



**BUSITEMA
UNIVERSITY**
Pursuing Excellence

FACULTY OF ENGINEERING

DEPARTMENT OF WATER RESOURCES AND MINING ENGINEERING

WATER RESOURCES ENGINEERING PROGRAMME

FINAL YEAR PROJECT REPORT

PROJECT TITLE

**INVESTIGATING THE EFFECT OF USING CHICKEN ESP AND FIRED CBWP
AS PARTIAL REPLACEMENT FOR CEMENT IN CONCRETE.**

BY

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*A final year project report submitted to the Department of Water Resources and Mining
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Science in Water Resources Engineering*

ABSTRACT

The report gives an overview of the practical application of a mixture of chicken ESP and fired CBWP as a good pozzolan. The study inspired by a study on its chemical composition and realize it was a good pozzolan. In this research study, the use of agricultural and construction solid wastes was evaluated for potential use as partial replacement for cement in concrete canal lining section.

From the SEM/EDX analysis, Chicken ESP were mainly composed of Oxygen (48.1%), calcium (28.9%) and Carbon (23%) while fired CBWP mainly composed of Oxygen (52.6%), Silicon (24.3%) and Aluminium (12%). The materials fineness results were within the required percentage of 10% with a low moisture content.

The mix combination was evaluated at nine (9) levels for potential use as partial replacement for cement in concrete canal lining with a slump of between 60– 180mm from which cubes were cast and tested for water absorption and compressive strength after 7 and 28 days curing.

Water absorption after 28days of curing was ranging from 1.36% to 4.63% which was within required maximum percentage of 15%. Test 2 (2.5%ESP20%CBWP) and Test 5 (5%ESP20%CBWP) gave the lowest water absorption percentages of concrete cubes after 28 days of curing, that's 1.36% and 1.38% respectively

The Normal Concrete (NC) was designed for M25 grade of concrete and this was observed to yield 26.54N/mm² at 28 days. The minimum compressive strength was obtained at 7.5%ESP30%CBWP with a yield of 21.63N/mm² which is below the minimum required for M25 grade. Test 5 (5%ESP20%CBWP) had the highest compressive strength of 28.89N/mm² after 28 days curing. Beyond this percentage, there was a decrease in compressive strength.

Test 5 was used to obtain the optimum mix design important in the evaluation of cost effectiveness of the project. The analysis showed that the project was viable.

DECLARATION

I **HIBITA MUSA**, hereby declare to the best of my knowledge, that this project report is an outcome of my efforts and that it has not been presented to any institution of learning for an academic award.

Signature:

Date:/...../.....

APPROVAL

This final research report has been submitted to the Faculty of Engineering for examination with approval of my supervisors.

CO-SUPERVISOR

MR. TIGALANA DAN

Signature..... Date...../...../.....

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Signature..... Date...../...../.....

DEDICATION

This report is dedicated to my beloved parents in appreciation for their selfless care and unflinching support provided to me since childhood, and for the spirit of hard work, courage and determination instilled into me, which attributes I have cherished with firmness and which have indeed made me what I am today.

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LIST OF ACROYNMS.

ACI.....	American Concrete Institute
ASTM.....	American Society of Testing Materials
CBWP.....	Clay Brick Waste Powder
CKD.....	Cement Kiln Dust
CRMs.....	Cement Replacement Materials
EDX.....	Energy Dispersive X-ray spectroscopy
EDTA.....	Ethylene diamine tetra acetic acid
ESP.....	Egg Shell Powder
GHG.....	Greenhouse gases
OPC.....	Ordinary Portland Cement
POFA.....	Palm Oil Fuel Ash
MWE.....	Ministry of Water and Environment
SEM.....	Scanning Electron Microscope