

BUSITEMA UNIVERSITY

FACULTY OF ENGINEERING

**DEPARTMENT OF AGRICULTURAL MECHANIZATION AND IRRIGATION
ENGINEERING**

Final year project

**DEVELOPMENT OF A MINIMUM COST SMALL SCALE COCOA DE-PULPING
MACHINE**

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A final year project report submitted to the Department of Agricultural Mechanization and Irrigation Engineering as a partial fulfillment for the award of Bachelors of Science in Agricultural Mechanization and Irrigation Engineering.

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DECLARATION

I, Gizamba Umar hereby declare that this project is completely based on my research work except for citations and quotations which have been specifically acknowledged. It has never been submitted to any examining body or academic institution for any academic award.

Gizamba Umar

Sign



APPROVAL

This project is compiled and submitted to the department of Agricultural Mechanization and Irrigation Engineering under supervision as approved below.

MAIN SUPERVISOR

Mr. ASHABAHABWEBA AMBROSE

Signature.....

Date.....

DEDICATION

I dedicate this report to my dear parents Mr. Mafabi Muhammad and his beloved wife Wanyenya Susan for the support they have given me, not forgetting my brother and classmates for financial assistance and academic reminders extended to me during the research period

ABSTRACT

Cocoa is one of the most important cash crops grown in Uganda after coffee, tea with a total land area of 25000 hectares covered by cocoa plants (www.monitor.co.ug). The crop grows in a limited geographical zone of about 20° to the north and south of the Equator (Bujjsse ,(2006)and Angelo,(2010)). It is widely grown in various districts in Uganda including: Bundibugyo, Mukono, Jinja, Kamuli, Buikwe, Masindi, Mayuge, Iganga and Kayunga districts on small scale.

Harvesting is carried out by cutting the pod stalks with knives. The harvested pods are transported to the farmer's home, opened, seeds removed and placed in baskets to allow fermentation to take place and then dried. The above processes are accompanied by high quantitative and qualitative losses, and are highly tedious, labor intensive, time consuming. The depulping machine was designed and constructed by first sizing the components through analysis of forces acting on the components, material selection, fabricated and assembled. The selected materials were those which would withstand the applied forces in order to avoid failure of the components during operation of the cocoa seed depulper.

The depulping capacity of the prototype was 3.44kg/min and an average depulping efficiency of 70%, and percentage loss of 7.64% obtained by carrying out two tests at rated engine speed of 1420rpm of a 3HP motor .The prototype has limitations of immobility, high power requirement and needs frequent cleaning.

The prototype was produce at a cost 651,250 UGX. Economic analysis of prototype was carried out using the Net Present Value and Profitability Index analysis to determine its viability. The profitability index was 1.78 which shows the project was viable.

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CHAPTER ONE: INTRODUCTION

1.0 INTRODUCTION

This chapter presents the background to the study, the problem addressed, the objectives of the study, and a justification for undertaking the study. Additionally the scope of the study is defined.

1.1 Background to the Study

Cocoa (*Theobroma Cocoa*) originates from Central America (*Bingham, A., & Roberts, J. (2010)*) and grows in a limited geographical zone of about 20° to the north and south of the Equator (*Bujisse ,(2006)and Angelo (2010)*) In Africa cocoa is grown in west and sub- Saharan countries such as Democratic republic of Congo, Nigeria, Ghana, Ivory Coast, Tanzania and Uganda. World cocoa production rose at an average annual growth rate of 2.5% with Africa sharing 70% in 2009/10 (*LWR: 2015 and Afoakwa, 2014*). In Uganda Hybrid seeds of cocoa such as Upper Amazon and Trinitario from Costa Rica and Trinidad were introduced in 1988 and planted on the island of Ddamba in Mukono districts. (*Aikpokpodion, 2012*). The major cocoa growing areas in Uganda include Bundibugyo, Mukono, Jinja, Kamuli, Buikwe, Masindi, Mayuge, Iganga and Kayunga districts on small scale. According to MAAF, farmers were given training, extension and inputs like seedlings in districts east of Kampala, western in a bid to increase production. The total land area for cocoa growing was estimated at 92,000 hectares and that occupied by cocoa plants was 25,000 hectares with an anticipated 50,000 hectares by the end of 2020. The total number of cocoa plants planted each year has increased from one million in 2005 to three million in 2015 and expects seven million to meet the 50000 hectares. The crop supports an estimated 38,000 small holder farmers in the country and the farm gate prices of cocoa have also increased from Shs4, 000 in 2010 to shs 9600 (*monitor nov,2016*). Cocoa is used in production of soft drinks, alcoholic drinks, jam, Vaseline and chocolate, ice cream etc. **The health benefits of cocoa** incorporated in medicine are for treating fever, dysentery, pressure, anti-oxidants, syrups, enhancing constipation and preventing deficiency. Additionally, petals from the cocoa flower are used to treat skin problems, burns and stomach ailments. (*Angelo,2010*).

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