Implementing Design Build Project Delivery System in Indonesia Road Infrastructure Projects[1]

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Abstract

Design-Build (DB) project delivery systems have increasingly been adopted by many private and public sector organizations worldwide due to its many advantages. However, many Indonesian road infrastructure projects are still delivered using the traditional design-bid-build (DBB) project delivery system. This paper reviews the existing literature to explore factors that can influence the successful implementation of design-build project delivery system in Indonesian road infrastructure projects. It founds the lack of clarification in existing legislations as well as the lack of experiences, knowledge and skill as the main obstacles in implementing DB systems in Indonesia. To overcome these obstacles, this paper proposes (1) A relook at existing legislation in term of providing more guidance on determining projects appropriate for the DB, procedures for implementing DB, and the structure of builder entity; (2) To develop the skills and knowledge of DB to all stakeholders through communications, knowledge sharing and training. The outcome of this review can serve as a guide to development a framework for the implementation of the design-build project delivery system in Indonesian road infrastructure projects.

Keywords: Road infrastructures, Design Build project delivery system

1. Introduction

Road infrastructure has a very strong linkage with the economic growth of a nation. In Indonesia, possession of a good road network is vital to support the economic activities and growth in both the central and regional levels. However, currently the road infrastructure in Indonesia is inadequate to cover the vast area of the whole country (Dardak 2005). In addition, the general condition of many existing roads is far from satisfactory. Given the important role of road infrastructure in supporting

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economic development, there is an urgent need for the Indonesian government to accelerate the provision and maintenance of road infrastructure.

Road infrastructure projects in Indonesia are currently delivered using a Design Bid Build (DBB) approach (Rahadian 2009) in which the design and the construction are contracted separately. Although the DBB approach is deemed fairer to the contractors, it is perceived as not able to create value for the infrastructure owner. Specifically, its lengthy procurement periods often result in less desirable outcomes such as excessive costs, poor quality and time delays. Recognising the drawback of this delivery system, the Indonesian government has introduced the Law of Indonesian Government No. 18, 1999 on Construction Services Regulation and Indonesian Government Regulation No. 29, 2000 on Construction Service Implementation. These two legislations state that construction project procurement can be delivered by means of an integrated approach. This suggest that a Design Build (DB) delivery system, in which design and construction stages are merged into one contract, is an acceptable form that is recognised as having potential to overcome the shortcomings of DBB delivery systems of Indonesia road infrastructure. Despite the regulation, the DB delivery system has not, to date, been implemented widely in Indonesian road infrastructure projects

This paper aims to examine the factors that influence the implementation of DB project delivery system in Indonesia. It begins by defining the DB project delivery system. Next, it examines the reasons for the lack of implementation of DB delivery system in Indonesian road infrastructure projects. Finally, it will propose the ways that can promote the successful implementation for DB project delivery system in Indonesia.

2. Concept of Design and Build (DB) Project Delivery System

Previous research has attempted to define the concept of the DB project delivery system. Generally, DB is an arrangement between an owner and a sole entity to execute both design and construction phases under one agreement (Construction Industry Institute 1997; Friedlander 1998; Beard ,Loukakis and Wundram 2001). Part, or all, of the design and construction might be executed by the entity or subcontracted to other firms. The contract is usually awarded on a lowest price or best value basis. Hence the central theme of the DB project delivery system is that the contractor has the responsibility to perform both the design and construction stages and so the system has several advantages. These advantages emanate from the contractor's early participation in the design process and include reduced project completion time, lower cost, enhanced communication (Anumba and Evbuoman 1996; Konchar and Sanvido 1998). This delivery system satisfies the client's need to accomplish projects earlier and with fewer overall expenses and additional costs.

Operationally, the real purpose of DB is to place design and construction in one company, i.e. the design builder (Levy 2007). Companies of this nature were formed when a general contractor employed an architect and an engineer as a team

to provide a full service association. Levy (2007) also describes DB as a system where general contractors proposes design build services and established a joint venture with an architectural company, or engage an architect (much as they engage subcontractors, to perform the design work). The Design and Build Institute of America (1996) explains that DB is also known as "design-construct" or "single responsibility". The contract the DB system is under one entity meaning that one entity performs both design and construction activities.

3. DB delivery system in Indonesia

Previous research reveals that DB project delivery system has been extensively and successfully implemented in many countries (Park et al. 2009; Koppinen and Lahdenpera 2007). Most of the DB system is adopted by private sector and state owned enterprises. Similarly, the need for adopting integrated project delivery system in road infrastructure projects in Indonesia has been discussed since mid 1990s. Despite the intense debate in the last 3 years (Soemardi and Pribadi 2010), the implementation of DB system in Indonesia is limited. The following sections discuss some of the reasons for the lack of implementation.

Lack of Regulation and Legal Framework

It has been argued that the limited implementation of the DB delivery system in Indonesia road infrastructure project can be attributed to the lack of regulation and framework (Soemardi and Pribadi 2010). Even though the integrated project delivery system such as DB is an acceptable delivery system in accordance to Law of Government No.18 and Indonesian Government Regulation No. 29, there is no detailed explanation for and guidance on implementing DB project delivery system, particularly in road infrastructure. Lack of enlightenment and instruction often lead to problems with misinterpretation and inappropriate attitude. Moreover, the fundamental issue of implementing DB project delivery system is the absence of specific rules and criteria to regulate DB project delivery system. For example, there is not clarification of the entity of the design builder, and what the criteria used to decide which project is appropriate to adopt DB project delivery system (Ministry of Public Works 2008). Lack of regulation and framework leads to difficulty in demystifying and accommodating DB project delivery system.

Similarly, Wahyudi (Wahyudi 2009) argues that this delivery system needs provision of appropriate budget in its implementation. DB, in general, is executed based on performance. Performance contract usually apply to multiyear budgeting arrangement, while current project delivery system use one year budgeting arrangement (Ministry of Public Works 2008; Wahyudi 2009). The multiyear arrangement funding has to be clearly stated. The client, in this case is the government should implement DB project delivery system only if there is adequate and clear budget arrangement. Otherwise, owners or clients can experience potential obstacle regarding in obtaining sufficient funds for implementing. Clear budget arrangement can convince the design builder that the clients are able to fund

the project immediately. This circumstance can affect the implementation of DB project delivery system.

Lack of experience, knowledge and skill

Wahyudi (2009) noted that another reason why DB is not implemented widely is the readiness of the construction industry in Indonesia. Particularly, he feels that skill, knowledge and experience are necessary in order to manage DB project delivery system. DB delivery system is a very intricate process that includes definition of scope of project, allocation of resource, facilitating multi-disciplinary project team and technical capability to execute project. Without the necessary, skill, experience and knowledge, the project will experience difficulties in quantifying cost, quality, and performance for highway construction (Carpenter ,Fekpe and Deepak 2003; Gibson et al. 2007) highlights that "problems can arise when the owner has ill-prepared project and equally ill-defined design-build criteria".

Without the necessary skills and expensive, it is also challenging for clients to attempt to implement a DB project delivery system for the first time as they are often constrained by the low-bid culture in their organisation (Molenaar and Gransberg 2001). In addition, the different characteristics of DB procurement usually lead to personnel spending extensive amounts of time experimenting with and developing new organisational routines to support the procurement change (USDOT Federal Highway Administration 2006). Lack of experience can create additional costs and time overruns, due to the need for educating the public, legislators, local governments, engineering firms, contractors and bonding and insurance companies who are to implement the design-build project delivery system for the first time (WYDOT 2002). The owner needs to be educated and informed about conveying ideas to the contractor in preparing the design specifications to ensure success when adopting the DB approach (Ibbs et al. 2003). The lack of past experience in the DB project delivery system can also cause uncertainty for the client trying to adopt DB delivery system. To implement DB delivery system successfully, the client therefore need to possess special management and procurement capabilities such as the ability to make judgements on a "best value" rather than a "lowest price" basis, to select DB offer, develop project requirements, asses project progress and quality, and to monitor payments.

In summary, the DB project delivery system is a new approach in government-funded Indonesian road infrastructure projects. Experience, skill and knowledge are thus required before the design and build delivery system can be implemented successfully in Indonesia.

4. Factors That Can Promote the Successful Implementation of DB

The DB project delivery system is perceived as an alternative project delivery system that can enhance the performance of road infrastructure projects in term of

cost, schedule and quality (Konchar and Sanvido 1998). Pietroforte and Miller (2002) predict that the implementation of a new approach for any state agencies implementing it can shift the paradigm of success after the decades-long use of the DBB project delivery system. The following sub-sections discuss factors that can promote the implementation of the DB project delivery system in Indonesia.

Improved regulation

The need to tighten current regulations in order to advance the adoption of DB has been argue by the National Society of Professional Engineers (1995) who states that "Selection of the design-build project delivery system without modification to current statutes and regulations can result in consequences that are contrary to the public interest". Accordingly, legal and regulatory changes are being sought by the public agencies to regulate the implementation of DB project delivery system. It is also expected that the detailed clarification of the regulations can overcome the barriers to implementing the DB project delivery system.

Therefore, modification for regulation is required to accommodate the implementation of DB project delivery system (Rahadian 2009). These amendments should provide further clarifications to aspects such as types of projects that are appropriate for design-build project delivery system, project procedures and appropriate designer builder entities.

a. Project appropriate for the DB project delivery system.

Gibson et al. (2007) emphasizes that deciding on when a project is appropriate for DB project delivery system and on what type of project is suitable for DB project delivery system are the critical stages to gain real benefit from the process. A debate is still ensuing over which projects are appropriate for the use of the DB project delivery system in Indonesia.

In the development of a DB project delivery system, the argument for what type of projects are appropriate for the DB project delivery system has changed. The DB project delivery system is perceived as a suitable approach for complex projects in all construction types (ASCE 1992; Molenaar and Songer 1998) as well as small project such as road widening or new construction, road rehabilitation or reconstruction, and for bridges (USDOT Federal Highway Administration 2006). Lam et.al (2004) suggested that types of projects need to be selected based on the size of project, level of complexity and project location. Accordingly, the type of projects suitable for using the DB project delivery system require further clarification in future amendments to the regulation

b. Project procedure

The current government legislation has not provided clear guidance on the procedures for using DB project delivery system. Project procedures consist of a

contractual arrangement and the tendering system (Akintoye 1994; Yates 1995; Sadeh ,D and A 2000; Lam ,Chan and Chan 2004).

There are three main methods of tendering namely(Molenaar ,Songer and Barash 1999):

- One step: award criteria based on price only
- Two step: award criteria based on qualifications and price
- Qualification-based: award criteria based on qualifications only, or qualifications and price

For instance, in the United States, the use of DB project delivery system was inhibited by the Federal Acquisition Regulation and the 1972 Brooks Act. It led the state and local procurement statutes to follow the federal procurement models (Pietroforte and Miller 2002). In 1996, the Federal Acquisition Reform Act (FARA) decreed that DB project delivery system can be engaged by using a two-phase procedure (Molenaar ,Songer and Barash 1999; Pietroforte and Miller 2002). Therefore, there is a need for procedures to be made clear before DB can be adopted as an alternative delivery system in Indonesia.

c. Design builder entity

The management of the DB delivery system, such as design criteria process, procurement process and executing process that can impact on the party which holds a dominant role in the Design Builder (Ministry of Public Works 2008). Tenah (2000, p.36) asserts that there is legal concern related to the relationship among the involved parties. Beard et al. (2001) emphasize the importance of the DB structural variations and how they relate to the structure of the design-build organisation and the different arrangements undertaken within. The existence of a team that involves the builder and designer creates unique legal issues considering the relationship between them. The formation of a design build entity will vary depending on several factors, as follows (National Society of Professional Engineers 1995):
Because the entity of design builder need to be regulated in the statute, it is inevitable that the design-build project delivery system as a new approach can create confusion in establishing this entity. Similarly, a mechanism that should be determined whether the constructor has entity including planner and supervisor or a consortium that consist of constructor, planner and supervisor. The need for structuring the organization is considering the effect of DB that may arise on the ability to Builder Design serves the client. Another reason is the management of the delivery system such as:

- The scope of the project
- The technical, managerial and administrative design and construction capability of the owner
- The technical, managerial and administrative design and construction capability of outside designers and constructors
- The availability of outside designers and constructors

- The owner's preference as to the structure of the outside design-builder team
- The requirements of or restriction in federal, state or local statute and regulations
- Case law
- Contract provision
- The availability of financing, insurance, and bonding to the DB team members
- Customary business practices in locality or region

Beard et al. (2001) proposes several structural variations in DB entity, as follows:

- Owner and Joint- Venture Design Builder
- Owner and Constructor-Led Design-Builder
- Owner and Designer-Led Design-Builder
- Owner and Integrated Design-Builder
- Owner and Developer-Led Design- Builder

Hence, there is a need to structure the organization in a DB entity as it can have effect on the ability of the Design Builder to serve as the client. For this reason, the entity of design builder in the DB delivery system needs to be regulated in the statute. However, there is confusion in establishing this entity. For example, a mechanism should be developed to guide the determination of whether the constructor should have an entity as planner and supervisor or a consortium that consists of constructor, planner and supervisor.

Management

Beside the strengthening of regulations, there is a need to strengthen the management aspects of organisation in order to embark on DB delivery system. This aspect is related to the owner competencies that involve experience, knowledge and skill. Although the DB project delivery system is extensively used and increasingly adopted, many agencies do not have the institutional culture suitable for implementing and operating a new project delivery system (Molenaar ,Songer and Barash 1999; Molenaar and Gransberg 2001). Therefore, the clients will experience difficulties if they are not accustomed to new system.

a. Commmunication

In implementing the DB project delivery system, the agency or client plays an important role. Experience and skill are crucial in successfully implementing design-build projects (Mo and Ng 1997; Leung 1999; Ling and Liu 2004; Lam ,Chan and Chan 2004; Lam ,Chan and Chan 2008; Xia and Chan 2010). The client should have experience of managing DB projects, and have skilled team members (Lam ,Chan and Chan 2004). Experience and skill enable the owner to manage the design process and design change (Pearson and Skues 1999; Chan ,Ho and Tam 2001). The skills involved are project management and technical skills (Lam ,Chan

and Chan 2008), and the staff will assist the client in the process of implementing the design-build project delivery system. The required project management skills can include: communication and feedback systems, quality, safety, risk and a conflict management system, organisational structures, control mechanisms of subcontractors' works, and the overall managerial actions in planning, organizing, leading and controlling (Lam ,Chan and Chan 2004). Lam (2008) states that the management needs to be involved in the up-front planning efforts and effectiveness of communication, control system, management system and organisational culture. Effective communication is expected to gain successful implemetation DB project delivery system. It can be done amongst ministries, division and parties involved in Design Build project delivery system.

b. Knowledge sharing and training

The infrastructure issues involve policy and decision-making that require practice and skills of the parties involved in this project delivery system. Lack of skills, experience and knowledge can be overcome with education through training in infrastructure field. This effort can address several challenges in the fields of infrastructure (Soemardi and Wirahadikusumah 2009), namely, first, efforts to incorporate a broader vision and integrated skills in the infrastructure education must not ignore the role of professional, second, practitioners or professionals must be willing to appreciate the value, contribution, and the views and interests of other stakeholders. The bureaucrats and practitioners should be more open with each other and respect among the various infrastructure professions (planners, engineers, architects, managers, decision makers, and environmental activists). The third challenge, the professional and bureaucrats are necessary to develop and implement work practices and procedures that are open to the input of other parties. The clients should provide efforts prior to executing DB projects, such as training, seminars, workshop with regard to DB project delivery system. The education through training, seminar and workshop in infrastructure field can be done by inviting expert from other countries and division or organisation who have applied DB project delivery system. Moreover, senior staffs of client who have past experience in executing DB projects should be able to educate others, share knowledge and keep communication to their junior about the DB project delivery system.

Conclusion

The purpose of this paper is to examine the factors that influence the implementation of DB project delivery system. Lack of regulation and legal framework; and lack of experience, skill and knowledge are the reasons why DB project delivery system is not widely implemented. Based on comprehensive literature review, there are two main ways to overcome those obstacles. Firstly, improved regulation by enlightening project appropriate for DB project delivery system, project procedure and design builder entity. Management is second way to overcome lack of experience, skill and knowledge. It can be done by enhanced communication, training and knowledge sharing.

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