

# Project Procurement Methods and Success of Infrastructure Projects in Malaysia

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**ABSTRACT:** Most of the country's strategy for infrastructure procurement has evolved to rely primarily upon a successful procurement method. This strategy was used to implement massive federal investment in highways, bridges, and wastewater treatment, etc. Construction projects have risk and the characteristics of the risk depend highly on the type of procurement (Contract method) being adopted for managing the projects. The project performances are also controlled by the contract methods. Therefore it is important for the local industry to understand the types of Contract procurement used in Malaysia infrastructure projects. This paper discusses the various procurement method followed here as Traditional contracts; Design and Build Contracts; Privately Financed Infrastructure Projects; United States PPP Projects; globally used models of PPP. Comparative study on the traditional and non-traditional procurement systems is also summarized and presented.

**KEYWORDS:** Procurements; Traditional contracts; Design and Build contracts.

## I. INTRODUCTION

The selection of the most appropriate procurement method is critical for both the client and other project participants as it is an important factor that contributes to the overall client's satisfaction and project success. This selection will be dependent upon a number of factors such as cost, time and quality which are widely considered as being the most fundamental criteria for clients seeking to achieve their end product 'at the highest quality, at the lowest cost and in the shortest time' [1]. Since World War II, Most of the country's strategy for infrastructure procurement has evolved to rely primarily upon a successful procurement method [2]. The existence of a wide variety of procurement methods available to project developers on the market today has led to several comparisons being made on how the different procurement methods have performed at the end of the construction phase. [3]. Construction projects have risk and the characteristics of the risk depend highly on the type of procurement (Contract method) being adopted for managing the projects. The project performances are also controlled by the contract methods [4]

The engineering, procurement, and construction community has now recognized the limitations of many procurement process. Change and latest findings are coming, and the transition to a new process will challenge public owners in novel, but meaningful ways. [2]. A key decision for any client commencing a construction project is how the project should be procured or, in other words, what contractual structure should be adopted. The two most common procurement methods are "traditional" and "design and build".

The traditional procurement method keeps the design and construction elements of the project separate. The client directly employs both a team of professional consultants to design the project and a contractor to build to that design. An architect or project manager will be appointed to administer the building contract for the client. The contractor has no design responsibility unless the parties agree that he will design a discrete portion of the works. A key benefit of traditional procurement is that the client has a high level of control over the project because he directly employs each designer and the contractor. This allows the client to keep a close eye on how his requirements for the project are being implemented. Traditional procurement can also provide the client with a reasonable degree of cost certainty, as the design of the project should be largely complete at tender stage to allow the contractor to price for it. However, since construction cannot begin until the professional team have completed their designs, traditional procurement can take some time. Another potential disadvantage of traditional procurement is that if something goes wrong with the project, the client is likely to have to pursue claims against multiple different parties in order to recover damages [5].

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In Design and Build procurement, the contractor assumes responsibility for both the design and the construction of the works. The client will usually engage a team of consultants to produce a preliminary design for the project. The design consultants are then typically novated to the contractor so that they can assist the contractor in developing the preliminary design. The main selling point of design and build is single point responsibility. If something goes wrong, the contractor should be the client's first and only port of call. However, to guard against the risk of contractor insolvency, the client should take additional security in the form of collateral warranties from novated consultants and subcontractors. Design and build projects can be commenced more quickly than those which are traditionally procured because the client can go out to tender with outline design requirements. However, if the client's requirements are not well developed, the client may be disappointed with the end result. Although design and build projects can provide reasonable cost certainty due to them often being procured on a lumpsum basis, there is a risk that the quality of the project could be compromised if the contractor's tender price turns out to have been too low, because this will incentivise the contractor to cut costs [5].

## II. MALAYSIAN CONTRACTS

Generally construction projects in Malaysia are procured through Traditional Contract, Design and Build contract, Management contract, Construction management contract, hybrid and miscellaneous contract [6]. Each of them are explained below:

- 1.1. Traditional Contract: The client has separate contractual undertaking with both Design Consultant and Contractor/builder.
- 1.2. Design and Build Contract (D&B): They are known as 'package deal' or 'turnkey contract' and both designing and constructing works are undertaken by one single entity called D&B contractor. This mode of procurement is not under Public Private Partnership (PPP) category.
- 1.3. Management Contract: The role is to manage, coordinate and supervise the work.
- 1.4. Construction Management: To provide managerial and supervisory service for the project.
- 1.5. Hybrid: different types as explained below:
  - 1.5.1. Develop and construct – concept design by independent professional.
  - 1.5.2. Design and Manage – contractor responsible to manage design process.
  - 1.5.3. Design and Construction Management
- 1.6. Miscellaneous Contracts PPP's/PFI: different types as explained below:
  - 1.6.1. Build, Operate and Transfer Contract – Privately financed, operated and transferred to the employer after the concession period.
  - 1.6.2. Serial Contract – more than one project in accordance with the tender submitted for the initial project and in series.
  - 1.6.3. Continuation Contract – Scope of the original contract extended beyond the contract domain.
  - 1.6.4. Periodic Contract – execution of works is required in intervals.
  - 1.6.5. Partnering Contract – Receives all contracts from employer and the payment follows an initial agreed formula.
  - 1.6.6. Independent Contract – undertaking stipulated tasks for an agreed consideration.

## III. TRADITIONAL PROCUREMENT SYSTEM

This method is called 'traditional' because it has been in existence for a long time and has been the only choice available for most clients of the construction industry for many years. Using this method, the client enters into an agreement with the design consultant (an architect or engineer) to actually carry out the design work and prepare contract documents. Following the completion of this phase, the contractor is then appointed based upon the owner's criteria and the owner enters into a contract with the successful contractor for the assembly of the project elements. In essence, the client is under two contractual obligations; that with the design professional and with the contractor. In order for the client to obtain a constructed facility, tenders for this type of procurement system are invited by one of the three following methods:

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#### A. OPEN TENDERING

Is a procedure that allows practically, any contractor to submit a tender for the work. This procedure involves either the client or consultant (on behalf of the client) placing a public advertisement giving a brief description of the work. Normally the client will require a cash deposit when contract documents are requested [7].

#### B. SELECTIVE TENDERING

It consists of the client drawing up a short-list of contractors that are known to have the appropriate qualifications to carry out the work satisfactorily. Those contractors who seek to be listed are then asked for further details concerning their technical competence, financial standing, resources at their disposal and relevant experience. Pre-qualifying contractors who are on the list are invited to tender [7]. The selection of designers (that is architects and engineers) is usually based on a combination of track record, fees, conceptual design, and previous working relations [8].

#### C. NEGOTIATED TENDERING

This method is applied in several different contexts, but the essence is that tenders are obtained by the client by inviting a single contractor of his/her choice to submit a tender for a particular project.

### IV. NON -TRADITIONAL PROCUREMENT SYSTEM

“Non-traditional” is a generic term which is used to refer to all emerging or contemporary procurement systems of the construction industry other than the traditional procurement system. Over the past number of years, the construction industry has undergone changes in a manner never seen before. The increased size and complexity of the construction projects, financial challenges, political and social consideration, and information technology are just some of the changes that are taking place. These changes lead to the development of alternative procurement systems other than the famous traditional one.

Although the development of non-traditional procurement systems seemed to be the favorite to most clients in the construction industry, it must however be emphasised that there is not yet a specific method used to select the most appropriate procurement system. Masterman [9] defines a non-traditional procurement system as a diversified contemporary procurement system(s) that not only considers design and construction, but also considers financing, operating and facility management. Listed below are the three different types of non-traditional procurement systems:

#### A. INTEGRATED PROCUREMENT SYSTEM

Where one organization, usually but not exclusively the contractor, takes responsibility for the design and construction of the project, in theory at least. The client deals only with one organization.

#### B. MANAGEMENT-ORIENTED PROCUREMENT SYSTEM

Under a management-oriented procurement system, the management of the project is carried out by an organization working with the designer and other consultants to produce the designs and manage the physical operations which are carried out by contractors. When using systems within this category, the client will need to have a greater involvement with the project than when employing any of the other methods described in the other two categories.

#### C. COLLABORATIVE/DISCRETIONARY PROCUREMENT SYSTEM

Under a collaborative system the client lays down a framework for the overall administration of the project within which he/she has the discretion to use the most appropriate of all the procurement systems contained within the other three categories. In a collaborative procurement system Quantity Surveyors play an integral role by providing a wide range of services, which include contractual issues; it also offers Quantity Surveyors an opportunity to act as independent advisors within the system [10].

Research study conducted in 2011 by Thwala and Mathonsi [11] in South Africa classifies the Design and Build contract type as one of Non-traditional procurement system under “integrated procurement system”.

## V. DESIGN AND BUILD CONTRACT

The D&B contracts are practiced in different forms based on the nature of the project. But the Malaysian procurement methods are framed to suit the industry practice and capability of the local practitioners. In terms of suitability, D&B is relatively suitable for large, complex and specialised projects. This package deal puts the contractors in charge of the whole project. Nevertheless, in practice clients are demanding more and more say in the design. This will put more risks to contractor. In addition to the single point responsibility, cost and completion time is firmer and fixed under the D&B procurement method. It means the client knows their total financial commitments of the project in early stage. This method certainly presents a better chance for the client to obtain their project completed within budget. Cost has become the key considerations affecting adoption of D&B method. In view of the risk sharing factors, the D&B contractors must be able to identify the success factor in order to further ensure meeting their ultimate mission [12]. Even though the client has defined and calculated financial commitments at the start, it is more dependent on the D&B contractor's performance in executing the projects with risk. Ultimately, it requires D&B firm to have the managing expertise to hold balance between design and construction through proper response to the risks, which is also the concern of the client until completion and delivery of the projects. Figure 2.1 illustrates the organisation and management structure for a design-build contract in Malaysia.

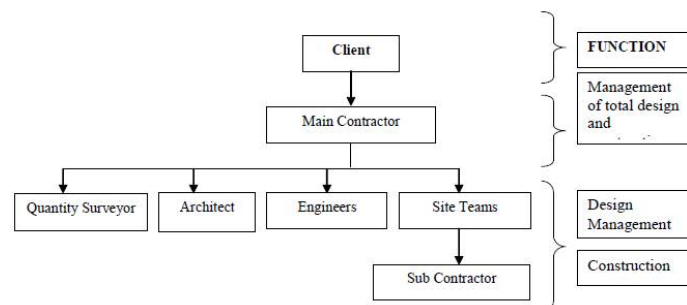


Figure 2.1: Management structure of the Design and Build Contract [13] pp.108

## VI. PROCUREMENT OF BOT AND PRIVATELY FINANCED INFRASTRUCTURE PROJECTS

The concept of BOT, private finance initiative (PFI), or any other privatization schemes, has been attracting both government and private sectors all over the world in recent decades. In a strict sense, BOT is just one of the schemes for privately financed infrastructures. However, the term BOT is often used to imply a private-finance project scheme which is a form of Public Private Partnership PPP deal in some cases. The following schemes are presented as alternatives for privately financed infrastructure projects [14] - [16]:

BOT;

- 1.1. build own operate transfer (BOOT);
- 1.2. build own operate (BOO);
- 1.3. build operate and renewal of concession (BOR);
- 1.4. design build finance operate (DBFO);
- 1.5. design construct manage and finance (DCMF);
- 1.6. build lease (or rent) transfer (BLTor (BRT));
- 1.7. lease renovate operate transfer (LROT);
- 1.8. build transfer operate (BTO);
- 1.9. rehabilitate own and operate (ROO);
- 1.10. rehabilitate own and transfer (ROT);
- 1.11. modernize own/operate and transfer (MOT); and
- 1.12. build and transfer (BT).

Although many governments may wish to build many of their infrastructures through private financing, not all projects are suitable for privatization. Projects that are well suited for a BOT agreement should have the following

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characteristics: The country in which the project is situated should have a stable political system. The legal system in the country should be predictable and reasonable. The economy should be promising in the long term with adequate local financial markets. The currency exchange risk associated with the project should be predictable. This is particularly necessary if expected income is to be paid in local currency. The project itself should be in the public interest, with governmental support being available to it. There should be long-term demand for the service to be offered by the project. There should be limited competition from other projects. Profits from the project must be sufficient to attract investors. The cash flow from the project must be attractive to lenders. The risk scenarios should be predictable, while still providing acceptable profit and cash flow [17].

**VII. D&B PROJECT & TRADITIONAL CONVENTIONAL TYPE OF PROJECTS**

The Design-Build Institute of America is the only organization that defines, teaches and promotes best practices in design-build. Design-build is an integrated approach that delivers design and construction services under one contract with a single point of responsibility. According to the Design/Build Institute of America, more than 40% of non-residential design and construction in the U.S. is provided through the design-build process. By 2015, this number will grow to more than 50% . Selected specialty work, or in some cases all work, may be procured through design & build specialty companies [18].

**A. COMPARING D&B PROJECT & TRADITIONAL CONVENTIONAL TYPE OF PROJECTS**

The basic concept behind D&B construction contracts can best be understood by studying the differences and similarities between D&B Projects and conventional/ traditional construction projects. The study has summarised the facts and concepts after intensive collection of information from the industrial practices and related literatures. This summary is provided in Table 2.2 (annexure).

**B. COST RELATED FACTS IN D&B CONTRACTS**

This sub heading is included to correlate the objective and the reason why this research has been taken up for study. Before directly getting into the comparison it is necessary to recap the highlights of pros and cons in D&B contract procurement method in simplified form as stated in Shapiro, Hankinson and Knutson [19]: even though the price of the design/build contract is likely to be relatively certain, great care is required if increases in the cost of the work are contemplated in the contract since abuses in this type of situation will be more difficult to detect by the owner and its staff, and control will be far more difficult than in a traditional contract. Most design/build contracts are lump-sum fixed-price in nature. Another way in which this feature is favorable to the owner is that the contractor bears any additional costs that may occur as a result of using defective or inadequate plans prepared by his engineer, but occasionally the payments will be made on a cost-plus basis. This statement has clear concern on cost related risk factors involved in this concept of contractual method. Both contractors and owners are being affected by the misconceptions about projects procured under D&B method.

**C. TIME RELATED FACTS IN D&B CONTRACTS**

Another convenience to the owner in D&B contractual method is that the project can often be completed within a shorter period of time than with the traditional three-party arrangement since the construction can begin before the entire plans and specifications are completed. The time savings results from designing the project in phases so that the contractor can begin work on the initial phase of the project while the later phases are being designed. This possible due to the in-house competency services providing the consultancy and design works by the Design Builder.

Therefore, the Design and Build projects has many advantages with inbuilt or bundled risk factors involving time and cost which is of high concern to the three contract parties Owner, Contractor and consultant from the conception to the completion of the projects. Figure 2.2 shows the Life time function of a Design and Build project management as studied by [20]. This D&B method has enabled the D&B contractor to have an integrated approach and complete the project in limited/given life time.

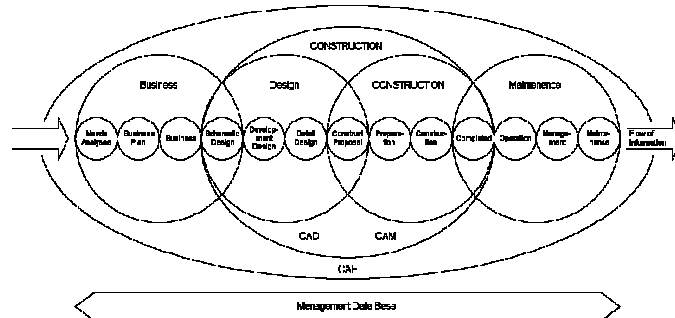


Figure 2.2: Life time function of a Design and Build project [20] pp.87

## VIII. PROS AND CONS OF D&B CONTRACT OVER TRADITIONAL CONTRACTS

As shown in Table 2.2 (Annexure), the Owner does the definition and conceptual stages by appointing a consultant in the cases of traditional contracts. Where as in D&B contract after definition by the owner the rest of the stages are all processed by D&B Contractor until close out. In D&B contract method the 'costing and scheduling' stage is of high risk to both owner and D&B contractor because mistakes in estimation may either be beneficial to contractor or owner affecting the other party. This is due to the fixed lump sum upon approval and no consideration of cost revision or variation is allowed in D&B contract method. The project life cycle comparison study on D&B and Traditional contract illustrated in Table 2.2 shows that D&B project procurement has HIGH risk in each and every stage when compared to Traditional type of contract. The comparison is summarised based on the references from condition of contracts clauses for both procurement methods.

## IX. SUMMARY

This extensive discussion and analysis of the Project procurement methods provides a brief background of D&B project and its risks characteristic on time and cost in Malaysian perspective

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ANNEXURE

TABLE 1 MATRIX FOR ESTABLISHING PROS AND CONS OF DESIGN AND BUILD CONTRACT OVER TRADITIONAL CONTRACTS

	Activity / Mile stone of D&B project life cycle	Design and Build Contracts	Traditional Contracts	Cost risk (D&B)	Cost risk (Traditional)	Time risk (D&B)	Time risk (Traditional)
<b>Definition</b>	Definition	Is the creator/first step for this procurement method.	Mostly implemented based on master planning or priority.	HIGH *	NIL because estimated based on requirement.	HIGH *	NIL because estimated based on requirement.
	Schematic Design	Prepared by D&B Contractor comply to owner Need statement	Directly dealt by owners team of members	HIGH # *	NIL	HIGH # *	NIL
	Cost plan & Budget	Prepared by the owner Project Director team.	Not at this early stage	HIGH *	NIL	HIGH *	NIL
<b>Conceptual</b>	Selection	The Owner select the D&B Contractor and provide Letter or Intend (LOI) to start work.	Generally not in beginning stage.	HIGH # Owner Transfer risk		HIGH # Owner Transfer risk	
	Feasibility Study	D&B contract perform appoint required professional (SI, Survey, Design Engineer, etc.)	Owner hire professionals to advice with study reports	HIGH # ^	NIL	HIGH # ^	NIL
	Conceptual design development	Prepared by D&B contractor for owners acceptance	All prepared after hiring Engineer for Design.	HIGH * # ^	NIL	HIGH * # ^	NIL
<b>Planning</b>	Detail Design	D&B contractor furnishes design drawing for construction	Provided by owner from the designer to contractor during tender notice.	HIGH #	NIL	HIGH #	NIL
	Costing and Scheduling	D&B contractor to estimate project cost and time frame for owner approval. Once approved the Cost is fixed lump sum for the project.	Bill of Quantities prepared based on the tender drawing.	HIGH * #	NIL	HIGH * #	NIL
	Documentation	It is D&B contractor responsibility to	Drawings and Bill of Quantities				

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		prepare the contract document.	prepared by owner for tending purposes.				
	Bill of Quantities	Bill of quantities is considered as schedule of rates in the contract book.	Used to measure the work done payment purposes	HIGH * #	NIL	HIGH * #	NIL
Implementation	Construction	To complete on time and within the fixed sum. D&B contractor to bear cost and time for any Changes required during construction. Owner required to deliver as defined.	Executed based on drawing and Bill of Quantities	HIGH #	NIL	HIGH #	NIL
	Payments	The claim payments based on the approved schedule of payments at the beginning.	Monthly progress payment as per work done.	HIGH # Contractor cash flow risk	NIL	HIGH #	NIL
	CPC- Certificate of Practical Completion.	Hand over only physical works but the design liability is on the D&B contractor for specified period.	Hand over the project after project completion.	HIGH # ^	NIL	HIGH #	NIL
Close Out	Maintenance	D&B has longer maintenance period at least 2 years or as in contract agreement.	Generally 1 year	HIGH #	NIL	HIGH #	NIL
	Variation Order and Final Accounts	No additional cost or VO allowed	Any changes during construction are considered as VO and final re-measurement is made to do final account and payment.	HIGH #	NIL	HIGH #	NIL

Note: Symbols representing the responsible party for the risk: \* Involving Owner; # Involving Contractor; ^ Involving Consultant