

**BUSITEMA
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Pursuing Excellence

FACULTY OF ENGINEERING

**DEPARTMENT OF POLYMER TEXTILE AND INDUSTRIAL
ENGINEERING**

FINAL YEAR PROJECT REPORT

**DEVELOPMENT OF A LUFFA FIBER/ PLA BIO
COMPOSITE MATERIAL FOR INDOOR WALL
PARTITIONING APPLICATIONS**

BY

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ABSTRACT

This is an outline for a project proposal report that was done at Busitema University between June 2023 and August 2023 for the second semester of the fourth year. The study reveals the potential of luffa fiber as a workable reinforcement for PLA matrix, providing a promising avenue for the creation of ecologically friendly and sustainable bio composites with enhanced performance properties. Utilizing the compression molding technique, luffa fiber was chemically treated and combined with PLA to create samples of Bio composite materials. The physical properties such as water absorption, moisture content and mechanical properties such as tensile strength, flexural strength a generated Bio composites are anticipated to be assessed. The research project intends to give engineering students the fundamental abilities needed to become competent as well as a fascinating look into engineering activities.

ACKNOWLEDGEMENT

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LIST OF ACRONYMS

- | | |
|---------|--------------------------------------------|
| 1. NaOH | Sodium hydroxide |
| 2. PLA | Poly lactic acid |
| 3. ULT | Un treated luffa fiber |
| 4. TLT | Treated luffa fiber |
| 5. FTIR | Fourier-Transform Infrared Spectroscopy |
| 6. PP | Polypropylene |
| 7. PVC | Polyvinyl Chloride |
| 8. ASTM | American Society for Testing and Materials |
| 9. ISO | International Organization For standards |
| 10. PET | Polyethylene Terephthalate |
| 11. UV | Ultraviolet |

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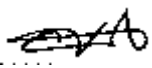
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DECLARATION

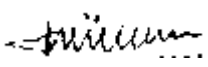
We hereby affirm that this final year project report is, to the best of our knowledge, the result of our research and work, and that it has never been offered or submitted to any organization or university for an academic award.

OCHAR JAMES

Signature..... 

Date..... 11 / 09 / 2023

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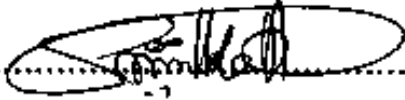
DEDICATION

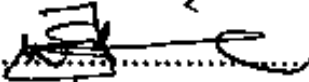
I Ochar James dedicate this report to My beloved parents, Uncle and other relative who have worked tirelessly to support me in my academic journey .

I Nambozo Gift Sarah dedicate this report to My beloved parents relatives and friends who endlessly supported and motivated me towards my goal and throughout the project proposal. We also thank my dear friends, course mates for their cooperation and lastly our supervisors who patiently and wisely handled us throughout the research project.

APPROVAL

This report has been submitted to the department of Polymer Textile and Industrial Engineering with the approval of the following supervisors.

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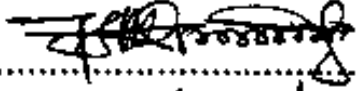
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1 CHAPTER ONE:

1.1 INTRODUCTION

In the pursuit of sustainable and eco-friendly construction materials, there has been a growing interest in the development of innovative solutions that address both environmental concerns and functional requirements. One such avenue of exploration is the creation of bio-composite materials, which combine natural fibers with biodegradable polymers to yield versatile, eco-conscious alternatives for traditional construction components(Bosák & Palko, 2019). This study explores the fascinating field of developing a bio-composite material for use in partition walls using luffa fiber and polylactic acid (PLA), exhibiting the potential to transform interior architecture with a focus on sustainability. Luffa fiber, sourced from the matured inner fibrous structure of the luffa gourd, offers an intriguing opportunity as a natural reinforcement in composite materials(Alhijazi et al., 2020). It boasts several attributes that make it a viable candidate for construction applications, including its lightweight nature, inherent strength, and renewability. On the other hand, polylactic acid (PLA), derived from renewable resources such as corn starch or sugarcane, presents an environmentally conscious choice as a biodegradable and compostable polymer(Kamran et al., 2022). Partition walls, being integral components of interior spaces, play a pivotal role in providing privacy, spatial organization, and noise separation. However, the conventional materials used for partition walls, such as gypsum board or concrete, often come with environmental drawbacks and limited design flexibility(Maneschi & Melhado, 2010). The interaction between luffa fiber and PLA holds the promise of overcoming these limitations by offering a sustainable solution that combines the advantages of both materials. Conclusion: By combining the durability of natural fibers with the environmentally friendly properties of biodegradable polymers, this research aims to contribute to the ongoing transformation of the construction industry into a greener, more responsible sector. The development of a luffa fiber/PLA bio-composite material for partition wall applications represents a significant step towards sustainable construction practices.

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