR LEVEL IN A PRIME CONTRACT

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The Building Down Barriers (BDB) initiative involves adopting a procurement strategy to promote collaborative working through use of incentives to innovate best value for the client. The framework set out by BDB provides a strategy for procuring the supply chain at the first tier subcontractor level. However a strategy for implementation further down the supply chain for smaller subcontractor work packages, at the second tier, is not well developed. This paper describes the work undertaken to gauge the feasibility of implementing a collaborative working incentivization agreement at the second tier subcontractor level. The research employed a case study research strategy. The case was a large regional construction contractor (annual turnover in excess of £100m) engaged as a first tier subcontractor on a prime contract project from a major national client organization (annual construction expenditure well in excess of £1 billion). Through careful analysis of literature, a collaborative working incentivization model was developed and validated with upstream parties. The model was then presented to three groups of second tier subcontractors and data relating to their opinions about the model and factors important to contractor-subcontractor relationships were collected. The results show that while the model was generally feasible, the agreements appropriate for different subcontractor groups vary due to different experience with open book relationships. It is argued that the success factors identified in this work provide a basis upon which contractors can develop strategies to overcome barriers to, and produce an environment that will facilitate, collaborative working.

Keywords: building down barriers, collaborative working, incentivization, supply chain.

INTRODUCTION

The construction industry has been heavily criticized for adversarial procurement practices, inefficient construction processes and high levels of wastage (Ireland 2004). Since publication of the Latham and Egan reports, ‘*Constructing the Team*’ and ‘*Rethinking Construction*’ respectively, many initiatives have been commissioned to try and improve performance in these areas with varying levels of success (Love, Irani and Edwards 2004). Building Down Barriers (BDB) is one such initiative that was envisaged as a learning mechanism for establishing supply chain integration principles in construction projects. Within the BDB framework, a unique procurement strategy is adopted that promotes collaborative working, through use of incentives, to produce ‘best value’ for the client. BDB is envisaged to provide a vehicle for enhanced construction performance that can realize benefits for all parties in the supply chain (Holti, Nicolini and Smalley 2000).

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Implementation of BDB

A number of organizations have implemented the BDB initiative with varying levels of success. The experience and issues faced by one such organization engaged in the implementation of the BDB initiative is the subject of this paper. For anonymity's sake, this organization will be referred to as the Cluster Contractor One (CC1).

CC1 is a regional construction company operating in the South of England with a turnover in excess of £100m (personal communications, July 15, 2006). CC1 was involved in a long term strategic partnership with a prime contractor. At project level, CC1 was part of an alliance of construction organizations (the cluster) that were bound by a cost reimbursement incentive scheme. A maximum price target cost was built up by accumulating the constituent cost estimates of each member in the cluster. This target cost was then used as a benchmark for completion of the project, and the actual price of the project relative to this target cost determined the amount of profit received.

The term 'cluster' refers to both a group of contractors who work together, and the scope of work that they perform. The cluster is responsible for designing and then delivering an element of the project. The prime contractor allocates overall responsibility for the work of each cluster to the lead contractor as the cluster leader (Holti *et al.* 2000). The cluster leader is responsible for coordinating all functions of the other cluster contractors/members within the alliance during both completion of the final design specification and delivery of project.

Supply Chain

The supply chain in the strategic partnership is illustrated in Figure 1 below. It can be described as a two-tier subcontractor supply chain (Oak 2006).

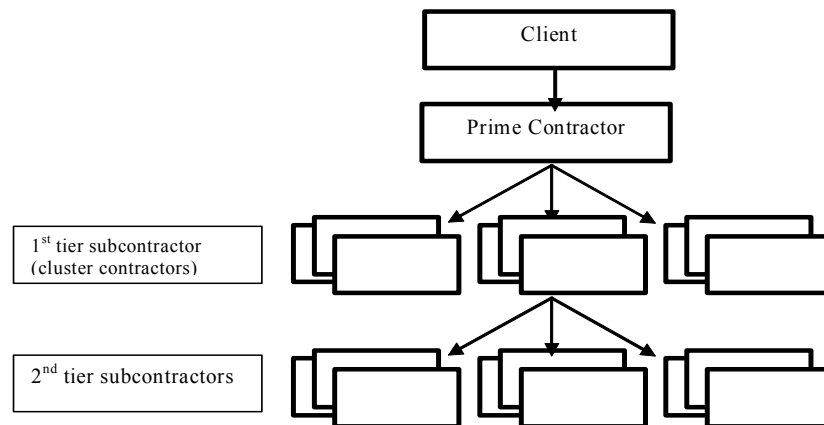


Figure 1: Supply chain in the strategic partnership

The Client is a public sector organization responsible for the delivery, construction and management of property across a diverse estate and exists to ensure the estate is managed efficiently and cost effectively to support the delivery of the core objectives of the public sector. The Client is a major player in the construction industry. It operates with an annual spend of about £1.4 billion in construction procurement and property/facilities management (personal communications, July 15, 2006). It is a member of the Confederation of Construction Clients and is actively involved in identifying opportunities for performance improvement and implementing new procurement processes.

The Prime Contractor is a joint venture between two national/international design and construction contractors. The Prime Contractor was formed in response to the prime contracting initiative which was itself a response to the Egan and Latham principles to drive efficiency and best value across the construction industry. The Prime Contractor's objectives include:

- Working together in an open, co-operative and collaborative relationship based on trust in the true spirit of partnering;
- Continuously improve performance and innovation in all aspects of management;
- Embracing the 'Lean Construction' philosophy;
- Delivering more flexible options and solutions through innovations in service delivery;
- Bringing innovation, best practice and best value solutions to all projects; and
- Ensuring all parties receive fair financial reward and are incentivized for excellent performance.

The Problem

The framework set out by BDB provides a strategy for procuring the supply chain through to the first tier subcontractor level, however, a strategy for implementation further down the supply chain for smaller subcontractor work packages, at the second tier level, has yet to be developed (Oak 2006). CC1 have the following clause in their contract with the Prime Contractor:

“Unless agreed otherwise by the D&B Contractor the Cluster Contractor shall use reasonable endeavours to incorporate a mechanism in each of its contracts with the Cluster Supply Chain substantially the same as that set out in Clauses 9 and 10 to ensure that each member of the Cluster Supply Chain shares in any cost over-runs or under-runs as the case may be.”

The above clause, together with core values geared towards continuous improvement and innovative thinking have led CC1 to take steps to identify a procurement strategy that can be implemented at the second tier level to incentivize their subcontractors, with the aim of creating 'best value' for the prime contractor (and client) and satisfying the contractual requirement (Oak 2006).

COLLABORATIVE WORKING INCENTIVIZATION MODEL

As highlighted in previous sections, the challenge was to develop a framework of procurement at the second tier subcontractor level that propagated the ideas and procedures already developed for the first tier subcontractor level so that the ideal of a fully integrated supply chain system could be realized. This was pursued by developing a collaborative working incentivization model in the following steps:

- Step 1 – Literature review - Literature about concepts of prime contracting, supply chain management and the building down barriers initiative (Pryke 2006; Briscoe and Dainty 2005; Thomas and Thomas 2005; Cain 2004; Ireland 2004; Love *et al.* 2004; Phua 2004; Humphreys, Mathews and Kumaraswamy 2003; Broome 2002; Lamming 2002; Love, Irani, Cheng and Li 2002; Walker, Hampson and Ranaye 2002; Dainty, Briscoe and Millet 2001a; Dainty, Briscoe and Millet 2001b; Scott 2001; Bresnen and Marshall 2000a; Bresnen and Marshall 2000b; Holti *et al.* 2000; Mathews, Pellow, Phua and Rowlinson 2000) was studied in detail. The study led to identification of issues that were

critical for effective collaborative working and incentivization which needed to be included in the model.

- Step 2: Interviews with upstream project participants - Having identified the critical issues, bespoke interview schedules were designed to gather information from upstream project participants (client, prime contractor and cluster contractor (CC1)) in a series of iterative interviews conducted with senior management in these organizations. These interviews were designed to gather information about the practice, experience, hopes and anxieties of the participants with reference to the key issues identified from literature.
- Step 3: Analysis of information and model development – The information collected from the three upstream project participants was carefully studied together with relevant literature. From the knowledge and understanding acquired, the proposed collaborative working incentivization model was developed to meet the criteria of relevance, practicability and acceptability.

The Model

The collaborative working incentivization model produced is shown in Figure 2 together with clarification of important points, and a conceptual tendering procedure to illustrate the move from purely price competition to inclusion of other factors, such as certainty of delivery and ability to innovate.

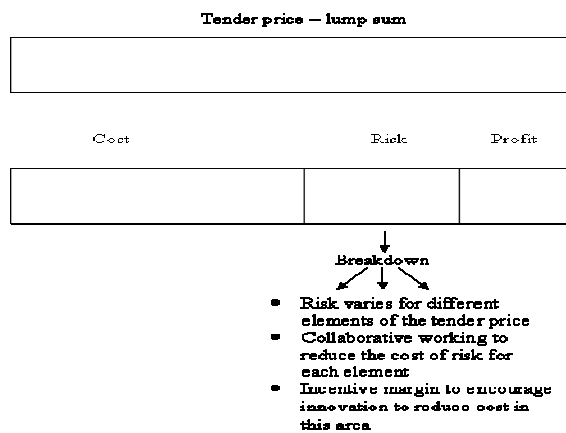


Figure 2: Collaborative working incentivization model

Points of Clarification about the Model

As far as tendering and contractor selection are concerned:

- Only pre-qualified, core supply chain subcontractors would be asked to tender;
- Tenders would initially be invited from two or three subcontractors to obtain realistic market prices; and
- Tenders would be evaluated on criteria such as overall price, size of risk pot, ability to innovate and reduce costs, previous performance in meeting target costs and reliability.

As far as incentivization is concerned:

- Incentive agreement to range from 50/50 to 60/40 in favour of the subcontractor for savings on risk elements;
- Encourage innovation in design with a 7% rebate to the contractor on any savings arising from innovation in design.

As far as future work is concerned:

- Rates from previous projects were to be taken onto the next project, risk allocation negotiated (with justification, increased or decreased for different elements); and
- Long term relationships to be developed as efficient and effective project delivery grow.

As far as envisaged benefit from and/or motivation for, the model is concerned:

- CC1 would secure long-term security of work and thus turnover and produce better products for the client;
- The model would ensure all work was auditable – this would lead to quick and hassle-free payment for CC1 and the subcontractors; and
- The subcontractors would develop better working relationships, maintain and improve profit margins, develop a more efficient workforce and improve the predictability of project durations and costs.

EXPLORING THE FEASIBILITY OF THE PROPOSED MODEL

A survey was considered appropriate given the qualitative nature of the data to be collected and the research instruments available. The main issues for consideration here were unreliability and biased errors (Fellows and Liu 2003). The methodology was designed to collect data on issues identified in literature as important to enable collaborative working whilst also gauging opinions on a conceptual model for incentivization. The wide scope of the research area, the potential complexity of the data, and thus the need for explanation warranted the use of interviews as the main research tool for data collection, whilst questionnaires were also employed to give directly comparable data on closed questions. The two research instruments chosen gave varying degrees of depth and breadth to the study; with interviews offering the depth required to enable points to be probed and a deeper understanding of the nature of issues to be attained, whilst the questionnaires gave scope for a range of variables to be covered in a more consistent and comparable way (Fellows and Liu 2003).

Interviews

Qualitative data obtained from interviews holds the quality of richness and wholism, allowing complex points to be explained and causal links to be followed (Miles and Hubberman 1994). Semi structured interviews, with open-ended questions were used, as these helped to expand the depth of data (Robson 1993). All interviewees were informed that the interviews were confidential in the hope that they would ‘open up’ to an impartial party. Anonymity meant that interviewees could express themselves in a way they may have been uncomfortable doing when dealing directly with CC1’s personnel. The interviews were recorded to ensure preservation of the meaning of points raised when processing. Once produced, the interview summary tables were e-mailed to the relevant interviewees to ensure any ambiguities were found, and language changed, to ensure the real meaning of what was said was conveyed.

Interviews were conducted with CC1’s core supply chain subcontractors in the following subcontractor groups: ground works, partitions and flooring. These subcontractor groups, along with the companies within each represented those companies CC1 classed as preferred suppliers and were considered suitable to enter into a collaborative working arrangement with. The number of companies included in each subcontractor group was small and therefore, the entire core supply chain population, as identified by the above definition, could be surveyed. 8 interviews

were conducted at this level with the following numbers of companies in each group: ground works, 4; partitions, 2; and flooring, 2.

The format for the interviews was shown in the Interview Agenda and as follows:

- Interviewees were presented with a copy of the Interview Agenda;
- Interviewees were given an introduction to prime contracting and the drivers behind the study using the Subcontractor Interview Script. This enabled interviewees to be brought up to a consistent level of understanding before the interview took place.

The interview schedule comprised of two sections. The first section covered the subcontractor's relationship with CC1. This section was split into generic topic areas identified as important from literature (tendering and selection; contract management; operational issues, site management and supervision; communication and feedback; contract administration and payment; and general/other). Further sub-topics within these generic topic areas were mentioned for the interviewee to give their thoughts on. This section was deliberately completed first, as it was important to gauge the interviewee's thoughts on the area with a minimal amount of influence from information to be presented, or from questions that were leading. The semi-structured nature of the interviews meant that if an interviewee brought up a particular subject, and it was deemed important, questions were used to follow up the point further. Sub-topics within each specific topic were simply stated to prompt consideration of any opinion regarding issues in the area; however, occasionally sub-topics had to be expressed in the format of a question to enable the required data to be obtained, and the interviewee to understand the point.

The second section sought to probe the interviewee's opinion and attitudes towards the proposed incentivization model, general aspects of collaborative working as well as gauging the subcontractor's experience in these areas and providing an insight into the systems in place in their company. At the beginning of this section, the collaborative working incentivization model was presented and the interviewee given time to scan through the handout to familiarize themselves with its particulars. Any queries on the model were then addressed before the interview proceeded. The questions in this section covered the following generic areas: incentivization; partnering and collaborative working; internal review; and continuous improvement.

Questionnaires

Questionnaires were produced, with questions in a closed format, to obtain data on variables deemed important. The variables covered by the questionnaire are shown in Table 1 below. A Likert scale was employed to enable the data to be quickly and easily analysed. A consistent scale, 1 (completely undesirable) – 5 (averagely desirable) - 10 (completely desirable), was adopted for each variable to facilitate a greater range of responses and to discourage 'safe' responses around the centre, which would have provided data with limited value. Furthermore, the respondents were given the opportunity to comment or raise other issues not covered in the interview and questionnaire. The questionnaire was administered after the interview was completed and collected before concluding the data collection event.

Data Analysis

From the questionnaire responses, a data set (see Table 1) below was generated (no textual comments were provided by any of the eight respondents). Although it is a small data set, it represents the entire target population. Visual inspection and

standard analysis of variance suggest that the three groups of subcontractor had similar views on each of the thirteen variables. The descriptive statistics (average, μ , and standard deviation, σ), show an above average level of desirability. This suggests, on the whole, that collaborative working between CC1 and its subcontractors, using the proposed model, is feasible across board.

From the interviews, qualitative data was generated. The data represented the participants' views about their relationship with CC1, collaborative working in general and the feasibility of the proposed collaborative working incentivization model. The interview record was transcribed into tables and forms and systematic content/textual analysis (Neuendorf 2002) undertaken. This was done firstly on a respondent by respondent basis, then on group by group basis and finally on the basis of the whole data set. Furthermore, content analysis was augmented by pattern matching to connect the data from the interviews and questionnaires. In this way, common themes were linked to build up a picture from which the research findings in the following section are derived (Robson 1993).

Table 1: Quantitative data set

Variable	Respondents								Descriptive statistics	
	G1*	G2	G3	G4	F1*	F2	P1*	P2	μ	σ
Rating of proposed model	8	8	10	7	7	8	9	8	8	1.0
Trustworthiness of CC1	7	6	8	8	7	7	8	5	7	1.1
CC1 peer comparison (on trustworthiness)	7	6	10	5	5	7	8	8	7	1.7
Attitude towards a collaborative agreement with CC1	8	7	10	10	10	9	9	10	9	1.1
Variation of attitude to collaborative working between CC1's site and corporate management	6	7	9	5	4	6	7	8	7	1.6
CC1's utilization of subcontractor knowledge and expertise	6	7	7	5	8	7	7	8	7	1.0
Rating of CC1-subcontractor relationship	7	5	9	5	8	7	8	9	7	1.6
Rating of CC1- subcontractor communication	7	4	9	7	5	6	7	4	6	1.7
Usefulness of evaluation, review and feedback system	7	5	10	6	10	9	8	10	8	2.0
Potential to improve value	9	7	9	7	5	6	7	10	7	1.7
Speed at which CC1 sorts out problems	7	3	8	8	6	6	7	7	7	1.6
Rating of CC1's ability to handle lack of information	7	3	8	6	5	5	7	4	6	1.7
Rating of relationship with other subcontractors employed by CC1	7	6	8	8	3	5	7	5	6	1.7

* G1=First ground works subcontractor; F1 = First flooring subcontractor; and P1 = First partitions subcontractor. G2, G3, F2, and P2 should be interpreted similarly.

RESEARCH FINDINGS

From the work undertaken in this study and explained in previous sections, the authors can highlight the findings below.

Successful transition to collaborative working will dependent upon creating relationships ingrained with all the aspects identified as having a positive effect on subcontractor performance. These aspects were fairly consistent across the subcontractor groups, all centring around factors identified in research as key to collaboration such as; honesty, reasonableness and fair dealing. Many of these aspects

seem in concept easy to create; for example, giving reasonable demands appears simple; it is not demanding things that are almost impossible to achieve. However, when internal pressures mean site management require a subcontractor to do the unreasonable to hit targets, the idea of reasonableness is all of a sudden not so simple.

Effective implementation of a collaborative working incentivization system at the second tier subcontractor level requires the following actions:

- CC1 should develop criteria and guidelines to use in subcontractor selection; and clarify how the subcontractor from each core supply chain group will be chosen i.e. location of main office, area within which they work, resources and personnel available, financial constraints, amount of work already being carried out for CC1. The core supply chain subcontractors need to be managed appropriately to spread the workload around.
- It is important to set more practical time frames at the beginning of a project to avoid unproductive trades at the outset.
- There is need to develop a structured approach to identifying lessons learnt, and communication of them to the people in a position to benefit.
- It is necessary to employ collaboration champions dedicated to monitoring collaborative performance, and managing the process. These should ideally be people who can independently oversee that collaborative working is utilized to its full effectiveness.
- There is a need to assign responsibility to senior personnel within each party (subcontractor and contractor) and set up lines of communication internally to facilitate operational personnel sorting out issues; these senior personnel can then converse to find ways forward.
- There is a need to organize debriefing meetings to facilitate identifying lessons learnt and how things could be done better in the future.
- Collaboration champions should produce scorecards on the performance of each site, indicating what was done right, what wasn't, and feedback given by the collaboration champion.
- These recommendations should be implemented in a logical, structured and systematic way with appropriate support mechanisms developed based on analysis of the processes that will be required. If this is not done and flaws remain within any collaborative framework introduced the effectiveness of any changes will be negated by the system breaking down.
- It is necessary to systematically establish the effectiveness of any changes or new systems introduced; for example, allocate a collaboration champion on one site to manage the process and establish how effective this step is before appointing an army of collaboration champions on each and every project/site.

The Collaborative Working Incentivization Model proposed received very positive feedback across the subcontractor groups. However, the strongest support was obtained from subcontractors who had limited or no experience with full open book incentivization (ground works subcontractors). Subcontractors with significant experience of open book relationships (flooring and partitions subcontractors) suggested that they would have preferred to see a model that was more geared towards open book accounting than the proposed model. It is, therefore, safe to suggest that the proposed model is more appropriate for those with limited open book relationships perhaps as an intermediate step towards full open book incentivization. As a consequence, it can be concluded that the feasibility of the model is inversely

proportional to the experience with full open book accounting experience. Therefore, the proposed Collaborative Working Incentivization Model proposed was considered most appropriate for implementation within the ground works subcontractor group.

CONCLUSIONS

The principle aim of this project was to determine the feasibility of implementing a collaborative working incentivization model at the second tier subcontractor level on a Prime Contract. The results from the research have shown that it is feasible to implement a collaborative working incentivization model at this level. The model used within the research was considered most appropriate for one of the subcontractor groups used in the study. It was considered most feasible to implement the proposed Collaborative Working Incentivization Model in the ground works subcontractor group. It is also feasible for the partitions and flooring subcontractor groups to be incentivized; however it is recommended that an incentivization scheme implemented in these two groups be of a full open book nature.

It was an aim of the research to provide an objective, impartial and informative view of the current environment that would be of value to CC1. The research surveyed the current situation and issues inherent within CC1's relationships with their subcontractors. Numerous issues were identified that require attention in order for a collaborative working arrangement to be as effective as possible. The complex interlinking array of aspects, factors, issues and key success factors identified gives CC1 a basis for developing a strategy to overcome any barriers to collaboration, and produce the environment that will facilitate effective collaborative working.

It is hoped that the study has increased awareness and understanding, of both concepts and prevailing issues within CC1's core supply chain. Through presenting the Collaborative Working Incentivization Model to the core supply chain subcontractors, and discussing the particulars, possible issues, and routes around these potential problems, that the subcontractors who participated in the study have an increased understanding of both prime contracting, CC1's motivation for developing a procurement strategy, and the correct attitude towards collaboration.

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