BUSITEMA UNIVERSITY
FACULTY OF ENGINEERING
DEPARTMENT OF AGRICULTURAL MERCHANIZATION AND IRRIGATION ENGINEERING

DESIGN AND CONSTRUCTION OF DUAL-POWERED COFFEE GRINDING MACHINE

BY

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ABSTRACT

Coffee is an important cash crop contributing 20% of Uganda's foreign exchange and about 500,000 households depend on coffee production as a major source of income and mainly is grown by smallholders with an estimated average coffee farm size of 0.58 hectares processing is done by dry and wet method. Coffee roasting and grinding has been found to enhance the taste of both Arabica and Robusta .It has the added advantage of producing coffees of superior quality which translate to better prices in the market. Coffee grinders are small in size and cannot used for large production. However where farmers can neither access coffee grinders nor afford to pay for its services a lot of improvisation and traditional methods have been employed to grind coffee .This method is time wasting, labor intensive, the output is of low quality. This project report describes the design and fabrication of a dual-coffee grinding machine aimed at increasing production capacity, saving time and increasing output of coffee . Component parts of the dual coffee grinding machine were designed, fabricated and assembled into a portable prototype which is screwed on the table when in operation. The prototype was tested giving an average production capacity 1Kg/hr with an efficiency of 69%when manually operated and 3kg when operated using motor with efficiency of 76% . The cost evaluation analysis of the designed and fabricated dual-powered coffee grinding machine was carried to determine the cost incurred during fabrication to find out if the machine is more economical and affordable compared to the available coffee grinders on market.

Declaration

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

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Tumushabe Cylus (BU/UG/2013/145)

Approval

This proposal has been submitted for examination with approval from the following supervisors;

Main supervisor

MR. Okirya Martin

Date …….

Signature ……..

Co-supervisor:

MR. Mugisha Moses

Date ……

Signature ……..

Dedication

This proposal is dedicated to my beloved parents Mr. Byaruhanga Patrick and Mrs.Basingire Jane in appreciation for their selfless care and unflinching support provided to me since childhood and for the spirit of hard work, courage and determination distilled into me which attributed I have cherished with firmness and which have indeed made me what I am today.

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CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

Coffee is one of the most important cash crops across the world and a major source of export earnings. It is second only to crude oil as the most important internationally traded commodity in monetary value (FAO, 2004). It belongs to the family Rubiacea (Illy and Viani, 2005) and consist more than one hundred species. Coffea Arabica (Arabic coffee) and Coffea canephora (Robusta coffee) are the two common species of coffee (Rick and Graham, 2004). Coffea Arabica is more economical and it represent three quarters of the world coffee productions while Coffea canephora makes the rest one quarter of world coffee production (Kristina, 2011). These species vary in terms of chemical composition (Clifford, 1985). Arabic coffee beans have good acid balance and chocolaty to flowery aroma while Robusta coffee beans have a bitter taste and, they are woody to earthy aroma (Kristina, 2011). Arabica coffee originated from Ethiopia (Anthony et al., 2001). While Robusta coffee is believed to come from Central to West Africa (Williams, 2008; Opeke, 2005; and Ngussie and Dererse, 2007).

Uganda majorly handles two types of coffee, Robusta and Arabica which are grown in the ratio of 4:1 respectively. Robusta is grown in the low altitude areas of Central, Eastern, Western and South Eastern Uganda up to 1,200m above sea level while Arabica coffee is grown in the highland areas on the slopes of Mount Elgon in the East and Mt. Rwenzori and Mt. Muhabura in the South Western Region (1500-2,300m above sea level). Uganda‟s best known Arabica coffee, “Bugisu”, is grown on the slopes of Mt.Elgon in eastern Uganda, the harvesting period begins in October/September for early ripening crops on lower slopes and ends in March at over 2,000meters above sea level, (Geoff Sayer, 2002).Coffee is an important cash crop that supports over 3.5 million families at all levels of the value chain contributing to income security and between 20 - 30% of Uganda’s foreign exchange earnings (UCDA, 2012). Coffee is therefore extremely important to both rural population and Ugandan economy as it provides an estimated 500,000 coffee-growing small house holding with their main source of income and they produce 97% of the country’s crop. Coffee processing in Uganda is done by both dry and wet processing technology. Wet processing results into high quality coffee and there are about 26 independent

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