

Multi-Steps Integrated Mathematical MCDM Model for Construction Material Selection of Addis Ababa High-Rise Building Infrastructure

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Abstract : The construction industry is confronted by resource constraints. It affects the initial costs and environment that requires resource and method optimization. The objective of the research is to design a mathematical MCDM model that would enable to select economically and ecologically suitable building material. To achieve this, the researcher designed, evaluated, and selected the suitable concrete grade using a combined mathematical MCDM. The objective sampling technique is used in Addis Ababa to collect samples of high-rise structures and materials. The study used objective- weighed MCDM and fuzzy-AHP to create specific concrete grades. The amount of the objective was fitted by 95% sensitivity analysis cost and quantity of concrete using a combination of MCDM, linear programming, and Monte Carlo simulation. The result demonstrates that, although the unit cost of concrete increased as strength grew, the project's overall cost was reduced by reducing the project quantities. It will also add more space with environmentally friendly, sustainable structures. In conclusion, the integrated mathematical MCDM model is a helpful tool for selecting urban structure cost-effective materials,

Keywords : material property, material selection, combined mathematical MCDM, cost analysis, environmental impact assessment and scenario analysis

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