INSTABRIGHT e-GAZETTE
ISSN: 2704-3010
Volume VI, Issue IV
March 2025
Available online at https://www.instabrightgazette.com

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BICYCLE-POWERED CEMENT MIXER: SUSTAINABLE AND EFFICIENT SOLUTION FOR BUILDING MATERIALS PREPARATION IN CONSTRUCTION

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ABSTRACT

The increasing demand for sustainable construction has led to innovations like the bicycle-powered cement mixer, which offers an eco-friendly and cost-efficient alternative to traditional mixers that rely on fossil fuels or electricity. This study aims to design and evaluate the effectiveness of a bicycle-powered cement mixer, particularly for small-scale construction projects in low-resource areas. Using a Design-Based Research approach, the study focuses on material selection, assembly, and performance testing, analyzing factors such as mixing efficiency, ease of use, durability, and cost. Findings indicate that the bicycle-powered mixer reduces energy costs and emissions while remaining a practical option. However, challenges such as limited mixing capacity and physical effort requirements were identified. Despite these limitations, the project promotes sustainable construction by providing an accessible solution. Further research should optimize the gear system, increase capacity, and incorporate lightweight yet durable materials. Industry-based training and funding support can enhance

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adoption, contributing to the development of sustainable construction tools that address environmental challenges.