

**ANALYSIS OF QUANTITY TAKE OFF (QTO) CALCULATION USING BIM
(REVIT) METHOD COMPARED TO CONVENTIONAL CALCULATION ON
STRUCTURAL AND ARCHITECTURAL WORKS (CASE STUDY :
EMERGENCY ROOM BUILDING OF RUPAT UTARA REGIONAL
GENERAL HOSPITAL)**

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ABSTRACT

Quantity Take Off (QTO) is a critical component in determining construction project budgets. Errors in volume calculation can lead to significant cost overruns. This study compares structural work volume calculations between the conventional (manual) method and the Building Information Modeling (BIM) method using Autodesk Revit. The case study was conducted on the construction project of the Emergency Room (IGD) Building at Rupert Utara Regional Public Hospital. The research method involved literature review, data collection from project sources (both primary and secondary), and 3D modeling of structural elements including foundations, pile caps, pedestal columns, sloofs, columns, beams, and floor slabs. The volume outputs from Autodesk Revit were compared with those obtained manually using Microsoft Excel. The results indicate that concrete volume outputs between the conventional and BIM methods were generally consistent. However, minor discrepancies were found in reinforcement quantities. For instance, the reinforcement volume for pile cap PC2 using Revit was 1,414.6 kg, while the manual method yielded 1,406.6 kg—a difference of 8 kg ($\pm 0.56\%$). For beam B1, Revit calculated 646.45 kg of reinforcement compared to 650.97 kg manually—a difference of 4.52 kg ($\pm 0.69\%$). These differences are likely due to variations in modeling parameters and detailing approaches in Revit. In conclusion, the BIM method using Autodesk Revit proves to be more effective and efficient than conventional methods, especially in terms of visualization and speed of calculation. BIM minimizes human error, improves volume accuracy, and facilitates better integration of project documentation.

Keywords: BIM, Conventional Method, Reinforced Concrete Structures, Volume Estimation, Quantity Take Off (QTO)