Design bid build to integrated project delivery: Strategic formulation to increase partnering

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Abstract: COVID-19 pandemic has caused many design bid build projects to suffer losses. Design bid build or DBB has the disadvantage of depth partnering. The research purpose is to reveal the depth of partnering of DBB, the characteristics of existing partnering in DBB through detection in each project life cycle in DBB, then efforts to increase DBB partnering to partnering in integrated project delivery (IPD). The methodology used is secondary data from three project DBB, then validation using focused group discussions (FGD) with expert judgment, then the Delphi method to analyse and propose recommendations. This project recommends that DBB project can improve the project performance so stakeholder can increase partnering toward integrated project delivery (IPD) partnering. This research can be used for increasing partnering in DBB projects towards partnering in IPD. This research will produce strategic recommendations that can be utilized by stakeholders (owner, contractor, designer) in improving project performance to generate great value for the project, will result in long-term project sustainability, improve relationships, and learn valuable lessons for future projects. DBB projects usually experience many problems due to the competitive nature of partnering for owners, contractors, and designers, so it is necessary to develop an overall strategy as an option to improve partnering in DBB project contracts. This research will help create a sustainable project by the owner, contractor, and designer.

Keywords: design-bid-build; integrated project delivery; maturity partnering; partnering; project life cycle

1. Introduction

All construction projects always want to be successful in achieving their goals, namely the achievement of indicators of cost, quality and time in accordance with the principles that are believed and set as indicators of the project being said to be successful for handover. Previous research has revealed that there are still impeding issues in construction projects that delay the project and prevent all indicators from being met (Sari et al., 2021; Sari, Irawan, Wibowo, Siregar, Praja, 2023; Sari, Irawan, Wibowo, Siregar, Tamin, et al., 2023). Changes in design, specification, cost overruns, and variation orders all indicate that a project is not completed properly (Ballard, 2000a; Hermanto et al., 2018; Koskela et al., 2002; Koskela, Howell, Lichtig, 2006; Sari, Irawan, Wibowo, Siregar, Praja, 2023; Sari, Irawan, Wibowo, Siregar, Tamin, et al., 2023). The most difficult aspects of implementing lean
construction are (1) concept comprehension, (2) design and construction integration, and (3) effective communication among the various participants (Adamtey, 2021; Katar, 2019; Kraakenes et al., 2019; Lam et al., 2004; Tran et al., 2016; Xia et al., 2015). In the field, various project delivery systems have been implemented with varying goals in mind to improve project quality. A common project delivery system is design-bid-build.

1.1. Partnering in construction project

A long-term commitment between two (owner and contractor) or more organizations (owner, contractor, consultant, sub-contractors, supplier, etc.) to improve communication, engagement to achieve specific project objectives by maximizing the effectiveness of each participant’s resources is defined as partnering in construction project (Eriksson, 2015; Larsson and Larsson, 2020; Thompson’ et al., 1998). According to Thompson et al. (1998), partnering is classified into four levels there are competition, cooperation, collaboration, and coalescence. Each of them possesses the following characteristics, according to Table 1, shown the depth of partnering begins with competition and progresses through cooperation, collaboration, and coalescence (Thompson et al., 1998). Increased partnering yields numerous benefits and adds value to construction projects. Partnering have implications for risk sharing and culture sharing at the most fundamental level (Thompson et al., 1998).

<table>
<thead>
<tr>
<th>No.</th>
<th>Level of partnering</th>
<th>Characteristics</th>
</tr>
</thead>
</table>
| 1)  | Competition         | 1) There is no shared objective that is created and can cause conflict.  
               |                     | 2) Measure the success of the project from the costs incurred.  
               |                     | 3) Short term focus on implemented projects.  
               |                     | 4) Not developing a comprehensive measure of the project.  
               |                     | 5) Relations are competitive.  
               |                     | 6) There is no overall improvement on fragmented projects.  
               |                     | 7) Single contract on project implementation only owner and contractor.  
               |                     | 8) Trust is not deep and there is no risk sharing in the project.  |
| 2)  | Cooperation         | 1) Project objectives began to be prepared together.  
               |                     | 2) There is an increase in interpersonal relationships in the project.  
               |                     | 3) Each team member is involved in partnering that occurs in the project.  
               |                     | 4) Using previous project experience as a lesson learned to be developed in the project.  
               |                     | 5) Communication is developed better. Trust begins to grow by developing a risk-sharing scheme in project planning.  |
| 3)  | Collaboration       | 1) Long-term focus on strategic goals in order to participate in project implementation.  
               |                     | 2) Project participants collaborate with one another.  
               |                     | 3) Project and relationship measurement system that is consistent.  
               |                     | 4) Improving the process of joint project control.  
               |                     | 5) Relationship-based metrics linked to team incentives  |
Table 1. (Continued).

<table>
<thead>
<tr>
<th>No.</th>
<th>Level of partnering</th>
<th>Characteristics</th>
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<tbody>
<tr>
<td>4)</td>
<td>Coalescence</td>
<td>1) Development of a comprehensive and joint measurement system.</td>
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<td></td>
<td></td>
<td>2) Collaborative in carrying out work from start to finish.</td>
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<td>3) Cultural integration in work management.</td>
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<td>4) Transparency in cooperation</td>
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<td></td>
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<td>5) Trust is very high and risk sharing occurs.</td>
</tr>
</tbody>
</table>

Figure 1 describes the partnering that has been carried out since before the project started between construction project stakeholders which will result in joint evaluation, escalation, continuous improvement, and persistent leadership, to produce projects with better performance includes cost, quality, time safety and environmental (Elizar et al., 2017; Li et al., 2013; Love, 2002; Ramanathan and Narayanan, 2012).

Figure 1. Project partnering framework (Larsson and Larsson, 2020).

1.2. Design bid build project
1.2.1. Characteristics

The project delivery system is a set of activities and stakeholder involvement based on the project’s life cycle, which contractual relationships between stakeholders and mechanisms for managing project performance in terms of cost, quality, time, safety, and the environment (Elizar et al., 2017; Pal et al., 2017; Xia et al., 2015). The three main types of project delivery systems are design bid build (DBB), design and build (DB), and integrated project delivery (IPD) (Asmar et al., 2013; Katar, 2019; Sari, Irawan, Wibowo, Siregar, Praja, 2023). The project delivery system influences the project’s communication and performance patterns (Sari, Irawan, Wibowo, Siregar, Praja, 2023; Asmar et al., 2013; Baiden et al., 2006; Eriksson, 2015; Larsson and Larsson, 2020) as well as stakeholder involvement before the project begins and stakeholder involvement throughout the project life cycle.

Design-bid-build is used when the owner wants to separate functions in the construction process. The owner prefers that a different company design and build the project. It strives for professionalism in the work performed within their respective scopes (Ashcraft, 2022; Glavinich et al., 2008; Katar, 2019; O’Connor, 2009).

In Figure 2, The owner first hires a team of architects and engineers to prepare design work, which leads to the preparation and development of drawings and technical specifications in accordance with construction documents that describe the
building’s details. In contrast to DB projects, where the agreement is between the owner and a single entity to carry out design and construction work under the same contract, the implementation of design and construction is carried out by different entities (designer & builder). The owner creates definitive design criteria that must be followed in cases where part or all the design and construction can be completed by the designer or subcontracted to another company (Asmar et al., 2013; Katar, 2019; Kent et al., 2010; Molenaar and Johnson, 2003; Patil and Molenaar, 2011). The DB projects are under consideration.

![Figure 2. Design Bid Build (DBB) (Asmar et al., 2013; Katar, 2019).](image)

Construction firms were then invited to bid on the project. Before estimating the costs to build this project, each bidding company examines the construction documents. The bids are then evaluated by the owner, and the construction contract is awarded to the bidder who he or she believes is the best fit. This decision may be made solely based on the bid price, or it may take into account other factors related to the bidder’s qualifications. As a result, the construction documents become part of the construction contract, and the work is completed by the chosen company. Except for small projects, the winning company serves as general contractor, coordinating and managing the entire construction process. It may, however, rely on smaller, more specialized subcontractors to complete the majority, if not all, of the construction work. During construction, the design team continues to provide services to the owner, ensuring that the project adheres to the document requirements and answering questions about design, contractor payments, job changes, and other similar issues. As a result, the construction documents become part of the construction contract, and the chosen company completes the work. Apart from small projects, the winning firm acts as general contractor, coordinating and managing the entire construction process. However, the majority, if not all, of the construction work may be completed by smaller, more specialized subcontractors. Throughout the construction process, the design team continues to provide services to the owner, ensuring that the project adheres to the document requirements and answering questions about design, contractor payments, job changes, and other similar issues (Ballard, 2000b; Howell and Ballard, 1998; Tommelein, 2015).

1.2.2. Maturity partnering of DBB

The partnering process in the DBB project delivery system is classified based on the following stages (Katar, 2019; Schwartz et al., 2014; Tommelein and Ballard, 2007; Tommelein, 2015; Tran et al., 2016; Zimina et al., 2012):
a) Stages the owner recruits a designer consultant through an auction (bid) resulting in competition between design consultants.

b) The design implementation stage at this stage is the activity of the designer consultant preparing the design is a competition: if the design consultant conducts a tender (bid) between design sub-contractors, for example data consultants, investigative consultants, etc. (Katar, 2019).

c) Stages the owner recruits for contractors, at this stage is competition: if the owner in carrying out the selection of contractors conducts a tender (bid) so that there is competition between contractors.

d) Stages of construction implementation at this stage there were 2 (two) activities in the implementation of construction namely:

i. The interaction between the design consultant and the contractor occurs in partnering is competition: the contractor and the design consultant supervise each other in the implementation of construction. The contractor evaluates the DED, the design consultant supervises the implementation of the DED.

ii. The interaction between contractors and sub-contractors/suppliers in the implementation of construction, the partnering that occurs is competition: if the selection of sub-contractors/suppliers is the result of a tender (bid).

As a summary of partnering in DBB, table is presented in Table 2. Table 2 shown that in the DBB project delivery system the partnering process is in the form of competition and collaboration, competition occurs when the owner chooses to make a pure bid (tender) both when selecting contractors and consultants, as well as contractors when selecting subcontractors.

Table 2. Stage partnering of design bid build (Katar, 2019; Sari, Irawan, Wibowo, Siregar, Praja, 2023; etc.).

<table>
<thead>
<tr>
<th>The owner is looking for a designer</th>
<th>competition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implementation of design</td>
<td>competition</td>
</tr>
<tr>
<td>The owner is looking for a contractor</td>
<td>competition</td>
</tr>
<tr>
<td>Construction execution</td>
<td>competition</td>
</tr>
<tr>
<td>Interaction of the contractor and the designer</td>
<td>competition</td>
</tr>
<tr>
<td>Contractor-subcontractor/supplier interaction</td>
<td>competition</td>
</tr>
</tbody>
</table>

1.2.3. Advantage and disadvantage DBB

Among the benefits of DBB are the project structure’s simplicity, well-established legal practice, and management. The owner’s direct relationship with the design team ensures that the owner retains control over the design and that a fit system of checks and balances is in place throughout the construction process. Furthermore, because the design work was completed prior to bidding on the project, the owner began construction with a fixed cost and a high level of confidence in the project’s final cost. Table 3 shows the advantage and disadvantage of the DBB project as presented by Katar (2019) (Katar, 2019; Sari et al., 2021; Sari, Irawan, Wibowo, Siregar, Praja, 2023). Table 3 shows the researchers’ similarities in terms...
of advantages and disadvantages in the DBB project. Where the separation of entities between designer and contractor causes a variety of issues in design, supervision, and project variation orders.

Table 3. Advantage and disadvantage DBB (Katar, 2019; Sari, Irawan, Wibowo, Siregar, Praja, 2023).

<table>
<thead>
<tr>
<th>Researcher</th>
<th>Advantage</th>
<th>Disadvantage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sari EM (2022)</td>
<td>1) The design team is objective and looks out for the best interests of the owner.</td>
<td>1) Failures in the design team may increase the cost and delay the DBB project.</td>
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<tr>
<td></td>
<td>2) The system is fair to prospective bidders and assists the owner in making better decisions.</td>
<td>2) The general contractor faces increased risk, as well as the possibility of compromising quality to reduce project costs.</td>
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<tr>
<td></td>
<td>3) It aids the owner in determining an appropriate project cost.</td>
<td>3) There is little opportunity for input on cost-effective alternatives because the general contractors brought pre design to the team.</td>
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<tr>
<td></td>
<td>4) In general, project completion meets acceptable quality levels.</td>
<td>4) Pressure on the design and construction teams may result in disagreements between the architect and the general contractor.</td>
</tr>
<tr>
<td>Katar (2019)</td>
<td>1) Planning is driven by desired needs rather than economic feasibility, financial availability, or the owner’s ability.</td>
<td>1) The project’s performance is inferior to that of DB.</td>
</tr>
<tr>
<td></td>
<td>2) There are penalties for late work and cost overruns in the contract, as well as incentives for on-time performance.</td>
<td>2) A variation cost that is higher than the DB at the end of the project.</td>
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<td></td>
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<td>3) Planners and contractors do not produce an integrated design.</td>
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<td>4) Rising project costs.</td>
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</tbody>
</table>

1.3. Integrated project delivery system

1.3.1. Characteristics

IPD is following three key aspects (Ashcraft and Bridgett, 2011; Asmar et al., 2013; Dossick et al., 2013; Ghassemi and Gerber-Becerik, 2011; Glick and Guggemos, 2009; Guan, 2018; Leicht and Harty, 2017; Rached et al., 2014).

a) One multiparty contract is signed by all key project stakeholders.

b) When only 0% of the design is completed, that is, before the design even begins. Many project participants, including the owner, general contractor, architect, consultants, subcontractors, and suppliers, can be regarded as key stakeholders.

c) Sharing risks and benefits.

d) It should be noted that IPD is a relatively new concept that is still evolving and far from being universally standardized, the relationships between key participants are governed by a single multiparty agreement; and these key participants are involved very early in the project, typically before the design even begins.

Figure 3 shows that the IPD is involved in the project while the design is still at 0% progress, allowing for the partnering depth of each project stakeholder to be established before the project begins, resulting in improved project performance (Asmar et al., 2013; Kent et al., 2010; Larsson and Larsson, 2020; Mollaoglu-Korkmaz et al., 2013; Thompson et al., 1998).
1.3.2. Maturity partnering of IPD

In the integrated project delivery (IPD) system, the partnering process is divided into the following stages (Asmar et al., 2013, Katar, 2019):

1) The steps for the owner to looking for a designer consultant and contractor are carried out through direct appointment by the owner to the designer consultant and contractor or DB so that cooperation occurs in this process. In this process jointly laying the foundations of IPD where the three parties carry out cooperation openly, the basis is the existing basic design each of which proposes the need for design costs and construction implementation. Each stakeholder has expectations of better performance, it is even possible to have an agreement if they can provide the best value from the general ceiling (estimated) where there is an incentive distribution between owners, consultants, contractors. All clarity and agreement contained in the agreement.

2) Stages of IPD implementation (Asmar et al., 2013, Katar, 2019, Sari, Irawan, Wibowo, Siregar, Praja, 2023)

In this stage there is a quality of interaction with openness, honesty, and willingness to deliver better work so that you will get a reward for the work done. At this stage, 2 (two) activities occur in the implementation of IPD, namely:

a) Interaction between the owner, designer consultant, contractor occurs in partnering by means of cooperation.

b) The interaction between contractors and sub-contractors/suppliers in the implementation of construction, the partnering that occurs is cooperation where from the start the sub-contractors/suppliers are invited to interact to realize the success of the project since the design has not yet started.

Table 4 illustrates that all processes in the project life cycle are carried out with cooperation, the involvement of each stakeholder from the start of the project makes partnering in IPD simpler and the project life cycle will be easier to implement in a shorter period compared to project delivery other systems.

Table 4. Stage partnering in IPD (Asmar et al., 2013; Sari E.M, Irawan, Wibowo, Siregar, Praja, 2023).

| Owner takes bid to looking for designer consultants and contractors | cooperation |
| Construction implementation | cooperation |
| Owner, designer consultant, and contractor interaction | cooperation |
| Contractor subcontractor/supplier interaction | cooperation |
Table 4 shows the pattern of partnering in IPD is at the level of cooperation for all stages. This shows that there has been stakeholder involvement from the start of the project marked by in-depth interaction and shared value between project stakeholders so that the IPD project provides better added value. Table 5 compares various delivery projects studied by previous researchers that have had an impact on project performance in terms of cost, quality, time, safety, and so on. Table 5 shows types of project delivery systems, including DBB, DB, and IPD, affect project performance in terms of cost, quality, time, safety, and other factors.

Table 5. Comparison of research on DBB and integrated (DB and IPD) projects (Adamtey, 2021; Akadiri et al., 2012; Asmar et al., 2013; etc.).

<table>
<thead>
<tr>
<th>Researchers and year</th>
<th>Performance indicators</th>
<th>Cost</th>
<th>Quality</th>
<th>Time</th>
<th>Safety</th>
<th>Others</th>
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<tbody>
<tr>
<td>James Pocock et al. (1996)</td>
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<td>Molenaar et al. (1999)</td>
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<td>Sanvindo and Konchar (1998)</td>
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<td>Chan, Chan, et al. (2004)</td>
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<td>Debell and Ries. (2006)</td>
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<td>Forbes (2011)</td>
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<td>Asmar et al. (2013)</td>
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<td>A. S. Hanna et al. (2019)</td>
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<td>Yana et al. (2015)</td>
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<tr>
<td>Katar (2019)</td>
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<td>Sari EM (2022)</td>
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1.3.3. Advantage and disadvantage IPD

From previous research explaining that IPD has many advantages in overcoming project problems, creating more value and can improve performance, however, IPD has not been fully implemented in government projects, where it is feared that there are elements that are not transparent in the selection of partners. The advantages and disadvantages of IPD based on the opinions of various studies are listed in Table 6. (Asmar et al., 2013; Bellini et al., 2016; Elghaish et al., 2020; Elghaish, Abrishami, Abu Samra, et al., 2021; Hosseini et al., 2018; Mohammad Hasanzadeh et al., 2014; Perera et al., 2014; Sari, Irawan, Wibowo, Siregar, Praja, 2023; Wøien et al., 2016) Hall and Scott, 2016, 2019). Table 6 shows that IPD is a solution in system delivery projects to share risks and reduce the weaknesses of design changes and variation orders. IPD makes engagement better by increasing a sense of trust between stakeholders in the project, however IPD cannot yet be implemented in government projects.
Table 6. Advantages and disadvantages of IPD.

<table>
<thead>
<tr>
<th>Advantage</th>
<th>Disadvantage</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Early construction manager involvement improves coordination (Ashcraft</td>
<td>1) Not yet believed by all stakeholders is the best solution in project delivery. (Asmar et al., 2013, Sari,</td>
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<tr>
<td>and Bridgett, 2011; Ghassemi and Gerber-Becerik, 2011; Glick and Guggemos,</td>
<td>2) Not yet implemented in government projects.</td>
<td>Irawan, Wibowo, Siregar, Praja, 2023, Ashcraft and Bridgett, 2011; Dossick et al., 2013; Glick and Guggemos, 2009; Leicht and Harty, 2017; Thompson et al., 1998; Xia et al., 2015.</td>
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<tr>
<td>2) Involving the team from the start of the project, including the designer,</td>
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<td>builder, and contractors, to assist the owners in crystallizing the project’s</td>
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<td>goals and objectives and collaborating throughout the project (Asmar et al.,</td>
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<td>2013; Thompson et al., 1998).</td>
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<tr>
<td>3) Team members who participate share the benefit of meeting project targets</td>
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<td>while also bearing the risk of project cost overruns (schedule and quality).</td>
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<td>4) The parties sign a single contract agreement outlining all team members’</td>
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<td>roles and responsibilities (El-adaway et al., 2017; Hall and Scott, 2016).</td>
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<tr>
<td>5) The parties must agree on a clear and specific set of project decision-</td>
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<td>making and control criteria, which can be established based on the project</td>
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<td>goal of the owner (Thompson et al., 1998; Xia et al., 2015).</td>
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<td>6) To maintain a sense of fairness, contracted parties waive any claim</td>
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<td>against one another, except in the case of willful default.</td>
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<td>7) To maintain a sense of unity and a collaborative environment,</td>
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<td>contracted parties waive any claim against one another, except in the case</td>
<td></td>
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<td>of willful default (Sari, Irawan, Wibowo, Siregar, Praja, 2023; Thompson et al., 1998).</td>
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<td>8) The owner, in collaboration with the project team, establishes</td>
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<td>measurable goals and benchmarks. Achieving the objectives entails both risk</td>
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<td>and reward (Asmar et al., 2013).</td>
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</table>

The objective of this research is that it is hoped that the owner can change the perspective of choosing partners through deeper collaboration with the same vision since before the project was implemented in its project life cycle. The factors of objectivity, trust, fairness can be developed more deeply through this concept by selecting partners who have the same loyalty, experience, and vision in realizing the project’s success.

2. Research methodology

This research uses secondary data with three projects in Indonesia, with building qualifications with a value of over 1 billion rupiah, the results show from previous research (Adamtey, 2021; Asmar et al., 2013; Chen et al., 2016; Katar, 2019; Lam et al., 2004; Molenaar et al., 2023; Sari, Irawan, Wibowo, Siregar, Praja, 2023; Tran et al., 2016; Xia et al., 2015) that the DBB project experienced delays due to several factors, especially design changes and material scarcity in projects (Abotaleb et al., 2019; Dixit, Mandal, et al., 2017; Conte and Gransberg, 2001; Johansen and Walter, 2007; Sari et al., 2021; Rached et al., 2014; Abdelhamid et al., 2008; Sari, Irawan, Wibowo, Siregar, raja, 2023; Tommelein, 2015). Based on the secondary data, a focus group discussion (FGD) was carried out with the aim of uncovering the causes of project delays. The FGD was held by presenting 14 experts
consisting of owners, contractors, designers, and academics. The profile of the expert must meet the following criteria:

a. Expert in construction management and/or expertise in civil and building engineering. Have experience as a construction management expert with a minimum title of Ph.D., preferably a professor of construction management at least four people.

b. Practitioners/contractors/owners in the field of civil buildings, especially buildings. Have experience in managing civil buildings, especially buildings for at least 20 years. If a project manager has at least a project manager experience of more than 10 years in the field of civil buildings.

The stages of the data analysis method are carried out based on Figure 4 as follows:

Figure 4. Step by step of the research.

Figure 4 describes the step-by-step research starting from analyzing secondary data on a national-scale DBB project, then carrying out expert judgment through in-depth interviews and expert FGDs, then carrying out Delphi analysis by developing consensus in decision making. Recommendations are built based on a consensus that is represented by all stakeholders in the construction projects are carried out.

3. Results

The findings of this study constitute a model for improving partnering in DBB projects to improve project performance in terms of cost, quality, time, safety, and the environment. This is critical for the project’s long-term viability. As we know, construction projects are considered fragmented due to different perceptions of each stakeholder in the project (Asmar et al., 2013; Sari, Irawan, Wibowo, Siregar, Praja, 2023; Sari, Irawan, Wibowo, Siregar, Tamin, et al., 2023; Thompson et al., 1998; Xia et al., 2015). Figure 5 illustrates how conceptual partnering in DBB projects can be improved from the existing partnering condition which is competition so that it increases project performance (Ballard, 2000b; Besiktepe et al., 2020; Elizar et al., 2017; Falesi et al., 2006; Howell and Ballard, 1998; Sari, Irawan, Wibowo, Siregar, Praja, 2023; Thompson’ et al., 1998.; Viana et al., 2020; Xia et al., 2015; Zhao and Li, 2013).
Figure 5. Conceptual improvement partnering in DBB project (Sar E.M, Irawan, Wibowo, Siregar, Praja, 2023; Sari E.M, Irawan, Wibowo, Siregar, Tamin, et al., 2023).

3.1. Quantification and statistical analysis

Quantitative analysis is carried out by comparing secondary data on DBB_A, DBB_B, and DBB_C projects based on them monthly progress achievements as shown in Figure 6. Figure 6 explains that the performance of the DBB project as shown from the three projects above has experienced delays, several causes of delays are due to design changes, worker skills, material delays, slow decision making, delays in payments by the owner and due to COVID-19. Then compared the standard deviation between the three projects based on Figure 7.

Figure 6. Monthly progress comparation (Sari, Irawan, Wibowo, Siregar, Praja, 2023).

Figure 7 illustrates deviation standard of the project, deviation standard is to show the progress of the project to the average value of the population, the closer to the value of one deviation the better. As can be seen from the numbers that occurred, all of them showed a large deviation value, so this further strengthened the fact that the DBB project had a performance that was not in accordance with the plan.
3.2. FGD recommendation

The increase in partnering in DBB to partnering with IPD can be implemented by changing the ways in which stakeholders are selected since the beginning of the project. Below are recommendations for increasing DBB partnering to IPD. Some of the partnership improvements that can be made are as follows:

i. The owner’s process selects designers from competition to cooperation by appointing designers who have experience and project competence, have the same vision as the owner.

ii. The process of selecting contractors from competition to cooperation by inviting contractors to be involved in project development from the start.

iii. The process of contractors choosing suppliers/subcontractors from competition to long-term cooperation and sustainability by jointly thinking about materials and work operations.

The partnering change model from competition to collaboration in the DBB project can be illustrated in Figure 8.

From Figure 8, DBB projects that initially had competitive partnering have an alternative to collaboration, so that if the entire process can be carried out in cooperation, then it will form partnering as in integrated project delivery (IPD) as follows:

Figure 8 illustrates that DBB projects can increase partnering to collaboration without having to change the DBB project contract. This is in accordance with
maturity partnering in IPD, so that the advantages in IPD can be adopted in the DBB project.

3.3. Discussion

DBB projects with separate contracts between designers and contractors can improve project performance without having to change the DBB contract. A potential solution is for the owner to change the way designers and contractors’ contract by inviting designers and contractors from the start before the project starts, even if the entities are different. Likewise, contractors must enter contracts with long-term suppliers before the project starts (Thompson et al., 1998; Xia et al., 2015). Companies form collaborative relationships with “preferred” suppliers for relationships involving multiple projects with specific business objectives. Increasing the depth of partnering in construction projects can be carried out from the very beginning when the owner defines the project, the concept of sharing risks and rewards will reduce losses and understanding project contracts separately between stakeholders (Hussain et al., 2014; Adamtey, 2021; Alaloul et al., 2016; Dixit, Pandey, et al., 2017; Goh et al., 2013; Jacobson and Ok Chio, 2008; Kraakenes et al., 2019; Lam et al., 2004; Li et al., 2013; Molenaar et al., 2023; Momade et al., 2022; Songer and Walker, 2004; Xia et al., 2015).

This research takes project case studies in Indonesia where in Indonesia there are only two types of project contracts, namely DBB and DB. the alternative to becoming an IPD as happened in developed countries such as the US and Europe is a challenge in Indonesia. however, even though project contracts are not fully IPD as regulated in developed countries, project stakeholders in Indonesia can change their interaction behavior through deeper partnering in projects. The contract or type of project being carried out is still DBB without changing the characteristics of the project, but the partnering is deepened into IPD, or from competition to cooperation. With this change in behavior, it is hoped that it will create better value in the project and will result in better project performance (cost, quality, time, safety, and environment). projects with better performance will encourage long-term sustainability and generate economic profits for all stakeholders involved in the project. The achievement of project performance is influenced by the relationship in the project delivery system, a project delivery system without partnering will produce projects with short-term goals and compete. When there are unpredictable conditions such as the covid-19 pandemic, partnering development is essential to anticipate the risks that occur in the project. From the previous research (Thompson et al., 1998) some benefit increase partnering in construction projects have 10% increase worker productivity, 100% project success and reduction 50% repetitive work repeated.

4. Conclusions

Partnering in construction projects has a major impact in achieving project objectives. The design bid build project has the peculiarity of having a separate contract between designer and contractor so that there is a possibility of project delays due to different entities in deciding and communication limitations.
Partnering in DBB is generally competition so that it has goals in short-term projects, there is a possibility of conflict, there is no similarity in achieving objectives so that DBB projects often have worse performance (Ashcraft and Bridgett, 2011; Glick and Guggemos, 2009; Leicht and Harty, 2017; Sari, Irawan, Wibowo, Siregar, Praja, 2023; Sari, Irawan, Wibowo, Siregar, Tamin, et al., 2023).

Increasing DBB partnerships can be done by taking the IPD partnership philosophy where all processes are carried out through collaboration so that it will encourage specific long-term shared goals, increase trust and communication, improve interpersonal relationships, more team members are involved in projects and engagement occurs, so that project performance can be made better (Asmar et al., 2013; Katar, 2019; Lahdenperä, 2012; Hall and Scott, 2016; Xia et al., 2015).

Some of the benefits noted in various multi-project relationships from previous research are a 40% reduction in working hours of the total working hours used, a 21% reduction in labor incentives, a 10% increase in worker productivity, and in general there is a 10% reduction in the cost of the entire project, in addition there is a 100% success in meeting the budget and schedule, a 50% reduction in repetitive work repeated, so that project performance is considered better (Gadde and Dubois, 2010; Larsson and Larsson, 2020a; Thompson et al., 1998).

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