BUSITEMA UNIVERSITY
Pursuing Excellence

FACULTY OF ENGINEERING

DEPARTMENT OF PROCESS AND CHEMICAL ENGINEERING

ASSESSMENT OF ENERGY USAGE IN BOTH SMALL AND MEDIUM SCALE DRY MAIZE MILLING PLANTS.

CASE STUDY

(JINJA AND BUSIA MINICIPALITIES)

BY

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ABSTRACT

This research aims at the investigation of energy usage in dry small and medium scale maize milling plants in areas of Jinja and Busia municipalities'. The performance of the hammer mills were evaluated on different milling parameters including drum speed, mill clearance, moisture content of the grains and their influence on production time as a factor of energy utilized.

The obtained results reveal that there is a great gap between the operating conditions and design parameters of the existing mills to the standard dimensions among all factors that influence energy usage and production time. Many mills were found milling grains at moisture content above 13% from the standard below 12% which increase energy consumption by 36%, more mills have extra-ordinary mill clearances above 10mm in comparison with 4mm standard mill clearance for a hammer mill and the drum speeds were found to be relatively high though not sufficient with mills operating at speeds below 3500rpm which the utmost speed for a dry maize mill to covey flour.

This report has been able to show how dry maize mill fabricators and the business men can make a better comparison of their anticipated production and choose the right milling parameters and size for an economical mill. Through this paper the millers will find the loopholes that have always made them hate the UMEME people yet it's their mills that were leading to all the major losses realized in the industry, due to poor sizing of the mills and failure to understand the benefit of connecting a group of millers on a single metre under large industrial consumers.

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DECLARATION

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

Signature.....

Date.....31/05/2017.....

APPROVAL

This research report has been submitted to the Department of Agro-Processing Engineering for examination with approval from the following supervisors:

ENG. KILAMA GEORGE

Signature.....

Date 25/8/2016

Mr. KIYEMBA ANDREW NSIBUKA

Signature.....

Date.....

DEDICATION

This report is dedicated to my beloved mothers Ms. Nankwanga Tapenensi and Joy in appreciation for their selfless care and unflinching support provided to me since childhood, and for the spirit of hard work, courage, determination, believing and hope instilled into me, which attributes I have cherished with firmness and have indeed made me what I am today. May the good Lord Almighty continue to bless you abundantly!

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CHAPTER ONE

1.0 INTRODUCTION

This chapter provides information about the back ground, problem statement, significance of the study, objectives, research scope and the justification.

1.1 Back ground

Maize is a domesticated grass that originated approximately 7000 years ago from Mexico. Its evolution apparently occurred mainly under domestication and resulted in biotypes with adaptation ranging from the tropics to the north temperate zone, from sea level to 12,000 feet altitude, and growing periods (planting to maturity) extending from 6 weeks to 13 months (A non n.d.) . It is the third most important cereal grain worldwide after wheat and rice (Golob, *et al.*, 2004), hence the cereal of the future for its nutritional value and utilization of its products and by-products, (Lee, 1999). The demand for maize has been estimated to increase by 50% to 837 million metric tons in 2020, (Martinez *et al.*, 2011). Maize has diverse uses, from food processing, animal feed, to ethanol production, (FAO, 2006). It is a basic staple grain food for continents; Africa, Latin America, and Asia, (Yaouba *et al.*, 2012).

Processing of maize for flour production is a particle size reduction process under exposure mechanical forces that trench the structure of the grain by overcoming its interior bonding forces to make it safe for consumption (Wang, 2009). Because of the high-fat content, these whole or partially degerminated maize products are not particularly shelf stable. Much of the particle size reduction and separation is accomplished with equipments like cleaners, de-huller and hammer or roller mills which are all using power. The dry maize milling industries have played an important role in many developing countries like Uganda, where agricultural activities provide the best potential for labor absorption in rural areas (Real, 2014). Traditional maize mills are characterized by their high energy consumption and pollution into the environment (NEMA, 2010). This is largely due to the low-efficient and poorly maintained machinery that has caused losses to both the millers and the customers they serve since all those losses can hardly be mitigated after milling.

Many mills are working under installed capacity of (30-50%) which has a direct impact on the energy consumption (Export, 2003). Hence failure to realize profits by the millers because of lack of knowledge and advice on the relationship of energy consumption to unit

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