INTISARI

Penerapan *Building Information Modelling* (BIM) pada infrastruktur keairan seperti sabo dam di Indonesia masih terbatas, padahal bangunan ini vital untuk pengendalian sedimen dan memerlukan tingkat ketelitian lebih dalam perencanaan dan estimasi kuantitas yang sulit dicapai metode konvensional berbasis 2D. Penelitian ini bertujuan untuk 1) mengetahui perhitungan volume dan RAB pada bangunan sabo dam melalui BIM 5D dan 2) menganalisis perbandingan hasil perhitungan RAB antara metode BIM dengan metode konvensional. Metode penelitian menggunakan data sekunder berupa *As-Built Drawing* Sabo Dam GE-C Gadingan, melibatkan pemodelan 3D parametrik dengan *Autodesk Revit*, termasuk pembuatan *custom family* karena kompleksitas geometri Sabo Dam yang unik. Integrasi data kontur untuk perhitungan galian timbunan dilakukan menggunakan *Autodesk Civil 3D*. *Clash detection* dilakukan menggunakan *Autodesk Navisworks*. Perhitungan volume dan RAB divalidasi terhadap perhitungan manual (*Planswift* dan *Microsoft Excel*) dengan Harga Satuan Dasar (HSD) dan Analisa Harga Satuan Pekerjaan (AHSP) dari standar lokal. Hasil penelitian menunjukkan BIM dapat diimplementasikan secara efektif; sebanyak 596 *clash* non-kritis pada tulangan, yang tidak mempengaruhi volume beton, berhasil direduksi menjadi 248 titik melalui metode 'split' elemen. Perbandingan volume setelah optimasi, terutama pada pekerjaan timbunan yang awalnya memiliki perbedaan 22,8% dan *pavement* sebesar 5,9%, menghasilkan rata-rata perbedaan akhir sebesar -0,24%, memenuhi standar akurasi < 5%. Estimasi RAB menggunakan BIM (Rp10.960.421.564,97) lebih rendah -0,25% dari perhitungan manual (Rp10.988.462.982,18). Meskipun implementasi BIM 5D terbukti akurat, tantangan utama meliputi kompleksitas pemodelan elemen non-standar, keterbatasan *software* dalam integrasi *cut & fill*, dan kurangnya standarisasi BIM untuk bangunan air di Indonesia. Kontribusi utama dari penelitian ini adalah memberikan pendekatan terintegrasi dalam implementasi BIM 5D pada proyek sabo dam secara kuantitatif, serta menawarkan solusi pemodelan dan validasi estimasi biaya yang dapat direplikasi pada proyek bangunan air lainnya di Indonesia.

Kata kunci: *Building Information Modelling* (BIM), Pemodelan 3D, Sabo Dam, *Quantity Take-Off,* Estimasi Biaya

ABSTRACT

Despite their critical role in sediment control, the application of Building Information Modelling (BIM) in water infrastructure projects such as Sabo Dams remains limited in Indonesia. Conventional methods frequently faill to meet the accuracy required for quantity estimation and construction planning. This study focuses on the implementation of 5D BIM for the GE-C Gadingan Sabo Dam, aiming to 1) identify the quantity take-off (QTO) and cost estimation of a Sabo Dam project using 5D BIM, and (2) analyze the differences between BIM-based and conventional cost calculation methods. The research employed secondary data from as-built drawings and topographical surveys. Parametric 3D modeling was conducted using Autodesk Revit, supported by custom family creation to accommodate complex geomtries. Earthwork calculations were integrated via Autodesk Civil 3D, while clash detection was performed using Autodesk Navisworks. Validation was carried out by comparing BIM-generated QTO and cost estimates with manual calculations using Planswift and Microsoft Excel, based on local standard pricing references. Results demonstrated that BIM significantly enhanced model coordination, reducing 596 non-critical reinforcement clashes to 248. Post-optimization analysis revealed a final average deviation of -0.24% across key work items, well within the accepted threshold of 5%. Furthermore, BIM-based cost estimation resulted in a total project value of IDR 10.96 billion, slightly lower than the manual estimate of IDR 10.99 billion, indicating a deviation of -0.25%. While the implementation confirmed BIM's accuracy and efficiency, challenges remain in modeling non-standard elements, software limitations in earthwork analysis, and the lack of established BIM standards for hydraulic structures. This study contributes an integrated and replicable approach to implementing 5D BIM for dam infrastructure, providing a quantitative validation framework and modeling solutions that can inform future applications in similar water-related projects.

Keywords: *Building Information Modelling* (BIM), *3D Modelling, Sabo Dam, Quantity Take-Off, Cost Estimation*