

# Design and build procurement



**ASSIGN  
BUSTER**

In this chapter, the definitions of Design and Build procurement including its concept and characteristics will be revealed. The success factors of using Design and Build procurement and the major task of developing the project's scope of work will be covered in great detail in this chapter. The definitive performance criteria of a project specifically in major aspects of time, cost and quality will be deeply explained. The chapter then moves forward to the affect of features of Design and Build on roles and responsibilities of the contractor within the process. The explanation on ways of the contractor proposes to achieve them. This chapter then also describes the implementation of Design and Build in Malaysia accordingly to its history performance and problems that have been occurred in Malaysia by using Design and Build procurement.

## 2. 1 INTRODUCTION OF DESIGN AND BUILD PROCUREMENT

It is clear that there are many different variables to take into account when selecting the procurement method for our project. It is quite difficult due to each procurement methods differ from each other in unique ways. The key on making decisions on choosing the right procurement method is that each differs from the other on its own basis. Thus, it takes a few key questions to help decide which one should be use. The flow chart below shows the key questions and decisions on which procurement method should be used.

The process of building procurement involves a series of different specialists in contributing to the construction work at different times. Design and build procurement has been in use for a very long time for more than a decade in the twentieth century. It has become more widespread across United State

as well as around the world and had found in many industries. From a survey of trends in methods of procurement that were carried out by RICS from Davis Langdon and Everest revealed that in 1984, 5.06% of construction projects were procured on a Design and Build basis. Added that by 1991, this had risen to 14.78%. Revealing proudly by the Contract Journal July 1994, that the Design and Build turnover of the United Kingdom's top 70 Design and Build contractors increased by 15% during the period 1992 to 1993. The growth in the use of Design and Build recently as a procurement route is seen as being such radical change that could allow the industry to develop cost radical change that allow the industry to develop cost models that automatically can reflect the construction rather than design processes.

It seems as the most logical way to procure a building and thus given a clean slate to start with. However, many design professionals and owners had feared that this would result in the minimization or even destruction of the designers' responsibility. This procurement is said to be able to furnish a design that maximizes quality within the project's budgetary constraints.

Numerous successfully completed Design and Build projects range from housing, through industrial and commercial projects, to major complexes. It proves that this procurement method has very wide applicability. Frequently, the Design and Build contractor would be asked to contract with the client's designers, so that there is some continuity of the design effort, but the remaining design work is the contractors' responsibility. This involves formally transferring the designers' contracts from the client to the builder which is called 'novation'.

## 2. 1. 1 DEFINITIONS OF DESIGN AND BUILD PROCUREMENT

Design and build procurement is a procurement where it combine the design and construction process under a single entity. Design and Build terms are taken from its strategy itself where it would entail the contractor to carry out the work; the design work as well as the construction and also the completion of the work. As according to Turner (1990) and Jansen (1991) has supported that design and build contractor is supplying the procurement option of “ buying” a finished building.

While according to Masterman (1992) the term Design and Build has almost been unanimously interpreted and defined as being an arrangement where one contracting organization takes sole responsibility, normally on a lump sum fixed price basis, for the bespoke design and construction of a client’s project. he then elaborate that this contains three elements; the responsibility for design and construction, contractor’s reimbursement is generally by means of a fixed price lump sum and the project is designed and built specifically to meet the client’s need. Furthermore, as according to David Cappell (1997), Design and Build place responsibility for both design and erection in the hands of the contractor one point of responsibility for everything. However, there’s an existence of one common thread that all Design Build delivery systems share which would be a single point of responsibilities for both design and construction.

In other definition, Design and Build can be said as arrangement where one organization design and construct to the firm orders of the client for a single financial transaction.

In general, the definition of Design and Build can be summarized as providing a single point responsibility for the whole design and construction. Below is a chart to differentiate between Design and Build procurement with traditional procurement.

(a) (b)

Figure 2. 2: (a) Single point responsibility – Design and Build Procurement

(b) Fragmented responsibility – Traditional Procurement

(Source: Bennett and Grice, 1992)

## 2. 1. 2 CONCEPT AND CHARACTERISTICS OF DESIGN AND BUILD

A basic concept in Design and Build procurement is that it requires the project to be contracted to a single organization which is responsible for design, procurement, and engineering and commissioning. The first step before choosing a procurement method should be through analysis of the project's characteristics on a global basis, including those technical requirements for design and construction. The project's owner will ensure that the entire context in which the project be delivered is thorough understood and can be accounted for in plans for schedule, price and quality. Once the owner has determined all the external constraints that might impact on its project, a project procurement method can be selected.

There are quite many good reasons why an owner would select Design and Build for a given project. There's a list of reasons for which an owner might

decide that a project is suitable for the use of Design and Build procurement method. It would be:

Where a compressed delivery schedule is required;

A single point responsibility is required,

Constructability considerations drive the design concept or details,

Unique factors require special knowledge or experience to produce the least-cost design,

The owner/designer must rely on the builder to optimize technology with cost,

The project will site-adapt a previous design,

The project is a common commercial facility,

The project is beyond the owner's technical capability,

Lastly, where risk can be shared to reduce cost.

This can be supported by Masteman (2002), who argued that the definitions of the Design and Build contains three elements that would be fundamental characteristics of this system, which are; the responsibility for design and construction lies with one organization, reimbursement is generally by means of a fixed price lump sum, and project is designed and built specifically to meet the needs of the client.

## 2. 2 PERFORMANCE OF DESIGN AND BUILD

An owner of a project would definitely want to obtain a building that satisfies his needs of good performance. The meaning of a good performance here require the project to form a high level of quality, of which including optimum economic price within the agreed time. Hashim (1996) concluded that the major factors tat affect the time and cost overruns would be; (1) the procurement systems adopted, (2) the variation works, (3) delay in subcontractors' work, and lastly (4) shortage of building materials. She also provides her findings to prove the relation to the procurement systems used and their impact on time cost overruns.

It is very crucial that the selection of the procurement method lies in the client's responsibility. Because of that, the selected procurement should;

Meets the needs of the client, the type of project and the risks that might occur, can be handle by the client

Related to the expertise available within the client's organization, resource and funding facility.

Before the client decides which procurement method to be use, the relative importance of the three key criteria that need to be taken into account in procurement would be; time, cost and quality performance.

TIME

COST QUALITY

The three criteria are inter-related. For instance, decisions affecting time will affect cost or both cost and performance. The key objective are exists to

ensure that the client's objective are met effectively, efficiently and economically.

### 2. 2. 1 TIME

Early completion of a project rather one of the most required by the client. Nevertheless, most construction project fails to achieve this requirement. Because of that the selection of procurement method to be use should be done wisely.

This requirement of early completion can be achieved if construction starts before the design is completed. It can be said that the greater overlap between the construction and the design stage, the less time will be required to complete the project. However, the amount of variation is likely to increase because of this relation. Form the studies by University of Reading (United Kingdom) evaluate that the construction speed of design and build projects is 12% faster than traditional approaches and the overall project delivery speed (including design and construction) is 30% faster than traditional methods. Added that, the certainty of completion in time increases with the earlier the contractors involve in the design processes.

### 2. 2. 2 COST

Lower cost of the construction project is another factor that is most important in one's employer requirement. The overlap between the design and construction means that construction starts before the cost is fixed, which will increase the uncertainty over the cost. This will drag the cost forecasting to become critical.



Research had found out that time or cost have a real strong interactions between the design and build system. Also, from findings it stated that by combining the full overtime schedule, average ordering and also fast track construction with moderate crashing of design can made achieve towards improvements in both time and cost.

By the researchers findings, it had stated that 75% of design and build project were completed within 5% of budget, compared with 63% of traditional projects. Design and build projects are at least 13% cheaper than traditionally procured projects. Greatest cost certainty is achieved for design and builds projects when the owner's requirements are detailed.

### 2. 2. 3 QUALITY

The issue of building quality is very important. From the facts, the quality performance characteristics determine the project time and cost. The performance of a project includes the function of the facility, its quality and appearance and durability, together with reliability and efficiency of the operation. The quality performance required from the completed facility is where it has the ability to control and make changes to the detailed specification after the contracts have been let. Design and build consistently better in meeting quality requirements for complex or innovative buildings rather than simple, standard, traditional buildings.

### 2. 2. 4 ROLES AND RESPONSIBILITIES OF THE CONTRACTOR

The roles and responsibilities of each of the members of the project team should be considered carefully to avoid problems associated with assembling

temporary teams of professionals. The contractors are responsible to; (1) undertake the design work outlined in contractor's proposal which match with the employer's requirements, (2) to fabricate the building, (3) to coordinate and integrate the entire process. The figure below shows the relationship of project team in design and build procurement.

This contractual relationship in design and build clearly shows that the contractor is responsible for everything. The design and build process increases the opportunities to use the contractor's experience during the design stages of the project and their key strengths in management of the construction works. The extension of the contractor's role design role is sometimes much less than the associated design responsibilities. The contractor then takes the responsibility for the design, without having any previous involvement with the design team. However, with the variability of types of construction projects and the experiences of clients in such projects, recent research had found that contractors may lack proper understanding of managing the varying types of design processes.

The contractor must do whatever it takes to achieve the employer's requirements. A single point responsibility means that the contractor is responsible for ensuring that the project is completed in time within the specified budget. Any delays beyond the control of the employer would be at the risk of the contractor. Other than that, the contractor also has to take into account the qualities that are agreed between the employers. Design and build contractors should understand the aesthetics or architecture value because the clients might not understand this kind of things. However, to

ensure a contractor to produce what is specified by the client is not the same as ensuring the contractor producing a good and high quality building.

## 2. 3 IMPLEMENTATION OF DESIGN AND BUILD PROCUREMENT IN MALAYSIA

Construction activities occurred mostly on the more developed western side of peninsular Malaysia, which would be around KL. It began to gain importance in the economy in the 1990's through its roles in the areas of reconstruction and modernization.

There are seven main elements of the processes of construction procurement considered to be specific to Malaysia. These seven elements are divided into two broad categories; (1) the processes during preconstruction stage, and (2) the processes during construction stage.

The processes of construction procurement during preconstruction stage are:

Initiation / promotion

Funding

Design – schematic design, detailed design and specialist design.

Statutory approval – approval to initiate and to construct a facility and final approval to occupy the completed facility.

Tendering

The processes of construction procurement during construction stage are:

Construction – management and physical construction processes.

## Risk allocation

The mostly used procurement are listed below in order of their importance that has been identified as the dominant procurement systems in Malaysia.

Traditional lump sum system

Design and build / turnkey system

Management contracting

### 2. 3. 1 HISTORY AND BACKGROUND OF STUDY

Design and build procurement was first launched in the Public Works Department by the Malaysian Prime Minister in 1983. The first unit that has applied the system would be by the Kuala Terengganu Hospital, which was completed in 1985. Research has shown that there is a continuous increase in the use of Design and Build over the last 24 years. The system use in Malaysia was pioneered by the JKR. In this system, there exist only two parties, i. e., the client and the contractor.

In Malaysia, comprehensive data on the use of different types of procurement systems is not available. However, design and build is one of the procurement systems frequently used in Malaysia.

### 2. 3. 2 CONTRACTORS IN MALAYSIA

The total goals of a project to significant cost savings, time savings and better quality can be achieve in considering the contractor's construction experience in earlier construction phases. Since the system of design and

build become successfully growing in recent years, many contractors are successfully operate in this market and they bring appropriate skills to bare in regard to the management and co-ordination of the overall process.

However, the studies from Nima, M. A. & M. R. Abdul-Kadir et al. (2001) & also Rosli M. Z. (2004) show a shortage of knowledge among Malaysian contractors. They added that, a contractor have a supreme position in developing the constructability issue in different stages of construction projects which decreases probability of stoppages, delays and contract modifications. Any contribution from construction players in early stages of project can supply a useful guidance to bring deconstruction rules to design phase (Herman et al., 2003).

The issue in this country is where the construction contractors are not invited to participate in design activities, before the design reaches to end. This will reduce their ability to influence the project specification finally.

Other researches had state that different sources of knowledge has emphasized on importance of design phase and decisions that can make tremendous changes in the project output (BCA, 2005; Construction Industry Review Committee, 2001; Galvinich, 1995; Gray & Hughes, 2001; Nima et al., 2002; Unlik & Lones, 1998). The more integration will result in greater amount of cost savings, labor savings and also less substance wastage.

The design itself can lead the contractors to choose a better construction method which helps to an improved constructability. In addition, the contractors can use their construction experience to help the designers in better designs, then they can try to increase the flexibility of the project to

avoid any later design modifications that requires more money injections to the projects (Lam et al., 2007).

### 2. 3. 3 ADVANTAGES AND DISADVANTAGES IN DESIGN AND BUILD

Ndekugri & Turner (1994) suggests that by using design and build can provide better value for money and can give rise to fewer disputes than other procurement methods. One of the key advantage by using design and build is the opportunity to integrate the design and construction components. Argues by Saxon (2000) include that design and construction offers better performance in time and costs and results in lesser defects.

The main advantages of design and build system that are obviously shown include:

Single point responsibility for both design and construction processes

Price is fixed in advance of construction

Overlapping of design and construction process (in contrast to the traditional system)

The design and build contractor could incorporate the concept of buildability into the design which in turn would facilitate speedier and economical construction production.

However, implementing design and build procurement also have the cons that need to be aware of. Its disadvantages are:

Unclear client brief (Ho et al., 1996; Chan, 1997; Ernzan & Schexnayder, 2000)

Lack of standard forms of contract (Ho et al., 1996; Gunning & McDermott, 1997)

Inadequate and insufficient information and coordination among parties (Ndekugri & Church, 1996; Ho et al., 1996)

Late design changes (Gunning & McDermott, 1997; Chan, 1997).

The projects costs could be higher than the traditional system

Projects often lacks of aesthetic values

The system is not very accommodative to changes

Other than that, Smith (1992) stated some of his research of design and build difficulties that may have to be faced:

Contractor dominated by staff who are unfamiliar with the design process

Inadequate fee quoted for design services by consultants

Contractor's operational staff too busy to consider design issues

Contractors lacks expertise to manage the design interface between consultants and subcontract designers

Contractor leaves subcontractors to co-ordinate work amongst themselves

## 2. 4 CONCLUSION

Alternative project system or delivery is gaining popularity towards Malaysia and outside countries. From this literature, we can see that the implementation of design and build in Malaysia proven to be one of the successfully delivering method in an expeditious manner without sacrificing quality or economy. As for the contractors in Malaysia, the lack of knowledge can become the main reason to the unsuccessful of design and build delivery. Other than that, design and build seems the most appropriate delivery method that can improve one's project performance.

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