Identifying Inhibiting and Enabling Factors for Design-Build Method Adoption in Local Government Projects in Indonesia

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ABSTRACT

A design and build (DB) is a method that offers several advantages, including accelerated implementation time and reduced costs. Nevertheless, the implementation of the DB method in local government projects in Indonesia is still constrained by a number of factors. The objective of this study is to identify the inhibiting and enabling factors in the adoption of the DB method in local government. This research approach employed a Delphi survey, which involved experts and practitioners. The data was collected through the administration of questionnaires. The study identified 15 key barriers to DB implementation, including a lack of supportive regulations, low literacy in risk management, and a lack of staff knowledge and experience in implementing DB methods. Furthermore, distrust and a preference for more familiar methods represent significant obstacles. In contrast, there were 20 enabling elements, which were divided into four main factors. These were regulatory adjustment, capacity building of users and service providers, effective management, and external support. Regulatory adjustments included adjustments to the DB tendering and contracting system and shared perceptions with the legislature. The capacity building of users and service providers encompasses pilot projects, individuals who possess a comprehensive understanding of DB, and the provision of sufficient financial resources. Effective management encompasses inter-organisational communication and knowledge transfer, as well as DB-related socialisation and training. External support encompasses public acceptance, stakeholder support, and favourable political, economic, and cultural conditions. The findings of this research indicate that in order to enhance the utilisation of the DB method within local government, it is essential to address the identified obstacles and to capitalise on the identified opportunities.

Keywords: design; build; procurement; project; government**.**

INTRODUCTION

The design and build (DB) project is a contractual agreement between the owner and the contractor, encompassing both the design and construction phases. This system entrusts the contractor with the responsibility of carrying out both the design and construction phases, yielding several benefits. The main advantages include the ability to start projects earlier and at reduced costs (El Asmar et al., 2013). The DB method has gained widespread popularity and is viewed as a solution to the limitations of traditional design-bid-build (DBB) methods. For project owners, this method is highly practical as it involves a single party responsible for both the project's design and construction (Anumba & Evbuomwan, 1997). A design and build (DB) project is a work contract from the owner to an integrated contractor (with a design and development contract system in one unit). The DB system is that the contractor has the responsibility to carry out the design and construction stages and this brings the system several advantages. These advantages come from early participation in the design process, and include reduced project completion times, lower costs and improved communication (Armaeni et al., 2023). Initial research indicates that not all local governments in Indonesia utilize the design and build method for procuring local government projects with APBD funds. However, some local governments have adopted this approach. This initial research also suggests that not all local governments fully comprehend the regulations for design and development within their regions, which explains the limited application of design and build methods.

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Researchers have supported various definitions of design and development (DB) systems. Masterman argues that "design-build" almost exclusively refers to one contractor being solely responsible (Masterman, 2003). The meaning of design and 2 build places design and construction under one company: design builder. When a general contractor hires an architect and engineer to provide a full-service association, a company of this nature is formed. In these situations, the contractor is responsible for designing and building the project (Levy, 2009). An integrated procurement system that provides design and construction services under one contract is known as design and build (DB). In this system, one institutional entity or business entity carries out design and construction and is responsible for all aspects(Chen et al., 2016). The tender process is the only step in the design and construction system (Hale et al., 2009). Therefore, compared with conventional systems that require two tender steps, it saves a lot of time. One builder or designer can design and construct a building in part or in full, or they can hire another contractor. Designers work closely with contractors in DB systems. In the design and construction project procurement system, the contractor or constructor is responsible for the design and construction of the project. They may differ due to financing, operations, and maintenance. So, it can be said that project procurement uses a single contract system between the project owner and the construction implementation team, which is responsible for completing the design and construction process effectively (Ratnasabapathy & Rameezdeen, 2006).

Design and build (DB) is a work construction contract where the provider has a unified responsibility for designing and completing the building. it is different from conventional methods, where service users only need to prepare a basic design (DED), not detailed designs. The procurement period required by the client is also shorter and parallel. The design and build integrated construction work procurement process begins with determining the need for construction work and ends with the announcement of the procurement plan (Mohd Nasrun et al., 2015). Requirements for the use of the design and build method: initial planning documents at the design concept stage are available; documents covering aspects of environmental requirements are available; experts who can supervise the planning and construction implementation stages; and are complex, require high technology, have high risks, and have enormous expenses (PUPR, 2020). The design and build (DB) method was first used in Indonesia in 1974. This method is used for private projects and state-owned enterprises such as mining, energy, gas, factories, infrastructure, dangerous buildings, ports, and water sources. According to the regulations, this method is permitted for use but has not yet been fully implemented in local government projects. For this reason, it is necessary to investigate how this technique can be used to procure local government projects (Yuwono, 2007). The characteristics of Design and Build describe it as an alternative project management system in which design and construction contracts are not separated. Since this system is under a single contract, design and construction are paid in a single financial transaction (Seng & Yusof, 2006). DB project procurement systems are highly effective because they have the power in procurement speed where the process to bid for construction separately from design services is eliminated (Sanvido et al., 1997). Shrestha's research shows that the DB project significantly outperforms the DBB project in terms of schedule savings. The study also found that the number of construction change orders was significantly lower in the DB project than in the DBB project (Shrestha & Fernane, 2017). The Design and Build (DB) procurement system, in addition to having superior performance/advantages but also having weaknesses/obstacles in its implementation, but in complex work conditions or urgent work, the work procurement system with the Design and Build (DB) system is very appropriate and suitable for use in accelerating infrastructure development in Indonesia (Dwijendra et al., 2023).

According to the explanation above, it is necessary to analyze the inhibiting and driving factors in the design and build system in local government project procurement. So it is hoped that each local government can implement design and build.

RESEARCH METHODS

To achieve the research objectives, research methods and techniques must be applied systematically and carefully. The research method employed is a combination of a literature study and the Delphi method (Grisham, 2009). A literature study was conducted with the objective of gaining an

understanding of the design system in project procurement and to ascertain the extent of its application.

The Delphi Method was employed as a means of obtaining historical data on the implementation of the Design-Build methodology in government projects, which remains scarce (Hallowell & Gambatese, 2010). In order to reach consensus on the drivers and barriers of the design-build system in local government project procurement, the opinions and comments of experts were sought. This research employs questionnaires to conduct surveys and provides results of clarification, verification, and validation to experts. The process is iterative and necessitates numerous rounds of questionnaires and feedback to consider all options and reach a consensus on the correct value.

Respondents

The respondents sampled in the questionnaire distribution were drawn from a variety of sources, including service users or local governments, service providers such as engineering consultants and contractors, as well as the university academic community. Experts in Design and Build (DB) implementation, on the other hand, are individuals who have implemented DB construction methods from ministries and state-owned contractors.

Surveying Methods

The survey was conducted in three stages. Prior to the commencement of the study, a list of questions was prepared and validated by five experts. This list was then subjected to validity and reliability tests. The results of the initial questionnaire were subjected to analysis, with the objective of utilising the findings as a basis for the subsequent questionnaire. This second questionnaire was designed to elicit further insights from the respondents, particularly in relation to their initial responses, and to ascertain whether any modifications were required in light of the results obtained from the review of other questionnaires. Moreover, the results of the two rounds indicated that there were obstacles to DB implementation. Subsequently, the outcomes of Rounds 1 and 2 were subjected to analysis with a view to utilising them as questionnaire items in Round 3, with a view to identifying the factors that drive DB implementation.

Data Analysis

Validity and Reliability Test

In accordance with the standards of validity and reliability testing, with the number N = 41, the r table can be observed in Table 1.1, and r table = 0.308. Therefore, it can be concluded that r count must be greater than r table and the significance level must be less than 0.05.

The reliability test method employed is that of Cronbach's alpha. Cronbach's alpha, also known as tau equivalent reliability or alpha coefficient, is a reliability coefficient and a measure of the internal consistency of tests and measurements. If the instrument value exceeds the value of 0.6, the instrument is deemed reliable. The following section presents the results of the validity and reliability tests conducted on the questionnaire.

Table 1. Validity Test Result

Item	Pearson Correlation	r table	Result
X01	.325*	0,308	valid
X02	.324*	0,308	valid
X03	.519**	0,308	valid
X04	.474**	0,308	valid
X05	.458**	0,308	valid
X06	.614**	0,308	valid
X07	.489**	0,308	valid

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Item	Pearson Correlation	r table	Result
X08	.357*	0,308	valid
X09	.348*	0,308	valid
X10	.330*	0,308	valid
X11	.311*	0,308	valid
X12	.474**	0,308	valid
X13	.480**	0,308	valid
X14	.348*	0,308	valid
X15	.430**	0,308	valid
X16	.505**	0,308	valid
X17	.639**	0,308	valid
X18	.441**	0,308	valid
X19	.518**	0,308	valid
X20	.575**	0,308	valid
X21	.565**	0,308	valid
…	…	…	…
X50	.407**	0,308	valid
X51	.515**	0,308	valid
X52	.516**	0,308	valid

Table 2. Reliability Test Result

Item	Cronbach's Alpha	Cronbach's Alpha > 0,60
X01	0,925	reliable
X02	0,924	reliable
X03	0,923	reliable
X04	0,923	reliable
X05	0,923	reliable
X06	0,922	reliable
X07	0,923	reliable
X08	0,925	reliable
X09	0,925	reliable
X10	0,924	reliable
X11	0,924	reliable
X12	0,925	reliable
X13	0,923	reliable

Item	Cronbach's Alpha	Cronbach's Alpha > 0,60
X14	0,925	reliable
X15	0,923	reliable
…	…	…
X50	0,924	reliable
X51	0,923	reliable
X52	0,923	reliable

RESULT AND DISCUSSION

The data for this study was collected in several stages through the distribution of questionnaires. After obtaining validation from experts, passing the validity and realibility tests, the questionnaire was distributed to all local government areas of Bali Province. The questionnaire was designed to be completed by construction actors involved in the procurement of local government projects, including government agencies (commitment-making officials or PPK), goods and services procurement committees (PPBJ), engineering consultants, main contractors, and academic universities. The objective is to ascertain the extent of stakeholders' comprehension of design and development (DB) knowledge, its advantages, and the challenges associated with its utilisation for project procurement within the Bali local government context.

In the initial phase of the study, 50 questionnaires were distributed to various stakeholders in the Balinese government, including district and provincial authorities, engineering consultants, main contractors, and universities. Of the 50 questionnaires distributed, 41 were returned, providing the following details regarding respondents:

A descriptive analysis of the data revealed that the average respondent achievement rate (TCR) was 77.44%, indicating that respondents demonstrated an understanding of the concept of design and build. The research proceeded with the distribution of phase II questionnaires based on the TCR value, with the objective of clarifying and convincing respondents as to whether their answers remained unchanged or had undergone a change.

The responses to the Delphi Round II questionnaire indicated that participants continued to concur with the findings of Round I. Based on the analysis of both questionnaires, it was determined that their comprehension of the concept of design and build was classified as proficient. The understanding in this case encompasses knowledge of DB, advantages of DB, and barriers to the application of design and construction in the local government of Bali. The aforementioned understanding pertains to the comprehension of each individual as a participant in local government construction activities.

The responses to the initial and second rounds of the Delphi questionnaires indicate that there are 15 indicators that impede the implementation of DB. The 15 indicators of DB barriers can be found in Table 3.

Table 3. Inhibiting Factors of DB

No	Inhibiting Factors
1	Lack of regulations governing design and build contract agreements
2	Lack of regulations governing design and build procurement systems
3	Lack of literacy on risk-based management approach to design and build contracts
4	Lack of knowledge related to design and build
5	Lack of effort to implement design and build

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No	Inhibiting Factors
6	Lack of qualified staff to execute design and build projects
7	Insufficient number of employees who can implement design and build projects
8	Lack of experience of employees who can implement design and build projects
9	Customers prefer more familiar methods
10	Customers are not confident in implementing design and build
11	Customers do not know the benefits of implementing design and build
12	Lack of experience and ability of the stakeholders involved
13	Lack of design skills
14	Lack of specialised design and build specialists
15	Lack of project information that can be used as a case study

In order to facilitate the implementation of DB in Bali's local government, it is essential to address the aforementioned inhibiting factors through the creation of supportive drivers. The following drivers have the potential to effectively eliminate the identified inhibiting factors.

Table 4. Driving Factors of DB

No	Elements	Sub-Elements
1	Regulation	a. Adjustment of regulations based on project characteristics
		b. Availability of risk approach to manage project risks
		c. Adjustment of regulation on DB tender system
		d. Adjustment of regulations on the content of DB-related contract agreements
		e. Equalisation of Perception to Legislative Parties related to DB
2	Ability from user and provider	a. Availability of Pilot Projects that have been done and can be used as case studies
		b. Individuals who understand the concept of DB in depth
		c. Existence of User and Provider Experience in executing High Complexity Projects
		d. Adequate financial support
3	Managerial from user and provider	a. Establishment of communication and knowledge transfer between and among user and service provider organisations.
		b. The existence of individuals who have the qualifications to implement DB
		c. Management has a vision to implement DB
		d. Socialisation is held to improve and increase the understanding of the parties involved in DB
		e. There is training related to DB given to all individuals involved
		f. Establishment of special organisational structure for DB implementation

No	Elements	Sub-Elements
4	External	a. Implementation is accepted by the general public b. Political environment c. Support from stakeholders d. Support from industrial service providers (Subcon) e. Economic environment f. Influence of weather, topography, and demographics

CONCLUSION

This research aims to assess the awareness and understanding of regional government stakeholders regarding the implementation of the Design and Build (DB) system in public projects. It investigates both the barriers and enablers of DB system application in regional government projects in Indonesia, exploring the interactions and hierarchy among these factors. The study also seeks to formulate a DB model tailored for regional government procurement. The findings reveal that stakeholders in regional governments, especially in Bali, possess a strong grasp of the DB concept, its benefits, and the associated implementation challenges in public projects. Respondents' understanding averages at 77.44%, indicating a high level of comprehension of the DB system. Nonetheless, significant obstacles remain, including the absence of specific DB contract regulations, inadequate knowledge and experience among staff, and resistance from clients who prefer traditional methods. The study identifies 15 principal barriers, such as deficient regulatory frameworks, inadequate risk management strategies, insufficient training and information dissemination, and a shortage of qualified personnel for DB projects. On the other hand, the study highlights driving factors that could facilitate DB adoption, including legislative involvement, the availability of risk management strategies, and stakeholder support. The proposed DB model underscores the necessity of harmonizing perceptions between executive and legislative bodies, establishing specific regulations, and ensuring sufficient financial backing and qualified personnel. Training and information dissemination about DB are vital to enhance stakeholders' knowledge and skills. In conclusion, the successful implementation of the DB system in regional government projects necessitates a holistic approach that tackles both barriers and enablers. By developing a well-structured and systematic DB model, regional governments can improve the efficiency and effectiveness of their procurement processes, thereby contributing to regional development and infrastructure enhancement in Indonesia.

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