BUSITEMA UNIVERSITY
Pursuing Excellence

FACULTY OF ENGINEERING

DEPARTMENT OF GINNING & TEXTILE ENGINEERING

FINAL YEAR PROJECT

WATER ABSORBENCY OF WHEAT STRAW PAPER TREATED WITH GELATIN & CARBOXYMETHYL CELLULOSE

By

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DEDICATION

To my loving mum Ms. Nankabirwa Zubeda who has always made even the worst of days feel worth a smile.

And to my biggest sister Sarah who sacrificed her youth to be my mother when mummy couldn't make it through all visitation days and school fees bank lines.

DECLARATION

I Namubiru Shamim, hereby declare that the work presented herein is my original work except where citation has been made and has not been submitted to any other university or institution of higher learning for any award whatsoever.

Signature ..... Date 18th June, 2015

APPROVAL

I certify that this project report titled "Water Absorbency of Wheat Straw Paper Treated with Gelatin & Carboxymethyl Cellulose" has been executed under supervision by:

Supervisor:

Mr. Sendawula Charles

Sign: Sendawula C. ..... Date: 18th - 06 - 2015 .....

ABSTRACT

Chapter I consists of; the introduction which includes a background on how water absorbency affects paper properties, brief information about wheat straw, gelatin and carboxymethyl cellulose; the problem statement, justification, objectives, and scope. Chapter II provides a literature review giving a bit more detailed work on studies already existing in line with the project, treatment with gelatin and carboxymethyl cellulose in pulp and paper. Chapter III presents the materials to be used, how they are to be pretreated in preparation for papermaking and the methods to be used in order to achieve the aim of the study. Chapter IV includes the results and their discussion of the study. Chapter V is the conclusion and recommendation. An appendix containing some images that were taken during project implementation is given.

The pulp and paper industry around the world has been growing rapidly. As a result there has been a huge demand for pulp and paper making raw material. Recent years have seen a spurt in use of non-wood fibers being used as a raw material for this purpose. Although some of the non-wood fibers used for papermaking are used because of their fine paper making qualities, majority of non-wood fibers are used to overcome the shortage of wood fibers. Right from supply of raw material to the properties of finished paper, majority of non-wood raw material has proven to be economically inferior to wood. But over the last few years, technological breakthrough in almost all the fields of papermaking have made non-wood more competitive with wood as a raw material for papermaking.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

The major component of paper, cellulose fiber, is hygroscopic in nature. A material that is hygroscopic will absorb moisture from a damp atmosphere or release moisture to a dry atmosphere and, after sufficient exposure time, will come into equilibrium (balance) with its atmospheric environment (Glatfelter, 2015). This interaction of water and base paper forms the basis for the manufacture of paper, ultimately controls the functional properties in post-processing and the properties of the final paper product (Akinli, 2001). The entry of water into fibers causes de-bonding and separation of the solid elements (Scallan, 1983). This phenomenon may negatively affect paper quality due to the swelled fibres, which contributes to loss of strength under conditions of high humidity or exposure to moisture (Pereira et al., 1999).

Various approaches have been used in the making of water-resistant papers. One of the methods is the coating technique, where synthetic or natural substances are used to laminate the paper substrate surface. Another method is the impregnation via an immersion technique. Both techniques involve the preparation of ready-made paper before coating or impregnation takes place (Shen and Qian, 2012). Several investigators (Jayme and Froundjan, 1940; Bletzinger, 1943; Aiken, 1943; and Harrison, 1944) have studied cellulosic pulps in which varying amount of these hydroxyl groups have been substituted with hydrophobic groups such as the methoxyl or ethoxyl groups. To increase water resistance, sizing agents such as animal glue, rosin size, synthetic resins, starch, and several similar substances are being used in the industry (Mansour et al., 2001). Sizing improves the fiber-fiber contacts by the fulfilling of empty pores and spaces and thus conferring better superficial strength and increasing the resistance to the water penetration (Verboeff et al. 1963). Various treatments were also studied to modify the fibers as it was mentioned in Talwar (1958) that the introductions of acetyl (Bletzinger, 1943), butyryl (Harkson, 1944), methyl (Jayme and Froundjian, 1940), and carboxymethyl (Walecka, 1956) groups on cellulosic materials have been considered at some length, as have their effects on fiber and sheet properties.

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