

**BUSITEMA UNIVERSITY**

**FACULTY OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT OF POLYMER TEXTILE AND INDUSTRIAL  
ENGINEERING**

**APPLICATION OF RESPONSE SURFACE METHODOLOGY  
FOR OPTIMIZATION OF BANANA AND BAMBOO FIBRES  
BLEND FOR FLOOR TILES.**

**By**

**BASIIMA EDWIN (BU/UG/2021/0082).**

**KITUTU EARNEST (BU/UP/2021/3352).**

**This report is submitted to the faculty of engineering in partial fulfillment of the  
requirement for the award of Degree of Bachelor of Polymer Textile and Industrial  
Engineering of Busitema University.**



## **FINAL YEAR PROJECT REPORT.**

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**BASIIMA EDWIN (BU/UG/2021/0082).**

**KITUTU EARNEST (BU/UP/2021/3352).**

**SUPERVISORS: Dr Kamalha Edwin, Assoc Prof Nibikora  
Ildephonse and Mr. Muwulya Vincent.**

**MAY, 2025**



## **ABSTRACT**

The study investigates the optimization of banana fiber and bamboo fiber blends using epoxy resin for the development of eco-friendly composite tiles. This research aims to address the growing demand for sustainable construction materials by utilizing natural fibers, known for their high strength-to-weight ratio, renewability, and biodegradability. The fibers are first characterized to determine their physical, mechanical, and chemical properties, including tensile strength, thermal stability, and moisture resistance. Epoxy resin is chosen as the matrix due to its excellent adhesion, mechanical performance, and chemical resistance. Response Surface Methodology (RSM) is employed to optimize the ratios of epoxy resin, banana fibers, and bamboo fibers to achieve the desired mechanical properties, including compressive strength, flexural strength, and water absorption. Preliminary results indicate that the combination of banana and bamboo fibers enhances the performance of the composite, offering a balance between strength and durability. This study not only demonstrates the potential of natural fiber-reinforced composites for tile production but also contributes to sustainable material innovation, promoting environmental conservation and resource efficiency.

## **DECLARATION**

We declare that the information contained in this report is the result of our work and accurate to the best of our knowledge. It is our original presentation to Busitema University for the award of a bachelor's degree in Polymer, Textile, and Industrial Engineering. And we would like to affirm that it is our original work out of our own struggle, effort and sweat and has not been produced by any other person or presented to any other institution of learning before.

NAME: **BASIIMA EDWIN**

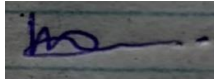
SIGNATURE:



DATE: **20/05/ 2025**

NAME: **KITUTU EARNEST**

SIGNATURE:



DATE: **20/05/2025**

## APPROVAL

This is to certify that this project proposal has been written under the guidance of our supervisors and it is to be handed over to the Department of Polymer Textile and Industrial Engineering, Busitema University.

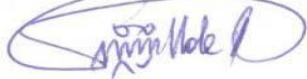
### SUPERVISORS:

Name: DR. KAMALHA EDWIN

Signature: 

Date: **May 22, 2025**

Name: ASSOC PROF NIBIKORA ILDEPHONSE

Signature: 

Date: **21<sup>st</sup> May 2025**

Name: MR. MUWULYA VINCENT

Signature: 

Date: **22<sup>nd</sup> May 2025**

## **DEDICATION**

The research is dedicated to everyone striving for sustainable and environmentally friendly solutions in the construction industry. May the results of this research lead to greener pasture for our communities and inspire others to explore innovative approaches to construction materials.

## **ACKNOWLEDGEMENT**

We would like to sincerely thank God the Almighty for giving us life and enabling us to accomplish this report successfully. Special thanks go to our supervisors Dr. Kamalha Edwin, Assos Prof. Nibikora Ildephonse and Mr. Muwulya Vincent for their continuous guidance and mentorship in the development of this idea. More thanks go to our fellow students for the continuous encouragements. May the almighty Lord bless you abundantly.

## Table of Contents

|                                                                   |      |
|-------------------------------------------------------------------|------|
| ABSTRACT.....                                                     | i    |
| DECLARATION.....                                                  | ii   |
| APPROVAL .....                                                    | iii  |
| DEDICATION .....                                                  | iv   |
| ACKNOWLEDGEMENT .....                                             | v    |
| Table of Contents .....                                           | vi   |
| LIST OF FIGURES .....                                             | viii |
| LIST OF TABLES .....                                              | viii |
| 1 CHAPTER ONE: INTRODUCTION .....                                 | 1    |
| 1.1 BACKGROUND .....                                              | 1    |
| 1.2 PROBLEM STATEMENT.....                                        | 3    |
| 1.3 MAIN OBJECTIVE.....                                           | 4    |
| 1.4 SPECIFIC OBJECTIVES .....                                     | 4    |
| 1.5 RESEARCH QUESTIONS .....                                      | 4    |
| 1.6 JUSTIFICATION.....                                            | 4    |
| 1.7 SCOPE OF THE STUDY .....                                      | 5    |
| 1.8 SIGNIFICANCE.....                                             | 5    |
| 2 CHAPTER TWO: LITERATURE REVIEW .....                            | 6    |
| 2.1 COMPOSITE MATERIALS .....                                     | 6    |
| 2.2 Description of ideas and selected concept products. ....      | 6    |
| 2.3 Raw materials.....                                            | 8    |
| 2.3.1 Banana fibres .....                                         | 8    |
| 2.3.2 Utilization of banana fibers in Uganda .....                | 10   |
| 2.3.3 Previous Work related to banana composite .....             | 10   |
| 2.3.4 Bamboo fibres .....                                         | 11   |
| 2.3.5 Diversity of Bamboo Plants and Utilization in Uganda.....   | 12   |
| 2.3.6 Previous work related to bamboo composite .....             | 13   |
| 2.3.7 Research related to bamboo and banana fibre composite ..... | 13   |
| 2.3.8 Epoxy resin .....                                           | 14   |
| 2.3.9 Composition and Curing Process.....                         | 14   |

|        |                                                                                                                                              |    |
|--------|----------------------------------------------------------------------------------------------------------------------------------------------|----|
| 2.3.10 | Key Properties.....                                                                                                                          | 14 |
| 2.3.11 | Applications .....                                                                                                                           | 15 |
| 3      | CHAPTER THREE: METHODOLOGY .....                                                                                                             | 16 |
| 3.1    | Specific Objective 1: To characterize both treated and untreated banana and bamboo fibers. 16                                                |    |
| 3.1.1  | Extraction of Bamboo fibers.....                                                                                                             | 16 |
| 3.1.2  | Extraction of Banana fibers .....                                                                                                            | 16 |
| 3.1.3  | Chemical treatment of banana and bamboo fibers with Sodium hydroxide. ....                                                                   | 17 |
| 3.1.4  | Characterization .....                                                                                                                       | 17 |
| 3.2    | Specific Objective 2: To determine the optimal blend ratio for the banana and bamboo fibers for the best performance of a floor tile.....    | 17 |
| 3.2.1  | Design of Experiments.....                                                                                                                   | 17 |
| 3.2.2  | Fabrication .....                                                                                                                            | 18 |
| 3.3    | Specific Objective 3: To evaluate the performance of the banana-bamboo composite tile 19                                                     |    |
| 3.3.1  | Water Absorption test.....                                                                                                                   | 19 |
| 3.3.2  | Flexural Strength Test .....                                                                                                                 | 19 |
| 3.3.3  | Bulk density test.....                                                                                                                       | 19 |
| 4      | CHAPTER FOUR: RESULTS AND DISCUSSION .....                                                                                                   | 20 |
| 4.1    | SPECIFIC OBJECTIVE ONE: To characterize banana and bamboo fibers. ....                                                                       | 20 |
| 4.1.1  | Effect of alkaline treatment on banana and bamboo.....                                                                                       | 20 |
| 4.1.2  | FOURIER TRANSFORM INFRARED ANALYSIS RESULTS .....                                                                                            | 20 |
| 4.2    | SPECIFIC OBJECTIVE TWO: To determine the optimal blend ratio for the banana and bamboo fibers for the best performance of a floor tile. .... | 22 |
| 4.2.1  | Experimental results.....                                                                                                                    | 22 |
| 4.2.2  | ANALYSIS OF VARIANCE .....                                                                                                                   | 23 |
| 4.2.3  | Response Optimization .....                                                                                                                  | 27 |
| 4.3    | SPECIFIC OBJECTIVE THREE: To evaluate the performance of the banana-bamboo composite tile. ....                                              | 28 |
| 4.3.1  | Water Absorption Test.....                                                                                                                   | 28 |
| 4.3.2  | Flexural Strength.....                                                                                                                       | 28 |
| 4.3.3  | Bulk density test.....                                                                                                                       | 29 |
| 5      | CHAPTER FIVE: CONCLUSIONS AND RECOMMENDATIONS .....                                                                                          | 30 |
| 5.1    | CONCLUSION.....                                                                                                                              | 30 |

|     |                       |    |
|-----|-----------------------|----|
| 5.2 | RECOMMENDATIONS ..... | 30 |
| 5.3 | CHALLENGES .....      | 30 |
| 6   | REFERENCES .....      | 31 |
| 7   | APPENDIX .....        | 34 |

## LIST OF FIGURES

|                                                                      |           |
|----------------------------------------------------------------------|-----------|
| <i>FIGURE.4. 1 SHOWING FTIR ANALYSIS FOR BANANA FIBERS.....</i>      | <i>20</i> |
| <i>FIGURE.4. 2 SHOWING FTIR ANALYSIS FOR BAMBOO FIBERS .....</i>     | <i>21</i> |
| <i>FIGURE.4. 3 SHOWING CONTOUR PLOTS FOR THE RESPONSES .....</i>     | <i>25</i> |
| <i>FIGURE.4. 4 SHOWING MAIN EFFECT GRAPHS FOR THE RESPONSES.....</i> | <i>26</i> |
| <i>FIGURE.4. 5 SHOWING RESPONSE OPTIMIZATION RESULTS .....</i>       | <i>27</i> |

## LIST OF TABLES

|                                                                                                  |    |
|--------------------------------------------------------------------------------------------------|----|
| TABLE 2-1: SHOWING CHEMICAL COMPOSITION OF GRAY BANANA FIBER .....                               | 9  |
| TABLE 2-2: SHOWING CHEMICAL COMPOSITION OF BANANA FIBERS .....                                   | 9  |
| TABLE 2-3: SHOWING MECHANICAL PROPERTIES OF BANANA FIBRES.....                                   | 10 |
| TABLE 2-4: SHOWING CHEMICAL COMPOSITION OF BAMBOO FIBERS .....                                   | 12 |
| TABLE 2-5: SHOWING MECHANICAL PROPERTIES OF BAMBOO FIBERS .....                                  | 12 |
| TABLE.3. 1:SHOWING MATERIALS / EQUIPMENT USED.....                                               | 16 |
| TABLE.3. 2: SHOWING DESIGN OF EXPERIMENTS .....                                                  | 18 |
| TABLE.4. 1 SHOWING EXPERIMENTAL RESULTS OF THE RESPONSES.....                                    | 22 |
| TABLE.4. 2 SHOWING RESPONSE SURFACE REGRESSION: COMPRESSION VS BLEND RATIO, FIBER FRACTION. .... | 23 |
| TABLE.4. 3 SHOWING RESPONSE SURFACE REGRESSION: WATER VS BLEND RATIO, FIBER FRACTION.....        | 24 |
| TABLE.4. 4 SHOWING OPTIMAL SOLUTION .....                                                        | 27 |
| TABLE.4. 5 SHOWING VALIDATION OF OPTIMAL RESULTS .....                                           | 27 |
| TABLE.4. 6 SHOWING RESULTS FOR WATER ABSORPTION TEST.....                                        | 28 |
| TABLE.4. 7 SHOWING RESULTS FOR FLEXURAL STRENGTH TEST .....                                      | 28 |
| TABLE.4. 8 SHOWING RESULTS FOR BULK DENSITY TEST .....                                           | 29 |

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