

THE EFFECTIVENESS OF DESIGN AND BUILD CONDITIONS OF CONTRACT

Gary T W Lam¹, S O Cheung¹ and S Thomas Ng²

¹*Department of Building and Construction, City University of Hong Kong, 83 Tat Chee Avenue, Hong Kong*

²*Department of Building, University of Newcastle, University Drive, Callaghan, NSW 2308, Australia*

The success of design and build (D&B) projects requires the support and use of appropriate contract conditions. The effectiveness of D&B conditions of contract in achieving the desired objectives were evaluated. It was found that respondents from the private sector were more satisfied with the performance of the conditions of contract, an unexpected result as it was the public sector that promoted the use of design and build procurement strategy. Out of the five contract objectives as described in this paper, single point of responsibility was considered highly achievable through the use D&B of conditions of contract. Enhancing buildability and financial stability were considered as moderately achieved. Shortening of project duration and minimizing disputes were considered as moderately achieved. One of the recommendations resulted from the study is to extend the role of professional independent checker to include both quality assurance as well as cost saving monitor.

Keywords: contract, design and build, project management.

INTRODUCTION

In any project development process, client always seek the procurement method that can fulfil the project requirements, typically in terms of time, cost and quality. In the past decade, an alternative contract strategy, 'design and build' (D&B), has become increasingly popular in the Hong Kong construction industry (Kwong 1996). The success of pursuing a particular procurement route requires the use of an appropriate conditions of contract that enshrines the special advantages offered by such a method (Akintoye 1993, Bird 1987, Nahapiet and Nahapiet 1995; Tam and Chan 1994). The focus of this study is to evaluate the effectiveness of D&B conditions of contract in achieving the contract objectives of design and build projects.

ACHIEVING CONTRACT OBJECTIVES THROUGH THE USE OF CONDITIONS OF CONTRACT

According to MacNeil (1974), the purposes of concluding contracts include effecting roles and planning. In other words, the primary purposes of using of a contract are to clearly state the obligations of the contracting parties and implement the desired risk allocation. These purposes can be described as contract objectives and are effected through the use of conditions of contract. In design and build procurement, the common contract objectives can be summarized as follows:

Establishing a single point of responsibility

The contractor in a D&B project assumes both the design and construction responsibility, one of the most distinctive features of D&B procurement strategy.

Enhancing financial certainty

Owing to the contractor's full responsibility for the work, most D&B conditions of contract are executed on a lump sum basis, which gives the employer the advantage of some certainty in price. This is achieved through the requirement that the contractor is required to prepare and warrant the accuracy of the quantities of its own design.

Shortening the project duration

D&B procurement compresses the overall project development cycle through maximizing the overlap between design and construction process.

Improving buildability

As contractors are involved in the design, this allows them to propose alternative designs (Janssens 1991). Proposals can be made in both the pre-contract and post contract stage.

Minimizing dispute occurrence

In theory, the likelihood of disputes is less in D&B projects (Schnelder 1986). This is because the designer and the constructor are in the same team. Conflict between the designer and contractors can be resolved within the team. Furthermore, D&B simplifies communications. These features should contribute to the reduction in disputes.

THE STUDY

The purpose of the study was to evaluate the effectiveness of D&B conditions of contract in achieving the contract objectives. In this regard, effectiveness is assessed by an achievability index (AI) defined as:

$$\text{Achievability Index} = \Sigma A / (S \times N)$$

Where:

A = The degree of achievability of contract objective through the use of D&B conditions of contract;

S = The highest score (7 in the present case); and

N = Number of responses.

The assessment scores are obtained through a questionnaire survey through which the respondents were asked to mark against each contract objective a scale of 1 to 7 the degree of achievability as assessed through the use of D&B conditions of contract (1= least achieved and 7 = most achieved). For example, the respondents were asked to rate:

...with regard to conditions of contract used for the project, the degree of achievability in establishing a single point of responsibility.

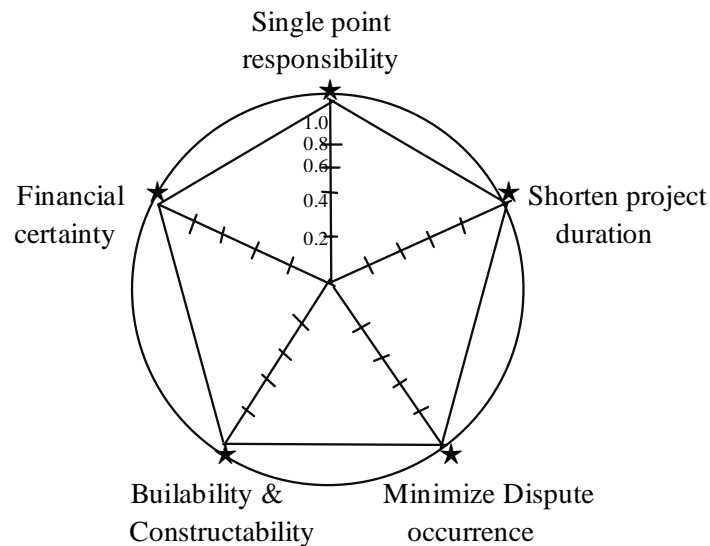


Figure 1: Web diagram for performance assessment

Table 1: Design and build project of respondents by sector

Related sector	Percentage of respondents
Public (GCC D&B)	48
Private (Specially drafted)	42
Both	5
Others	5
Total	100

The overall performance of the D&B conditions of contract was assessed by using the web diagram technique as shown in Figure 1.

The AI values obtained from the respondents were plotted on the web diagram and the effectiveness of the D&B conditions of contract is represented by

$$\text{Effectiveness} = \text{Piloted Area} / \text{Total Area in the Model}$$

Where the total area in the web diagram is the area of the pentagon and the piloted area resulted from linking up the AIs of the five contract objectives.

The survey sample was made up of the 49 contractors listed on the Hong Kong Government Design list of tenderers for D&B projects. To become a qualified response, the responding contractor must have experience in at least one D&B project. Out of the 49 samples, 22 responded to the survey. Excluding non-qualified responses due to incompleteness, 19 qualified responses representing a response rate of 39% were used for this analysis (Table 1).

General Observations

The experience of main contractor is shown in Table 1. There was an equal sharing in the total D&B project from the public and private sector. About 48% of the contractors were involved in public sector D&B projects and 42% in the private sector. A small amount (5%) of contractors had exposure in both sectors. The result also shows that the Hong Kong Government D&B conditions of contract were commonly used in the public sector. In the public sector the Government D&B

Table 2: Achievability of contract objectives (public sector respondents)

Contract objectives	Achievability index	Rank
Establishing a single point of responsibility	0.79	1
Enhancing financial certainty	0.68	2
Improving buildability	0.67	3
Shortening overall project duration time	0.65	4
Minimizing dispute occurrence	0.59	5

Table 3: Achievability of contract objectives (private sector respondents)

Contract objectives	Achievability index	Rank
Improving buildability	0.84	1
Establishing a single point of responsibility	0.80	2
Enhancing financial certainty	0.78	3
Shortening overall project duration time	0.70	4
Minimizing dispute occurrence	0.68	5

Table 4: Achievability of contract objectives (both sectors together)

Contract objectives	Achievability Index	Rank
Establishing a single point of responsibility	0.78	1
Enhancing financial certainty	0.72	2
Improving buildability	0.71	3
Shortening overall project duration time	0.68	4
Minimizing dispute occurrence	0.63	5

Table 5: Rankings of achievability indices

Contract objectives	Rankings by AI		
	Both Sectors	Public sector	Private sector
Establishing a single point of responsibility	1	1	2
Enhancing financial certainty	2	2	3
Shortening overall project duration time	4	4	4
Improving buildability	3	3	1
Minimizing dispute occurrence	5	5	5

conditions were used by all the respondents. In the private sector, the conditions of contract used were modified version of HKIA standard form (based on the UK's old JCT 63).

The achievability index of contract objectives

Based on the methods outlined in the previous sections, the Achievability Indices for the contract objectives are given in Tables 2 to 5

Having obtained the AIs, the effectiveness of D&B conditions of Contract can then be calculated. Figures 2 to 4 show the results. The numeric values of the effectiveness expressed as percentage are given in Table 6.

In the overall sample, D&B conditions of contract has achieved a 51% effectiveness in achieving the five contract objectives. This cannot be considered as satisfactory.

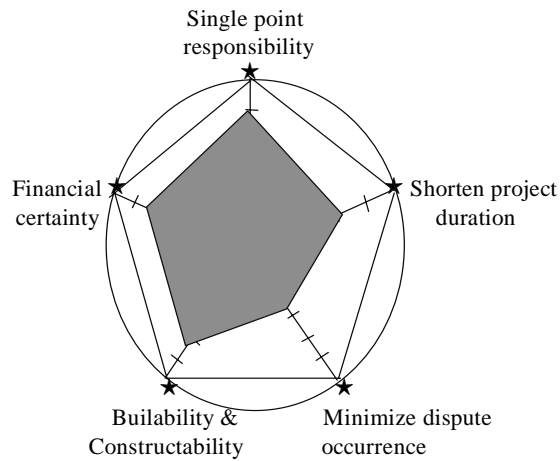


Figure 2: Effectiveness of D&B conditions of contract (public sector)

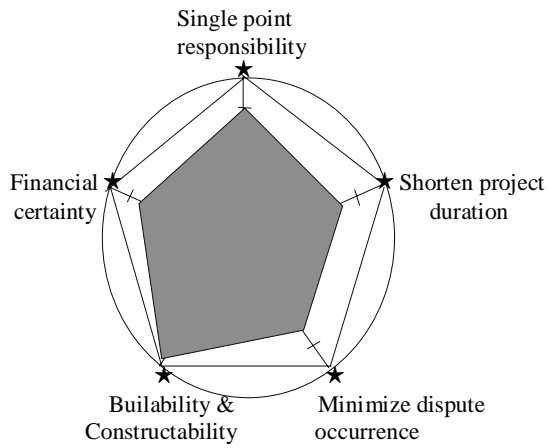


Figure 3: Effectiveness of D&B conditions of contract (private sector)

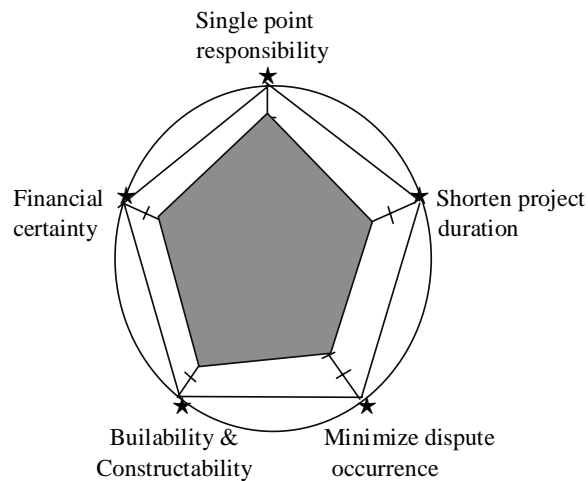


Figure 4: Effectiveness of D&B conditions of contract (both sectors)

Table 6: Effectiveness of D&B conditions of contract

Sector	Piloted Area	Total Area	Effectiveness (%)
Public	1.09	2.38	46
Private	1.38	2.38	58
Overall	1.21	2.38	51

In the public sector, effectiveness was lower than 50%. In actual fact, it was the public sector that pushes the use of design and build strategy and developed a standard form of conditions of contract for such use. Nevertheless, the satisfaction expressed by the respondents was relatively low. On the other hand, the conditions of contract used in the private sector is more receptive to the users.

DISCUSSION

The use of Likert scale for the assessment of achievability is inherently subjective. The reliability of the research findings is assured through the careful selection of the responding contractor must have experience in design and build projects.

Establishing a Single Point of Responsibility

Establishing a single point of responsibility can certainly be regarded as the cornerstone of D&B projects. It would be disturbing if the conditions of contract failed to achieve such contract objectives. From the study, the Achievability Indices for the public and private sector are 0.79 and 0.80 respectively (Tables 3 and 4). In terms of ranking, this contract objective is ranked first in the private sector and second in the private sector. As the Achievability Indices are very close, the difference in ranking is not considered important.

Enhancing financial certainty

Enhancing financial certainty achieves an overall second ranking in terms of AI. This is not difficult to understand as almost all design and build projects are let on a lump sum basis with adjustment permitted in limited circumstance like changes in client's requirements. However, the difference in AI between the public and private sector is great in this case (0.68 and 0.78), suggesting the private form is more onerous. For example, it is common in the private sector to specify that errors in contract document do not amount to a variation and no adjustment in contract sum shall be allowed. Similar provision can also be found in the JCT 81 (Joint Contracts Tribunal 1980) and ICE D&B (Institution of Civil Engineers 1980) contracts. The Government of Hong Kong (1993) D&B Form, at clause 60, empowers the supervising officer to order variations that is necessary for the completion of the works. The greater incidence of variations can be related to the fact that typically under a Governmental development, the project monitoring department is acting on behalf of the future end-user who often instigate changes during the project currency.

Improving Buildability

It is this contract objective that shows the greatest difference in AI between the public and private sector. The responses from the private sector suggest that the conditions of contract allow greater freedom for their input in order to improve buildability. Theoretically, the design is in the hands of the contractor in both the private and public sector. Hence under both situations, the contractors should enjoy the same advantage. On closer examination of the conditions of contract, the private sector also requires the sharing of cost saved from an alternative proposal thereby both the client and contractor derive benefit. This prompts less resistance to alternative proposals.

In practice, the most common proposals relate to changes in materials that are cheaper. This is not particularly well received in the public sector, where such proposals are viewed as cost-cutting exercises rather than a genuine attempt to improve buildability.

Shortening overall project duration

This contract objective is ranked fourth in both sectors. Shortening of the project perhaps is achieved through the procurement strategy under which a compressed project duration is specified. In this regard, there may be little relation with the conditions of contract used. More importantly attention should be given to the extension of time provisions. For grounds to grant extension of time, there is no marked difference between D&B conditions of contract and those commonly used for the more traditional, general contracting type of project. One interesting provision under the Hong Kong Government D&B form is that under clause 50(1)(b)(ix):

if in the opinion of the supervising officer the cause of delay is any special circumstances of any kind whatsoever, then the supervising officer shall within a reasonable time consider whether the contractor is fairly entitled to an extension of time for the completion of the works or any section thereof.

This appears to give a great discretionary power to the supervising officer in granting extension of time for reason he or she thinks fit. Nevertheless, this ‘wide’ power is curtailed by clause 50(1)(c) whereby certain situations are barred from extension of time entitlement. Three of those carry strong D&B features and compliment the achievability of the other four contract objectives. No extension of time will be allowed for:

- defective or late design by the contractor, or
- failure of the contractor to interpret properly the employer’s requirements or identify any ambiguity or discrepancy therein which could have been reasonably foreseen by an experienced contractor, or
- change in quantities as described in the breakdown of the contractor’s rates and prices other than by way of a variation ordered under clause 60.

Minimizing Dispute Occurrence

The contract objective of minimizing dispute occurrence received the lowest AI from respondents of both sectors. Minimizing dispute is a difficult task. Equitable risk sharing through contract has been widely accepted as suitable strategy to contain disputes (Cheung and Liu 1994, Cheung 1997, Nunn 1987, Schnelder 1993, Wall 1994). Because of the desire to establish single point responsibility, D&B conditions generally place all risks on to the contractor. In Hong Kong, typical D & B projects require the contractor to bear the risk associated with the approval process of the Building Department. The Building Department is the government department responsible for ensuring the drawings and plans submitted by the architects and engineers meet with the relevant building regulations and codes.

There are guidelines for the possible approval time, but typically the project duration takes account of multiple submissions. In extremes, there are occasions where the contractor has to take on approval risk of works not within the contractual responsibility of the contractor. These go against the equitable risk-sharing concept. However, in actual fact, the number of dispute in D&B projects are less general contracting projects. Perhaps this is the result of single point responsibility.

CONCLUSIONS

The use of D&B conditions of contract is satisfactory in achieving the five contract objectives. The respondents are most satisfied with the achievement of single point responsibility. The contract mechanism used for enhancing financial certainty is the imposition of a limit on the scope for variations. Improving buildability has been claimed by contractors as one key advantage in D&B in the private sector. The public sector is more sceptical and cautious in distinguishing buildability improvement from cost saving exercises. Minimizing disputes is the least achieved contract objective, presumably because in D&B projects, risks are shifted towards the contractor.

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