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A Review of Traditional Project Procurement Towards Integrated Practice

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ABSTRACT

As a new integrated procurement approach, Integrated Project Delivery (IPD) has been introduced as an alternative towards improving sustainability and integrated construction performance. Currently, however, most of the project procurement or method in Malaysia are still based on the traditional construction process approach; fragmented and separation of the design and construction phase. This traditional construction process has been widely criticized for its fragmented approach to project delivery and its failure to form effective teams. Due to that problem, a number of issues have recently arisen in current construction methods, such as reworks, time delay, rising costs, lack of communication and coordination, and wastages. This paper through literature review aims to explore this fragmentation issue especially in the design and build (DB) and clarify how far it affects the process of project delivery. Suggestion on how an integrated project delivery (IPD) approach for design and construction process in order to minimise the fragmentation issue will be concluded.

Keywords: Design and Build Procurement, fragmentation, integrated project delivery (IPD), Malaysian construction industry.

1. *The Construction Industry:*

The construction industry is a significant contributor to the world economy. The products of this industry provide the necessary public infrastructures and private physical structures for many daily activities such as services, commerce, utilities and other industries. The industry is not only important for its finished product, but it also employs a large number of people (directly and indirectly) hence the effect on the economy of a country during the actual construction process [30]. Similarly, Dlamini [11] has also noted the strong relationship between the construction industry and economic growth, specifically in terms of the provision of capital infrastructure. The importance of the construction industry and its many significant contributions are also noted by many studies [29,11,16] specifically in terms of impacts on Gross Domestic Products (GDP), economic activities, government revenues, benefit of investment and nation-wide employments.

However, it should be emphasized that the construction industry requires large sums of capital and resources due to its dynamic and complex nature of activities. Adnan *et al* [1] argues that due to the factor of the size and diversity of the construction industry, its major industry players are easily exposed to conflicts and numerous issues. This could be due to the misunderstanding of roles and improper risk and project procurement management within the industry.

Typically, there are a minimum of four or five parties directly involved with the process of a construction project such as clients, design consultants, contractors and material manufacturers or suppliers [13]. These parties have different levels of involvement and at different stages in the process. Bowron [8] identified that current methods of procurement have a major impact on the state of the industry by their approach to project delivery and in particular to:

- Procurement occurs across the development process from briefing to construction;

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- Determines the relationships between parties involved in the process;
- Risks are apportioned between the parties involved in the process;
- Contract terms are identified including payment, insurance, etc.

This segmented nature of the construction industry is the result of firms having various specialities working together towards the completion of construction projects in distinct separate stages, as cultured by the traditional procurement system [20,21]. Apart from their specialities these firms may also have different perceptions of priorities which lead to friction, misunderstanding and issues within the construction industry.

As a response to that challenge and consistent with the needs of the construction industry, this paper, therefore, is generated to discuss this issue. Although previous studies have been highlighted this issue earlier, however, the studies are not sufficient enough to represent and guide the traditional construction industry towards an effective integrated approach. For that reason, a thorough review and detailed discussion of the current practice of procurement (such as Design and Build) in term of concept, characteristics, advantages and limitation etc. is paramount. This paper however just focuses on the 'design and build (D&B) procurement as preferred and the most 'popular' method by industry in the Malaysian construction projects.

2. Design and Build (D&B) Procurement Method:

2.1 Definition and Concept of D&B:

In recent years, the Malaysian construction industry has undergone a wave of change, in which projects are of higher complexity and warrants greater emphasis on management techniques and engineering skills. The traditional method was deemed to be no longer the relevant approach to suit the needs for such projects. Public Works Department (PWD) has started introducing the Design and Build approach as a response to this situation) noted how generally Design and Build procurements are structured in one of two ways;

- The clients employ a dedicated Design and Build organization with its own in house design team.
- The clients engage a general building contractor who employs external design consultant members of the contractor's team for the duration of the project.

This method of project procurement was developed to give clients a single point of contact for both design and construction [8]. The contractual organisation for this method (shown in Figure 1) allows the responsibility for all aspects of the project to be taken by a single company with a single contract between the client and the design and build contractor [3,25].

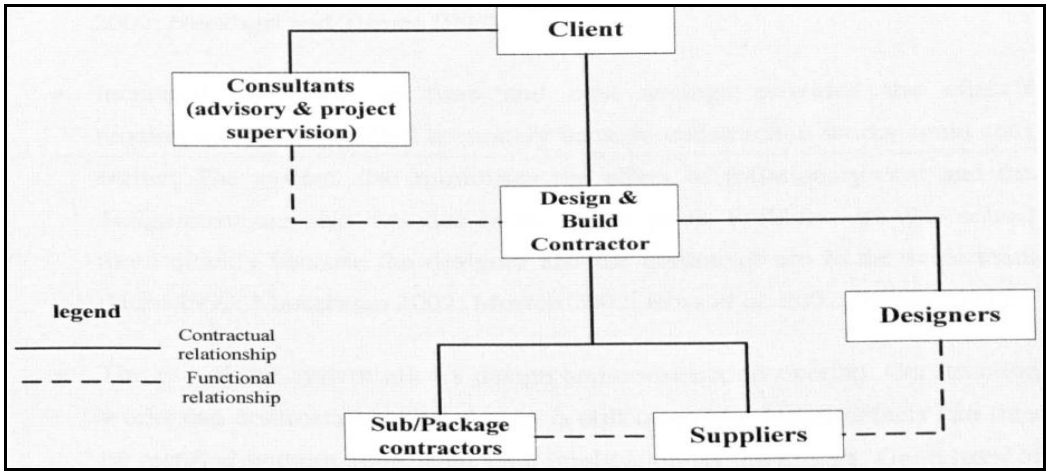

Fig. 1: Contractual and functional relationship in design and build procurement [18].

Many researchers [25,5] emphasised that the implementation of design and build (D&B) has been guided by the following characteristics;

- integrates the design and construction expertise at an early stage of project
- involves cooperative team effort
- coordinated team approach through continuity between designer and constructor
- allows design and construction to overlap (concurrently)
- sharing knowledge process
- designer and contractor come from a single organisation (same entity)
- same goals and have full responsibility for the outcome of the project

2.2 Design and Build Advantages:

Previous researchers highlighted that design and build (D&B) encourages a collaborative relationship among participants in a construction project. As mentioned by Anumba & Evbuomwan [5], D&B

procurement can integrate the design and construction expertise at an early stage in the project. Friedlander & Roberts supported the idea that D&B is a coordinated team approach through continuity between designer and constructor. In D&B procurement, the design-build team works with management and engineering personnel to identify the client's needs and allows design and construction activities to overlap. This practice creates an environment where the construction works can commence whilst design is still on-going. Therefore, initial defects can thus be rectified without significant time implication on the project [7].

2.3 Design and Build Limitation:

While some D&B projects are considered a success [3], others consider that D&B is no better than the traditional procurement system [24]. Research has shown that design build project delivery method suffers from some drawbacks compared to traditional projects, such as, loss of checks and balances, less owner control and flexibility, and difficulty obtaining competitive bidding [18,19,8,5].

In addition, the role of the client in this method of procurement is very limited causing many problems in design and build implementation [25]. Baiden (2006) argued that the difficulty in evaluating proposals and tender submission is caused by ambiguities, lack of precision or inaccuracies in the client's brief. For example, there is no client representation on the design-construction team and the control over design and construction integration is given over to the contractor [6,18,28]. On the other hand, Anumba & Evbuomwan [5] highlighted that this method of procurement creates a lack of flexibility in accommodating client changes. For example, if the client wants to change the design after the initial planning process, any consequential problems and cost is solely the client's burden. Projects eventually become price driven at the expense of quality [6].

Furthermore, it should also be noted that like other procurement methods, this approach also has some significant risks to be considered. A study conducted by Adnan *et al* [1] has acknowledged that the risks associated with Design and Build procurement method in Malaysia are; time overrun, cost overrun, delay caused by the owner or the government, overlapping of roles, difficulty in adhering/following instructions, lack in employer brief, conflict of interest and variation to changes in design criteria. Therefore, to achieve the full benefits of Design and Build, the construction practitioners involved will need to mitigate these risks effectively in a timely manner.

The single point responsibility approach indicates that it is imperative for the Design and Build contractor to possess excellent leadership skills. In a Design and Build project, the contractor is the main authority in the design and construction process, acting in the interest of the client. Jatarona [15] identified that besides experience, the leadership of the contractor is another important factor in determining the performance of the designers within a Design and Build project. However, this will place the contractor in a pivotal role, in some cases where misused, may cause tension among the parties involved further contributing to adverse relationships. It is under this premise the relational contracting methods are introduced to cure the negativity that may arise from the interaction of various parties involved within a construction project. The industry has now realize the existence of adverse relationships and opportunistic behaviour; thus now moving towards relationship-based approach to procurement and mutual trust working environment [31].

3. Time for an Integrated Approach:

A review of current literature has brought to light some of the current challenges within the industry; trends of sustainability in construction as well as problems in human resources and construction labour market which further show the need for integrated approach in the construction industry. For example, the process of current project delivery is mostly associated with problems of fragmentation, including the isolation of professionals, lack of co-ordination between design and construction, and as it is carried out in a sequential manner it leads to time delays, poor communication, conflicts and misunderstanding between design consultants and contractors [10,21,22]. The industry-led reports such as Strategic Forum for Construction [27] and Egan [12] have all called on the industry to change from its traditional modus operandi and perform better through integrated practice. One of the new integrated approach is namely as Integrated Project Delivery (IPD). The detail explanations of growing for improving construction project delivery processes through IPD will be highlighted in the next section.

4. Integrated Project Delivery (IPD):

4.1 Definition of IPD:

Integrated Project Delivery (IPD) is defined as a project delivery approach that integrates people, systems, business structures and practices into a process that collaboratively harnesses the talents and insights of all project participants to optimise the results, increase value to the owner, reduce waste, and maximise efficiency through all phases of design, fabrication and construction [14]. Furthermore, Anderson [4] described IPD as a business model for design, execution, and delivery of buildings by collaborative, integrated and productive teams composed of key project participants such as client, designer, contractor, manufacturer, and supplier.

The principles of IPD can be applied to a variety of contractual arrangements for highly effective collaboration among the owner, the prime designer and the prime constructor, commencing at initial design stage and continuing through to project handover [4,23]. For example, this concept has been inspired by various alternative delivery models for building a project around the world, most notably the Project Alliance method that, in the last few years, has been successfully implemented in Australia on 30 to 40 projects [17].

In addition to being highly collaborative and seeking input from project team members at the outset of the project, many reports [14,2] suggested that IPD should be operated together with Building Information Modelling (BIM). According to the reports, this integration process allows member of projects to leverage Building Information Modelling (BIM) by creating a virtual design of every element of a construction project's process. Furthermore, BIM can play a valuable role in IPD by enhancing communication between parties in the architectural, engineering, and construction industries [26]. Using BIM in IPD, digital images are created to precisely depict every aspect of a construction project and to simulate real-world performance and operation of a facility.

4.2 IPD Characteristics:

Building upon early-phase contributions of team members' expertise, the integrated team development is guided by the following principles [2,17,14,23]:

- Mutual respect and trust
- Mutual benefit and reward
- Collaborative innovation and decision making
- Early involvement of key participants
- Early goal definition
- Intensified planning
- Open communication
- Appropriate technology
- Organisation and leadership

4.3 IPD Advantages:

Previous studies [2,14,17,23] declared that IPD is not just a utopian vision but a practical reality that can actually be implemented on large, as well as small, projects for greater efficiency results. For example, it has been estimated that the construction cost will reduce an average of 2-10% (for single projects) and up to 30% (over a series of construction projects) through the implementation of an integrated teams approach. Based on the case study conducted by Khemlani, [17] who claimed that time for structural design was reduced from an expected 15 months to 8 months, and planning using information from other disciplines that is not usually available which led to better design quality. The same author further highlighted that despite all the time spent planning the design process and meeting to do 3D coordination (all of which were billable hours), the cost for design was at or below what was anticipated. Thus, up to the design stage, the process was completed faster, with no quantifiable increase in cost, and better quality work. Beyond these benefits, IPD also provides other positive values to the project such as strengthening the project team's understanding of client's needs and streamlines the communication among the project team [14]. This approach also allows constructors to contribute their expertise in construction techniques early in the design process which will, indirectly, help the designers to produce an accurate budget of estimation and reduce design-related issues during the construction phase such as, constructability, reworks, wastages etc. [2,17,23]. Furthermore, the use of IPD and BIM is advancing the construction industry overall by making it easier to not only predict, but also, to achieve high-quality outcomes [14]. Finally, IPD also puts the owner in control of the entire collaborative process for example; through the multiparty contractual arrangement of IPD the Owner maintains privacy with both the design and construction agents which is totally difference practice with a Design-Build (DB) method. As highlighted by Brenna [9], although DB is a more integrated approach than traditional (Design-Bid-Build), the owner does not have the same control of the design process as in the IPD method. Depending on the weighting and statistical significance the research observes, the results of the study may be interpreted by owners as demonstrating IPD as superior to both DBB and DB.

5. Conclusion:

Bearing in mind, some D&B projects are considered a success however, the growth of this procurement method has created considerable controversies due two main reasons; the reduced power of the design team (especially the architect); and the problem of quality in terms of lack of client flexibility (control and accommodating changes). Practically, this situation shows that most of the Malaysian design-build contractors have a poor performance in terms of ability to complete project on time and within budget. Therefore, based on these difficulties and deficiencies, current design and build procurement needs a radical review of its existing procedures in order for it to be applied to Malaysian IBS projects. Apart from such weaknesses, improvement in D&B is still needed especially in terms of freely sharing of information among project team members, in order to reduce the culture of 'blaming each other' and for operation without boundaries among various organisation members. It could be concluded that IPD might, in theory, be a potential solution to the problems of communication and also as an alternative procurement method for more collaborative work among participants in construction projects. This collaborative procurement enables construction work to commence before the

final completion of the design. Project buildability, communication and design information flow are enhanced through contractor early involvement on the project helps prevent potential future design difficulties.

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