Analysis of Reducing the Construction Waste in Residential Buildings Through Lean Construction Methods Integrated with Building Information Modeling (BIM)

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Abstract:
The Construction waste is a growing concern in India's residential sector, driven by inefficient planning, material mismanagement, and fragmented workflows. As urban housing demand rises, minimizing waste becomes essential for cost control, sustainability, and timely project delivery.

This project investigates how integrating Lean Construction methods with Building Information Modeling (BIM) can significantly reduce construction waste in residential buildings.

A G+1 residential building model encompassing architectural, structural, and MEP disciplines was developed in Autodesk Revit using Building Information Modeling (BIM) to extract the precise material quantification.

Lean Construction focuses on eliminating waste, improving workflow reliability, and maximizing client value. BIM complements this by offering a digital platform for real-time collaboration, clash detection, accurate quantity take-offs, and streamlined scheduling.

This study analyzes key waste sources such as overproduction, waiting, excess inventory, and defects and maps them against BIM-enabled Lean solutions. Through literature review, case studies, and simulation, the project aims to quantify waste reduction and assess improvements in cost and delivery timelines.

Ultimately, this project advocates for a shift from reactive waste management to proactive prevention, aligning with global trends in sustainable and efficient construction.

Keywords:
Construction waste, Residential buildings, Lean construction, BIM analysis, BIM Integration, Transparency, Quantity accuracy, Value-for-money, Design Visualization, Client satisfaction.