



**BUSITEMA
UNIVERSITY**
Pursuing Excellence

FACULTY OF ENGINEERING

DEPARTMENT OF GINNING AND TEXTILE ENGINEERING

FINAL YEAR PROJECT

PRODUCTION OF PACKAGING PAPER FROM JUTE AND HEMP BLENDED WITH WASTE PAPER

BY

KIIZA SOLOMON

BU/UG/2012/146



E-mail: solomonkiizabakora19@gmail.com

SUPERVISORS:

- 1. SENDAWULA CHARLES**
- 2. MUSINGUZI ALEX**

*This project report is handed in partial fulfillment of the requirement for the award of a
Bachelor's Degree in Textile Engineering at Busitema University*

May 2016

ACKNOWLEDGMENT

I extend my sincere gratitude to the almighty God for seeing me through this entire challenging period of my four years, and my parents, siblings and entire family for their endless love, provision and support.

In a special way allow me extend my heart felt feeling to my supervisors Mr. Sendawula Charles, Mr. Musinguzi Alex and the entire textile Engineering staff for their guidance and help throughout my project proposal writing.


Am grateful to Professor Martin Hubbe of NCU state university, Mr. Okwanga Alex and Mr. Atuhaire Godfrey of Uganda Industrial Research Institute, The family of Professor Wilson Muhwezi for the care they showed to me during my project implementation, family of Mr. Matsiko Denis, Family of Mr. Fabiano Britunga, Family of Mr. Muhumuza of Ishaaka Bushenyi, Family of Mr. Mwesigye Venance of Ntare school, Family of Mr. Musigire Fende Evalisto, Family of Mr. Bakwatanisa Longino my two Grandmothers Kekiiyenje Regina and Janeroza Kemikyera, My formatters and teacher of Kitabi Seminary, Tr. Sunday Gervase who started the good work in me and my late Grand Father Mzee Guaiagire Simeo who always encouraged formal education.

And to my classmates, Roommates, Akullo Medride and friends who have been there to listen to my never ending questions and given me ideas.

I lastly thank the government of Uganda through Busitema University, at the faculty of engineering, for sponsoring my higher education.

DECELERATION

I KIIZA SOLOMON confirm that this is my own work and it has never been presented anywhere or in any institution of learning


.....

KIIZA SOLOMON



APPROVAL



I certify that this proposal titled “**production of packaging paper from jute and hemp blended with waste paper**” has been executed under supervision by:

Supervisors:

Mr. Sendawula Charles

Sign: Date:

Mr. Musinguzi Alex

Sign:  Date: 

ABSTRACT

Chapter one is an introduction containing a background including packaging industry of Uganda, actions taken by different countries on light weight polythene bags, how writing and printing paper is treated in Uganda , advantages of handmade paper, brief information about hemp and jute, problem statement, main objectives, specific objectives justification and scope of the study. Chapter II methods of producing waste paper, existing work showing the effects of different chemicals used in paper production, properties of hemp and jute. Chapter III presents the materials that were used, how they were pretreated in preparation for papermaking and the methods to used in order to achieve the aim of the study. Chapter IV includes the results and their discussion of the study.

Contents

ACKNOWLEDGMENT.....	I
DEDICATION.....	II
APPROVAL.....	IV
Abstract.....	V
Chapter; BACKGROUND.....	1
1.1 Problem statement.....	5
1.2 Main objective.....	5
1.3 Specific objectives.....	5
1.4 Justification.....	5
1.5 Scope of the study.....	6
Chapter two; LITERATURE review.....	7
2.1 Classical pulping technology.....	7
2.2 The fiber length of jute fiber.....	8
2.3 Paper production from bust fibers.....	9
2.4 Calendaring;.....	10
2.5 Impact of rosin.....	11
2.5 History of Alum-Rosin Size.....	12
2.5.2 Chemistry of Alum-Rosin Size.....	12
chapter three; METHODS AND MATERIALS.....	14
3.1 Assumptions taken.....	14
3.2 Procedure for making paper from waste paper.....	14
3.3 Production of 100% hemp paper.....	15
3.4 Production of 100% jute paper.....	15
3.5 Production of blended papers 1:1 (waste paper: jute).....	16
3.5 Production of blended papers 1:1 (waste paper: Hemp).....	17
3.6 Production of blended paper 1:1.3 (paper: Hemp fibers).....	18
3.7 Production of blended paper 1:1.3 (paper: Jute fibers).....	19
3.8 Production of blended paper 1:1.6(waste paper to jute fibers).....	20
3.8 Production of blended paper 1:1.6(waste paper to hemp fibers).....	21
3.9 Production of blended paper 1:1:1 (waste paper: Hemp: jute).....	22
Chapter four.....	24
Determination of properties and discussion of results.....	24

4.1 Tear index testing (mNm ² /g).....	24
4.2 Tensile strength testing (Nm/g).....	24
4.3 GSM Testing (g/m ²).....	25
4.4 Cobb value:	25
4.5 Result discussion.....	27
4.5.1 Tensile strength.....	27
4.5.2 Tear strength.....	28
4.4.3 Cobb value:	29
4.4.4GSM;.....	31
5.0 Conclusions and recommendations.....	32
5.1 conclusions.....	32
REFERENCES.....	33
Appendix.....	35

CHAPTER; BACKGROUND

Packaging is a large and complex global industry which meets the needs of other industries through the provision of packaging materials and related services. Packaging commonly entails the processing, manufacturer or assembly of items such as paper, plastic, glass, wood, or metal. (Rwanda development board, 2013)

In Uganda, the packaging industry is in its infancy, with only a handful of manufacturers producing lightweight plastic bags, PET bottles, and occasionally corrugated boxes. Uganda is dependent on regional and international suppliers for nearly 100% of its packaging needs. For Uganda specifically, demand for packaging has continued unabated along with overall national consumption (GDP). (Uganda development board, 2013).

Printing and writing paper can be recycled to produce packaging paper. The Costa Rica Natural Paper Company produces 100 percent recycled packaging paper made from 95% post-consumer paper fibre and 5% banana stalks. College students grow, harvest and process the banana stalks. The end products include recycled stationery, notepads, journals, cards, boxes, art supplies and envelopes. (Michael Pilarski,1999)

In Uganda over 100 tons of waste paper is generated from examination board (UNEB) per year, institutions of higher learning like universities, and national teacher's collages. Other sources of paper news prints approximately 200tons are generated annually, printing press, urban resident areas, Oscar and picfare industries which make books leading to generation of a lot of paper off cuts, Government and private companies and offices. Paper recycling is quite new in Uganda. (Personal communications, 2015)

In Uganda nearly all waste paper that is generated from institutions of learning, administrative and business centers is disposed-off for burning. And this due to lack of adequate storage facilities as indicated by workers from different environments, (Atuhaire, 2007), some of the paper is used for wrapping food stuffs like chappati, fried ground nuts and other dry snacks. Most people have a belief that it is useless and not economically viable. Burning becomes the best solution to the useless waste paper hence polluting the environment. The burning of this paper definitely leads global warming since it is not controlled. (Atuhaire, 2007)

REFERENCES

- Abel E.L. 1980. *Marihuana, the first twelve thousand years*. Plenum press, New York, 289 pp.
- Conrad C., 1993. *Hemp, lifeline to the future*. Creative Expressions Publishing, Los Angeles, California.
- FAO 1991. *The outlook for pulp and paper to 1995. Paper products, and industrial update*. Food and Agricultural Organization of the United Nations, Rome.
- Hunter, D. 1957. *Papermaking, the history and technique of an ancient craft*. 2nd Ed. Albert A. Knopf
- Smook G.A. 1982. *Handbook for pulp & paper technologists*. 2nd Ed. Angus Wilde Publications, Vancouver, B.C.
- Temple R.K.C, 1986. *China, land of discovery and invention*. Patrick Stevens Ltd., United Kingdom.
- Jim Thurn, "History, Chemistry, and Long-Term Effects of Alum-Rosin Size in Paper" *The Cochineal* December 3, 2003. Quoting Barrow Research Laboratory, W.J.. 1974. *Permanence/durability of the book-VII physical and chemical properties of book papers, 1507-1949*. Richmond: W.J. Barrow Research Laboratory and Green, S. 1992. "An outline history of sizing methods with special reference to practices at Hayle Mill". Conference papers Manchester 1992, Third International Institute of Paper Conservation Conference, Manchester. 197-200. <https://pacer.ischool.utexas.edu/html/2081/1396/j-thurn-03-alum.html> accessed 3/11/2014
- *Randon Chisnell*. "[Greif Containerboard Mills - Red Rosin](#)". greifcontainerboard.com.
- *James McCaffrey*. "[Red Rosin Paper](#)". plasticover.com.
- Svensson, Inga-Lisa and Alwarsdotter, Ylwa. "A Papermaker's View of the Standard of Perminant Paper, ISO 9706", *A reader in preservation and conservation*. München: K.G. Saur, 2000. 62. Print.
- Chambers, E. *Cyclopedia or an Universal Dictionary of Arts and Sciences*. London, 1784.
- Church, A. H. *The Chemistry of Paints and Painting*. Seeley and Co. Ltd., London, 1901.
- Daniels, Vincent. "The Elimination of Bleaching Agents from Paper." *The Paper Conservator, Journal of the IIC United Kingdom Group Paper Group*, 1976, Vol. 1.
- Davis, Charles T. *The Manufacture of Paper*. Philadelphia, 1886.

- Gess, J. M. et al. "The Strong Bond/Weak Bond Theory of Sizing." Tappi Journal, January 1991.
- Gess, J. M. "Rosin Sizing of Papermaking Fibers," Tappi Journal, July 1989.
- Grant, J. A Laboratory Handbook of Pulp and Paper Manufacture, 2nd edition. Edward Arnold & Co., 1944.
- Hofmann, Carl. Praktisches Handbuch der Papier Fabrikation. Verlag der Papierzeitung, Berlin, 1891. Vol. 2.
- Jenner, Thomas. A Book of Drawing, Limning, Washing or Colouring of Maps and Prints. Printed by Simmons for Jenner, London, 1652.
- Kragh, A. M. "The Effect of Aluminum Sulphate and other Polyvalent Metals on the Viscosity of Gelatin Solutions." Journal of the Science of Food and Agriculture, June 8, 1957.
- Lalande, Joseph de. The Art of Papermaking (1761), transl. by R. Atkinson. County Clare, Ireland: Ashling Press, 1976.
- Libby, C. Earl. Pulp and Paper Science and Technology, Vol. II. McGraw-Hill, New York, no date (probably 1960s).
- Martin hubbe, Associate Professor of Wood and Paper Science, NC State University, m_hubbe@ncsu.edu. 2015
- Gaiker-IVL and KTH (2005). Technological Reference Paper on Recycling Plastics. GNA (2005). AMA to temporarily ban use of plastics.
- <http://www.ghanaweb.com/ghanahomepage/newsarchive/article> (access on 12 June, 2006)