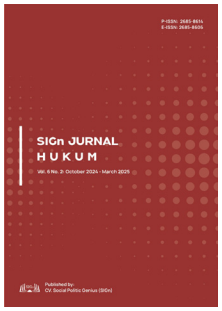


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Article Title

## Resolving Hydropower Plant Construction Disputes through a Standing Dispute Board: A Case Study of Asahan 3 HEPP

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## ABSTRACT

*Electricity deficits in North Sumatra have hindered regional economic growth. The Asahan 3 HEPP, a national strategic project, was constructed to address this crisis. However, the Lot I Civil Works contract encountered complexities, resulting in 25 contractor claims within the first 20 months. This study analyzes the effectiveness of the SDB in resolving construction disputes at the Asahan 3 HEPP following a contract amendment. Employing a qualitative case study with a descriptive-analytical approach, the research examines the dynamics of dispute resolution before and after SDB activation. Primary data were gathered through interviews and observations, while secondary data were sourced from project documents and relevant legal literature. The findings indicate that the Engineer's Determination proved ineffective, with only one claim resolved prior to the amendment. Contract Amendment No. 1 activated the SDB clause in accordance with the FIDIC Harmonised Edition 2010 General Conditions, replacing the previously implemented Ad-hoc mechanism. Post-amendment, the SDB, comprising independent experts, successfully issued five formal opinions, resolving all 25 contractor claims. This success was underpinned by the competence of the SDB members, their comprehensive understanding of the project, and the efficiency of the procedures. The study concludes that SDB activation was a strategic step that minimized conflict escalation. The SDB contributed significantly, effectively, and efficiently to the resolution of construction disputes at the Asahan 3 HEPP, aligning with Law Number 30 of 1999 and Law Number 2 of 2017.*


*Keywords:* *Asahan 3 HEPP; Construction Dispute Resolution; FIDIC; Standing Dispute Board.*

## INTRODUCTION

The utilization of water resources as a renewable energy source is crucial to meeting the increasing demand for electricity while supporting global commitments to sustainable development (Sebastian et al., 2025). The Asahan River, which originates at Lake Toba and flows into the Strait of Malacca in North Sumatra Province, possesses significant hydroelectric potential for development into a Hydropower Plant (HEPP). Within the framework of harnessing this potential, the Asahan 3 HEPP project was designed as part of a larger energy development scheme in the region. This strategic project, located downstream of the Asahan 2 HEPP, was identified as early as 1972 in the Lake Toba and Asahan River Basin Hydropower Development Master Plan, affirming the government's long-term vision to optimize natural resources for energy independence (Tambunan, 2024).

Although initially planned to support the aluminum industry, the dynamics of national energy needs, especially in North Sumatra, have driven the prioritization of the Asahan 3 HEPP. Feasibility studies initiated by the Japan International Cooperation Agency (JICA) in 1981-1982 (Nippon Koei, 2023) and followed by detailed design by the Overseas Economic Cooperation Fund (OECF) from 1984-1988, initially planning for the construction of a large dam had to be postponed (Manalu, 2012). Financial constraints and social complexities related to large-scale infrastructure development were the main contributing factors to this delay (Yanuar et al., 2025). However, the prolonged electricity supply crisis in North Sumatra, exacerbated by high crude oil

prices, has brought the urgency of the Asahan 3 HEPP back to the forefront. This electricity deficit has not only hampered industrial activities in Medan but has also become a significant obstacle to regional economic growth.


*Figure 1. Asahan 3 HEPP Project in North Sumatra Province*

A concrete response to this energy crisis was realized through the Japan Bank for International Cooperation (JBIC) Loan IP-526 agreement in March 2004, which funded the detailed design of the Asahan 3 HEPP. The construction of the Asahan 3 HEPP (2x87 MW) is intended to meet the electricity demand in Sumatra, supplying 1,477 GWh/year (Murdaningsih, 2019). The project was subsequently integrated into the 2nd Phase Crash Program (FTP II) in 2010, a national initiative aimed at developing 10,000 MW of new power plants utilizing renewable energy. As a priority project, the Asahan 3 HEPP is conceptualized as a run-of-river type with an installed capacity of 174 MW, harnessing a maximum discharge of 106.8 m3/sec and a gross head of 196 meters. This design allows the plant to operate 24 hours a day, following the operational pattern of the existing Tangga HEPP and contributing significantly to the stability of the power grid in North Sumatra.

In the course of its implementation, the construction of the Asahan 3 HEPP, particularly Lot I Civil Works, has encountered various challenges with the potential to cause conflicts between the parties, in this case, the contractor and the project owner. Numerous studies have identified the factors that trigger conflicts in construction projects. Semple et al. (1994) found that changes in the scope of work, weather conditions, and site access restrictions are common causes of construction claims that can escalate into disputes. Furthermore, Jaffar et al. (2011) classified conflicts into three categories: behavioural factors (such as individual interactions, communication, and power dynamics), contractual factors (such as contract interpretation and payment issues), and technical factors (such as uncertainties in technical information, design errors, and construction methods). Acharya et al. (2006), in a case study in South Korea, identified six main factors causing conflicts, including differing site conditions, local community interference, discrepancies in the assessment of work changes, errors, and omissions in design, excessive work volume, and ambiguous specifications. Kumaraswamy and Yogeswaran (1998) concluded that the majority of construction conflicts are related to contractual issues. Meanwhile, Pelled et al. (1999) highlighted the higher potential for conflict in multicultural project teams.

The Lot I Civil Works Contract for the Asahan 3 HEPP, initially based on the General Conditions of the FIDIC Harmonised Edition 2010, initially required the establishment of a Standing Dispute Board (SDB) as the dispute resolution mechanism. However, the clauses related to the SDB were modified in the Particular Conditions, effectively changing the dispute resolution mechanism to an Ad-hoc one. As a result, during the initial project implementation period, dispute resolution was conducted through the Engineer's Determination. This situation was exacerbated by the high number of claims submitted by the contractor, indicating the complexity of project implementation and the significant potential for differing interpretations between the parties. Recognizing the importance of an effective dispute resolution mechanism, the parties subsequently agreed to amend the contract to activate the SDB clause. Under the *Fédération Internationale des Ingénieurs-Conseils* (FIDIC) framework, SDBs and Ad-hoc Dispute Boards (Ad-hoc DBs) have fundamental differences. SDBs consist of a panel of experts appointed at the beginning of the project and continuously involved, whereas ad hoc DBs are formed only when specific disputes arise (Aceris Law, 2022).

This research focuses on analyzing the effectiveness of the SDB in resolving construction disputes in the Asahan 3 HEPP project, particularly after the contract amendment. Thus, this study is expected to provide comprehensive and applicable solutions for the national construction industry, especially in minimizing the negative impacts of construction disputes on cost, time, and business relationships.

## METHOD

This study examines the effectiveness of the SDB in resolving construction disputes in the Asahan 3 HEPP project following the contract amendment that activated the SDB clause. To achieve this objective, the research employs an empirical case study approach with a qualitative research design (Irwansyah, 2021). The case study approach was chosen because it provides an opportunity to conduct an in-depth and contextual investigation of the implementation and effectiveness of the SDB in resolving disputes on a large-scale and complex infrastructure project. This research will focus on the period after the JICA-approved Contract Amendment No. 1, which formally activated the SDB. The research will be conducted at the Asahan 3 HEPP project office in North Sumatra, Indonesia, as well as at other locations where SDB hearings or meetings are held. The selection of these locations is based on accessibility to data and informants necessary to answer the research questions.

The data used in this study consists of primary and secondary data (Sampara & Husen, 2016). Primary data will be obtained through semi-structured interviews with parties directly involved in the dispute resolution process through the SDB at the Asahan 3 HEPP. Interview participants include the Engineer, representatives of PT PLN (Persero), representatives of the contractor, and members of the SDB. These interviews, guided by an interview protocol, will explore crucial topics, including the SDB implementation process, the dynamics and procedures of dispute resolution, challenges encountered, and the parties' perceptions of the effectiveness of this mechanism. In addition, non-participant observation will be carried out on the dispute resolution process, particularly during SDB hearings or meetings, to capture the dynamics of interactions, communication patterns, and decision-making processes. Comprehensive field notes will be compiled during the observations to document important findings.

Secondary data sources include official documents related to the Asahan 3 HEPP project, such as the contract, minutes of meetings, agreements, progress reports, claim documents, evaluation reports, and internal company reports. Furthermore, this study also refers to authoritative legal literature, including books, journals, and scientific articles relevant to SDBs, construction dispute resolution, and FIDIC contracts. Analysis of these documents, including Contract Amendment No. 1 and documents related to the agreed-upon amendments and changes to payment terms, will provide the legal and contractual context of the disputes and the legal basis for SDB implementation.

To process and analyze the collected data, this study applies content analysis techniques and qualitative descriptive analysis (Qamar & Rezah, 2020). Interview transcripts and field notes will be transcribed, coded, and categorized to identify

key themes and patterns related to the effectiveness of the SDB. Meanwhile, official documents and legal literature will be critically analyzed to understand the context of the dispute, the contractual framework, and the relevant theoretical underpinnings. Specifically, qualitative descriptive analysis will be used to interpret and understand the perceptions, experiences, and views of the interview participants regarding the SDB process and its effectiveness. Through the combination of these data collection and analysis methods, this study seeks to comprehensively describe the dynamics of construction dispute resolution through the SDB in the Asahan 3 HEPP project, answer the research questions, and ultimately, make a significant contribution to a better understanding of the effectiveness of SDBs in resolving construction disputes in strategic infrastructure projects.

## RESULTS AND DISCUSSION

The Asahan 3 HEPP project is one of the national strategic projects aimed at increasing the electricity supply in North Sumatra. To realize this project, the construction of the Asahan 3 HEPP is divided into four main work packages, namely Lot I Civil Works, Lot II Metal Works, Lot III Electromechanical Works, and Lot IV Transmission Line Works. This research focuses on Lot I Civil Works, which, in its implementation, experienced a dynamic of claim submissions by the contractor and involved a complex dispute resolution process.

**Table 1. Construction Packages of the Asahan 3 HEPP**

| No. | Contract Name | Date of Signing | Commencement Date | Name of Contractor |
|---|---|---|---|---|
| 1. | Lot I Civil Works | 15-Jan-19 | 28-Mar-19 | Shimizu - Adhi Karya JO |
| 2. | Lot II Metal Works | 04-Sep-19 | 01-Nov-19 | Andritz Hydro Consortium |
| 3. | Lot III Electromechanical Works | 22-Sep-20 | 02-Nov-20 | Mitsubishi Corporation |
| 4. | Lot IV Transmission Line Works | 16-Aug-22 | 25-Oct-22 | PT Hasta Prajatama |

### A. Contractor Claims and Dispute Resolution Efforts Prior to Contract Amendment

The execution of the Asahan 3 HEPP project, notably Lot I Civil Works, faced a number of challenges that prompted the contractor to submit claims. The contract for Lot I Civil Works was signed on January 15, 2019, under the FIDIC based agreement, with a project duration of 48 months, commencing on March 3, 2019, and concluding on March 3, 2023. Within the first 20 months from the Commencement Date, the contractor had submitted 25 claim notifications to the

Engineer. This high number of claims, averaging more than one claim per month, indicates the complexity faced during project execution and suggests significant potential for differences in interpretation between the contractor and the project owner regarding rights and obligations stipulated in the contract. Analysis of the Monthly Progress Report for December 2020 shows that as of April 2020, the physical progress had only reached 10.20%, compared to the target of 17.68%, representing a negative deviation of -7.48%. This delay, caused by several factors, including limited access through land owned by PT INALUM (Persero), the availability of additional land acquisition areas, and work stoppages caused by community groups, was identified as a significant trigger for the contractor's claims.

The aforementioned conditions prompted the contractor to submit 25 claims within the project's first 20 months. In response to these claims, the Engineer conducted technical and contractual evaluations, held direct negotiations with the contractor on-site, and issued Engineer's Determinations in accordance with Clause 3.5 of the General Conditions of the FIDIC MDB Harmonised Edition 2010. It should be underlined that these Engineer's Determinations are not final and binding, thus allowing the contractor the right to dispute and object to them. Under the original contract, which was based on the General Conditions of the FIDIC Harmonised Edition 2010, dispute resolution should have been conducted through an SDB. However, specific clauses in the contract, detailed in the Particular Conditions, modified the dispute resolution mechanism to an Ad-hoc one, resulting in the SDB not being activated at the beginning of the project. Consequently, during those first 20 months, dispute resolution was carried out via the Engineer's Determination mechanism.

The effectiveness of the Engineer's Determination in resolving the contractor's claims in this project proved to be very limited. Of the 25 claims submitted, only one was successfully resolved and reached a value agreement between the contractor and the project owner, while the remaining 24 claims remained pending. This situation indicates that the Engineer's Determination mechanism was not sufficiently effective in bridging the differences in interpretation and reaching an agreement between the two parties. These limitations may have been influenced by several factors, such as the complexity and the substantial value of the claims, as well as the potential for the Engineer, who is also representing the project owner, to be perceived as less than impartial when making decisions. The slow resolution of claims through the Engineer's Determination contributed to project delays and increased the potential for escalating conflict, which subsequently encouraged the parties to amend the contract in order to activate the SDB.

## B. Contract Amendment: Activation of the Standing Dispute Board Clause

The high number of contractor claims and the limited effectiveness of the Engineer's Determination in resolving disputes in the Asahan 3 HEPP project underscores the importance of a more effective dispute resolution mechanism. This situation prompted the parties, namely the contractor and the project owner, to amend the Lot I Civil Works contract. This amendment, formalized through Contract Amendment No. 1, primarily aimed to reactivate the SDB clause, which had been previously modified and not implemented.

The original Lot I Civil Works contract for the Asahan 3 HEPP (2x87 MW) was based on the FIDIC Harmonised Edition 2010 General Conditions, which requires the use of an SDB. However, in the Particular Conditions of the contract, the clauses related to the SDB, specifically Sub-Clause 20.2, were substantially modified, thus changing the dispute resolution mechanism to an Ad-hoc one. The modification stipulated that the appointment of Dispute Board members would occur 28 days after one Party notified the other Party to resolve a dispute using the Dispute Board. This provision differs from the FIDIC Harmonised Edition 2010 standard, which stipulates that the SDB appointment should take place between 28 to 56 days after the Commencement Date, as illustrated in Figure 2.

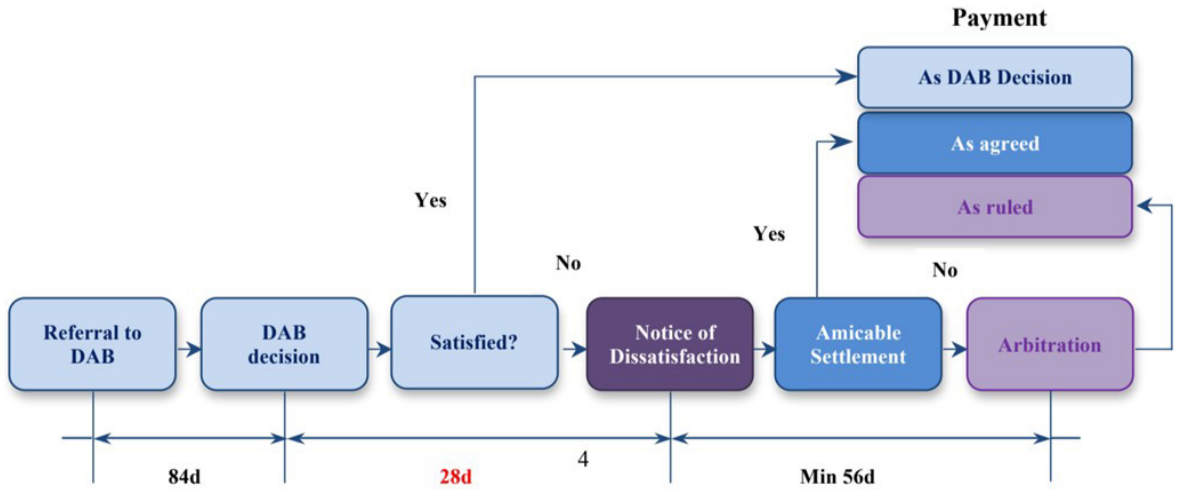


*Figure 2. Timetable for Planning the Process from Referral to Decision (Spassova, 2017)*

Figure 2 illustrates the timeline and stages of the dispute resolution process according to the FIDIC Harmonised Edition 2010 standard, which begins with the referral of a dispute to the Dispute Adjudication Board (DAB) (Referral to DAB). After the dispute is referred, the DAB has 84 days to render a decision (DAB Decision). The parties are then given 28 days to review the decision and express whether they are satisfied or dissatisfied (Satisfied?). If one party is dissatisfied, they may issue a Notice of Dissatisfaction within those 28 days. Subsequently, the parties are encouraged to seek an Amicable Settlement within a minimum of 56

days. If an amicable settlement cannot be reached, the dispute may be referred to Arbitration (Hardjomuljadi, 2020a). This flowchart demonstrates that the dispute resolution process through the DAB is designed to provide time certainty and encourage dispute resolution outside of court (Hardjomuljadi, 2020b).

This discrepancy in the appointment timeframe created a misalignment between the practice on-site and the international standards referenced in the contract. Instead of establishing an SDB within 28-56 days after the Commencement Date as per the FIDIC standard, an Ad-hoc DB was appointed only when a dispute arose, which in this case occurred approximately 21 months after the contract commencement. The implication of this was that the effective dispute resolution mechanism through an SDB could not be implemented from the project's outset.

To provide a more precise context, it is necessary to understand the fundamental differences between an Ad-hoc DB and an SDB within FIDIC-based contracts. An Ad-hoc DB, as used in the FIDIC Yellow Book and Silver Book 2010 editions, is formed only when a specific dispute arises. Conversely, an SDB, as applied in the FIDIC Red Book 2010 edition, the FIDIC Golden Book 2008 edition, the FIDIC Multilateral Development Bank (MDB) 2005/2006/2010 editions, and the FIDIC Red, Yellow, and Silver Books 2017 editions, is established at the beginning of the project with jointly agreed-upon members who are continuously involved in monitoring the project's progress. This ongoing involvement allows SDB members to have a comprehensive understanding of the project and the parties involved, thus making them better prepared and more effective in handling disputes that arise and potentially preventing the escalation of conflicts. The main differences between these two types of Dispute Boards are summarized in Table 2.

**Table 2. Differences between Ad-hoc DB and SDB**

| Item | Ad Hoc Dispute Board | Standing Dispute Board |
|---|---|---|
| The process of assigning DB members | The appointment is undertaken when Dispute is notified by either Party. Typically, after a Determination has been made and one or other of the Parties notifies dissatisfaction. | Appointment is done at the beginning of the project within a period defined in the Conditions of Contract and remain in place until the expiration of Defects Notification Period. |
| DB member Availability | DB members are not tied to the Project. Therefore, their appointment and the time for establishment of the DB depends on availability | DB members are contracted to the Project by the DB Agreement and are available to provide opinions and feedback regarding project issues that occur between Employer and Contractor<br><br>DB members are better prepared to start the evaluation of any dispute immediately as they are required to visit the Project regularly and be cognizant of ongoing issues. Therefore, the process of evaluation may be faster. |

| Item | Ad Hoc Dispute Board | Standing Dispute Board |
|---|---|---|
| Cost | Component costs are limited to non regular cost, such as Site visit fees, airfares, daily fee during site visit, drafting fee and decision reviewing.<br><br>The periods for review and thus cost may be longer as the Members need And to become conversant of the issues | The cost components consist of:<br>Non regular cost<br>Such as:, Board Hearing visits, review of submissions drafting fee and decision reviewing for each dispute referred<br><br>And<br><br>Regular cost<br>Such as monthly retainer fee for each member and Site visit fees, airfares, daily fee during site visit for regular visit costs. |
| Time for Evaluation/ Determination | Potentially longer because the requirement to establish the DB for each dispute.<br><br>In addition, the time required to become conversant with the issue may mean that the determinations take longer. | Faster because the members are already be familiar with the contract, the project and the personnel when a dispute is referred to them. Therefore, they are able to deal with the dispute in an informed, efficient and timely manner because there is no learning curve. |

Recognizing the advantages of an SDB and restoring the dispute resolution function in accordance with the FIDIC Harmonised Edition 2010 General Conditions, Contract Amendment No. 1 was agreed upon. The amendment, approved by the Japan International Cooperation Agency (JICA) as the funding agency, revises Particular Conditions Part A – Contract Data Sub-Clause 20.2, changing it from "28 days after one Party gives notice of its intention to refer a Dispute to a DB" to "Within 56 days of Contract Amendment No. 1 being approved by JICA". Importantly, JICA, in its 2012 Dispute Board Manual, strongly discourages the use of an Ad-hoc DB and recommends the implementation of the SDB. JICA's recommendation further strengthened the basis for the amendment to reactivate the SDB clause. Thus, Contract Amendment No. 1 effectively reactivates the SDB and replaces the previously implemented Ad-hoc mechanism.

The activation of the SDB through this contract amendment is a strategic step to enhance the effectiveness of dispute resolution in the Asahan 3 HEPP project. This step is based on a mutual agreement between the parties, considering the effectiveness of dispute resolution, alignment with the latest FIDIC contract standards, and the JICA Dispute Board manual. With the SDB in place, it is anticipated that future dispute resolution will be more structured, efficient, and in line with international best practices, thereby minimizing the potential for conflict escalation that could hinder the project's smooth progress.

## C. The Effectiveness of the Standing Dispute Board in Resolving Construction Disputes at the Asahan 3 HEPP

In the construction industry, dispute resolution through litigation is often regarded as a last resort. Litigation generally entails lengthy processes, high costs, and significant resources, and it has the potential to damage business relationships between the involved parties (Crisyanti et al., 2023). Therefore, Alternative Dispute Resolution (ADR) mechanisms are increasingly favoured, with one prominent option being the SDB. SDBs have become a globally recognized instrument in resolving disputes in the construction industry. Data from the Dispute Resolution Board Foundation (DRBF) in 2018 indicates that the adoption of an SDB significantly reduces the likelihood of disputes escalating to arbitration, with only 0.53% of disputes ending in arbitration compared to 14.05% for Ad-hoc DBs (Svinhufvud, 2020). The DRBF (2024) also notes the implementation of SDBs in over 2,700 construction projects worldwide, with a total project value reaching US$270 billion. Furthermore, DRBF (2024) analysis indicates that 85-98% of recommendations or decisions issued by SDBs are accepted by the parties. The effectiveness of SDBs in mitigating the potential for conflict and streamlining time and cost makes them an increasingly relied-upon dispute resolution mechanism worldwide.

The presence of an SDB in a project has also been shown to have a deterrent effect on the emergence of disputes. DRBF (2024) data indicates that the average number of disputes referred to SDBs is only 1.2 per project, a significantly lower figure than the number of disputes in projects without SDBs that end up in litigation or arbitration. This low number indicates that the presence of an SDB encourages the parties involved in the project, namely the owner and contractor, to be more cautious and cooperative and prioritize internal problem-solving before escalating to a formal dispute. In other words, an SDB not only functions as a dispute resolution mechanism but also as an effective instrument for conflict prevention.

The positive trend of utilizing SDBs has also begun to be seen in Indonesia, driven by the spirit of Law Number 30 of 1999 and Law Number 2 of 2017. Specifically, Article 88 of Law Number 2 of 2017 provides a legal basis for out-of-court construction dispute resolution (Indahwati et al., 2025). Moreover, mediation facilitated by an SDB offers efficiency and speed, as well as provides a win-win solution for the parties involved, making it a preferred alternative to litigation (Kurniawan et al., 2023). This efficiency and speed are supported by the capability of SDB members to build communication and rapport among the parties, as emphasized by Huda et al. (2023).

The implementation of the SDB in the Asahan 3 HEPP project adopts best practices recommended by the DRBF and aligns with the global trend of utilizing SDBs in large-scale construction projects. A key factor underpinning the effectiveness of the SDB in this project lies in the composition of its members, who are experts with extensive track records in construction, particularly in similar HEPP projects. This expertise and practical experience enable them to comprehend the technical and contractual intricacies of the project comprehensively. Additionally, SDB members regularly attend quarterly project status meetings and review monthly progress reports. This routine involvement allows SDB members to comprehensively monitor project progress, understand the context of potential problems, and build rapport with stakeholders. Thus, when disputes arise, SDB members act not only as objective assessors but also as mediators who understand the project's intricacies and the parties involved.

The effectiveness of the SDB at the Asahan 3 HEPP is also supported by its procedures, which are designed to be more informal and straightforward compared to formal court or arbitration proceedings. SDB hearings are generally held at the project site, providing easy access for all parties and facilitating a more contextual understanding of the issues at hand. In practice, the involvement of lawyers in SDB hearings is also minimized; even if present, their roles are limited so that the dispute resolution process can proceed more quickly and focus on the substance of the issues. The combination of SDB members' expertise, in-depth understanding of the project, and efficient procedures significantly contributes to the effectiveness of dispute resolution.

The evaluation of the SDB's performance on the Asahan 3 HEPP project also considers financial aspects. Based on project data and documents, the operational costs of the SDB on this project ranged from 0.04% to 0.26% of the final contract value, with an average of 0.15%, including expenses for issuing four dispute resolution recommendations. Although there are costs involved, this figure is relatively small compared to the potential losses that could arise from prolonged disputes, such as cost escalation, project delays and strained working relationships between the parties.

After being activated through a contract amendment, the SDB on the Asahan 3 HEPP project proved effective in carrying out its function as a mediation forum. It is reflected in the SDB's success in issuing five formal opinions that resolved 25 claims previously submitted by the contractor. Despite facing several challenges, both procedural and substantive, the SDB was able to facilitate dispute resolution and minimize the potential for escalating the conflict to a higher level. Thus, the activation of the SDB through the contract amendment proved to be a strategic step that positively contributed to dispute resolution and the smooth execution of the Asahan 3 HEPP project.

## CONCLUSIONS AND SUGGESTIONS

Based on the findings and discussion, it can be concluded that the activation of the SDB through Contract Amendment No. 1 in the Asahan 3 HEPP (2x87 MW) project has significantly contributed to the effective and efficient resolution of construction disputes. Prior to the contract amendment, the project's execution, especially Lot I Civil Works, was marked by a high number of contractor claims, totalling 25 claims within the first 20 months. The Engineer's Determination mechanism implemented during that period proved ineffective, with only one claim successfully resolved. This high number of claims and the low effectiveness of the Engineer's Determination underscore the crucial need for a reliable dispute resolution mechanism, especially for large-scale and complex projects such as the Asahan 3 HEPP. To address this limitation, Contract Amendment No. 1, which reactivated the SDB clause contained in the FIDIC Harmonised Edition 2010 General Conditions, previously modified to Ad-hoc, was a strategic step based on considerations of effectiveness, compliance with international contract standards and the guidelines of JICA as the funding agency. This amendment revised the provision for the appointment of SDB members to "within 56 days from the approval of Contract Amendment No. 1 by JICA," which is more in line with international best practices.

The implementation of the SDB following the contract amendment has yielded significant results. After its official activation, the SDB, comprising three independent experts in construction, particularly in HEPPs, successfully issued five formal opinions resolving the 25 previously outstanding contractor claims. This success was supported by the competence and experience of the SDB members, their comprehensive understanding of the project, and a dispute resolution procedure that is more informal and simplified than litigation processes. Dispute resolution through the SDB also proved to be faster and more cost-effective, with operational costs significantly lower than the estimated losses due to prolonged disputes. The preservation of a good relationship between PT PLN (Persero), as the project owner, and the contractor, which is crucial for the smooth execution of long-term projects, is another positive impact of dispute resolution through the SDB. The successful implementation of the SDB in this project also aligns with the spirit of Law Number 30 of 1999 and Law Number 2 of 2017. The SDB in this project has performed its function as an effective mediation forum and has demonstrably resolved disputes comprehensively. Overall, this research confirms that the activation of the SDB post-contract amendment was a strategic step that positively contributed to the dispute resolution and smooth implementation of the Asahan 3 HEPP project and serves as clear evidence of the SDB's effectiveness in construction projects in Indonesia.

Based on the above conclusions, several recommendations are proposed to enhance the effectiveness of construction dispute resolution through SDBs in the

future, especially for large-scale and complex infrastructure projects in Indonesia. *First*, the parties involved in dispute resolution, both the contractor and the project owner, need to prioritize transparency in every discussion and decision-making process. Transparency in claim evaluations and the SDB's decision-making process will build trust between the parties and create an opportunity to achieve a fair and balanced (win-win) solution. *Second*, the SDB clause should be activated from the beginning of the project before significant disputes arise. Earlier SDB implementation, ideally within the timeframe stipulated in the FIDIC General Conditions, will enable the SDB to actively monitor project progress, mitigate potential conflicts, and provide objective insights into the interpretation of contract clauses that could lead to differing viewpoints. It is in line with the spirit of Specific Provisions Clause 20.4, which authorizes the SDB to conduct investigations and consultations, which would be more optimal if carried out from the project's outset.

*Third*, the Indonesian government needs to intensify its efforts and facilitate the use of SDBs in other construction projects, especially those funded by international financial institutions that require the use of FIDIC-based contracts. This step is also in line with the mandate of Law Number 2 of 2017, which also regulates dispute resolution. *Fourth*, to enhance understanding and awareness regarding the benefits of SDBs, more intensive socialization and education are needed for stakeholders in the construction industry, including contractors, project owners, consultants, and funding agencies. With a good understanding, it is hoped that SDB implementation will become more widespread and make a more significant contribution to effective and efficient construction dispute resolution in Indonesia.

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