

ABSTRAK

Metode penelitian yang digunakan adalah pendekatan kuantitatif komparatif. Data sekunder berupa *Detail Engineering Design* (DED), Rencana Anggaran Biaya (RAB) proyek, dan Analisis Harga Satuan Pekerjaan (AHSP) diolah untuk merekonstruksi model 3D parametrik serta mengekstraksi data volume material (beton, penulangan, bekisting, dan pasangan batu) secara otomatis melalui fitur *Schedules/Quantities* pada *software* Autodesk Revit.

Hasil penelitian menunjukkan bahwa penerapan BIM 5D menghasilkan estimasi volume dan biaya yang lebih presisi serta efisien dibandingkan metode konvensional. Total estimasi biaya pekerjaan tanah, pondasi, dan beton struktur bawah berdasarkan metode konvensional adalah sebesar **Rp98.411.851,00**, sedangkan hasil perhitungan berbasis BIM Revit adalah sebesar **Rp89.839.193,10**. Terdapat selisih efisiensi/penghematan biaya sebesar **Rp8.572.657,90** (efisiensi sebesar **8,71%**). Perbedaan tersebut didominasi oleh ketelitian BIM dalam memperhitungkan volume bersih (*net quantity*), meminimalisasi *overlapping* pada pasangan batu belah dan beton, serta mengurangi *over-estimation* luasan bekisting dan berat besi tulangan pada elemen sloof. Implementasi BIM 5D terbukti meningkatkan akurasi data kuantitas (*Quantity Take-Off*), mempercepat proses estimasi, dan memitigasi risiko pembengkakan biaya (*unforeseen cost*) akibat *human error*.

Kata Kunci: *Building Information Modeling* (BIM) 5D, Autodesk Revit, Estimasi Biaya, *Quantity Take-Off*, Pondasi, PLHUT Pangandaran.

ABSTRACT

The research method used in this study is a comparative quantitative approach. Secondary data, including Detail Engineering Design (DED), Project Cost Estimates (RAB), and Analysis of Work Unit Prices (AHSP), were processed to reconstruct a 3D parametric model and automatically extract material volume data (concrete, reinforcement, formwork, and stone masonry) using the Schedules/Quantities feature in Autodesk Revit software.

The results indicate that the application of 5D BIM produces more precise and cost-effective volume and cost estimates compared to conventional methods. The total estimated cost for earthworks, foundation, and substructure concrete based on the conventional method amounted to IDR 98,411,851.00, whereas the calculation based on BIM Revit yielded IDR 89,839,193.10. This results in a cost efficiency/saving of IDR 8,572,657.90 (an efficiency rate of 8.71%). This discrepancy is mainly driven by BIM's accuracy in calculating net quantities, minimizing overlaps in rubble stone masonry and concrete, as well as reducing the overestimation of formwork surface area and rebar weight on sloof elements. The implementation of 5D BIM is proven to enhance Quantity Take-Off (QTO) data accuracy, accelerate the estimation process, and mitigate the risk of cost overruns (unforeseen costs) due to human error.

Keywords: *Building Information Modeling (BIM) 5D, Autodesk Revit, Cost Estimation, Quantity Take-Off, Foundation, PLHUT Pangandaran.*