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FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF AGRICULTURAL MECHANIZATION AND IRRIGATION ENGINEERING

DESIGN AND CONSTRUCTION OF A MINI COMBINE HARVESTER FOR SMALL SCALE RICE FARMERS

FINAL YEAR PROJECT REPORT

BY

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A final year project report submitted to the Department of Agricultural Mechanization and Irrigation Engineering in partial fulfillment of the requirement for the Award of the Bachelor's Degree in Agricultural Mechanization and irrigation Engineering of Busitema University

DECLARATION

We a team of 5 members,

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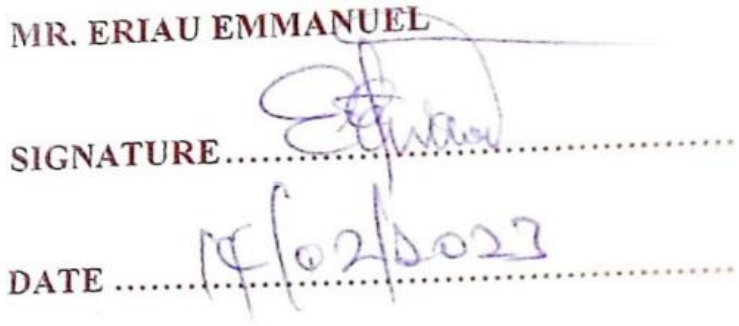
declare to the best of our knowledge that the piece of this project report was as a result of our research and effort and it has never been presented or submitted to any institution or university for an academic award.

APPROVAL

This project has been submitted for examination with approval from the following supervisor:



ACKNOWLEDGEMENT

Sincere thanks go to the Almighty God for the wisdom, knowledge, grace, mercy, and protection He has given to us. We are highly indebted to the Head of Department Agricultural mechanization and irrigation Engineering Busitema University faculty of engineering, Mr. Eriau Emmanuel and all the other lecturers for their moral and academic support through the course of my journey in the University.

ABSTRACT

This Report is organized in three chapters, that is, chapter one contains the introduction, chapter two presents the literature review and chapter three presents the methodology that was used to achieve all the specific objectives.

The introduction presents what the project is all about and clearly shows the intent of the researcher. It contains sub-sections such as, background of the study, gap in knowledge, statement of the problem, general objective and specific objectives of the study, research questions, justification, scope of the study and structure of the proposal.

The literature review presents concepts that are vital for the design of the machine, such as the engineering properties of rice, and the recommended values for the crop and machines variables, that can ensure efficient harvesting, threshing and winnowing of the paddy.

In chapter three, the methodology presents clear procedures of achieving each specific objective. It describes the conceptual framework that guides the design of machine components. It shows how machine components are designed and constructed. It also describes how characteristics of machine performance were established, as well as how a cost-benefit analysis of the prototype carried out.

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CHAPTER ONE

1.0 INTRODUCTION

1.1 BACKGROUND

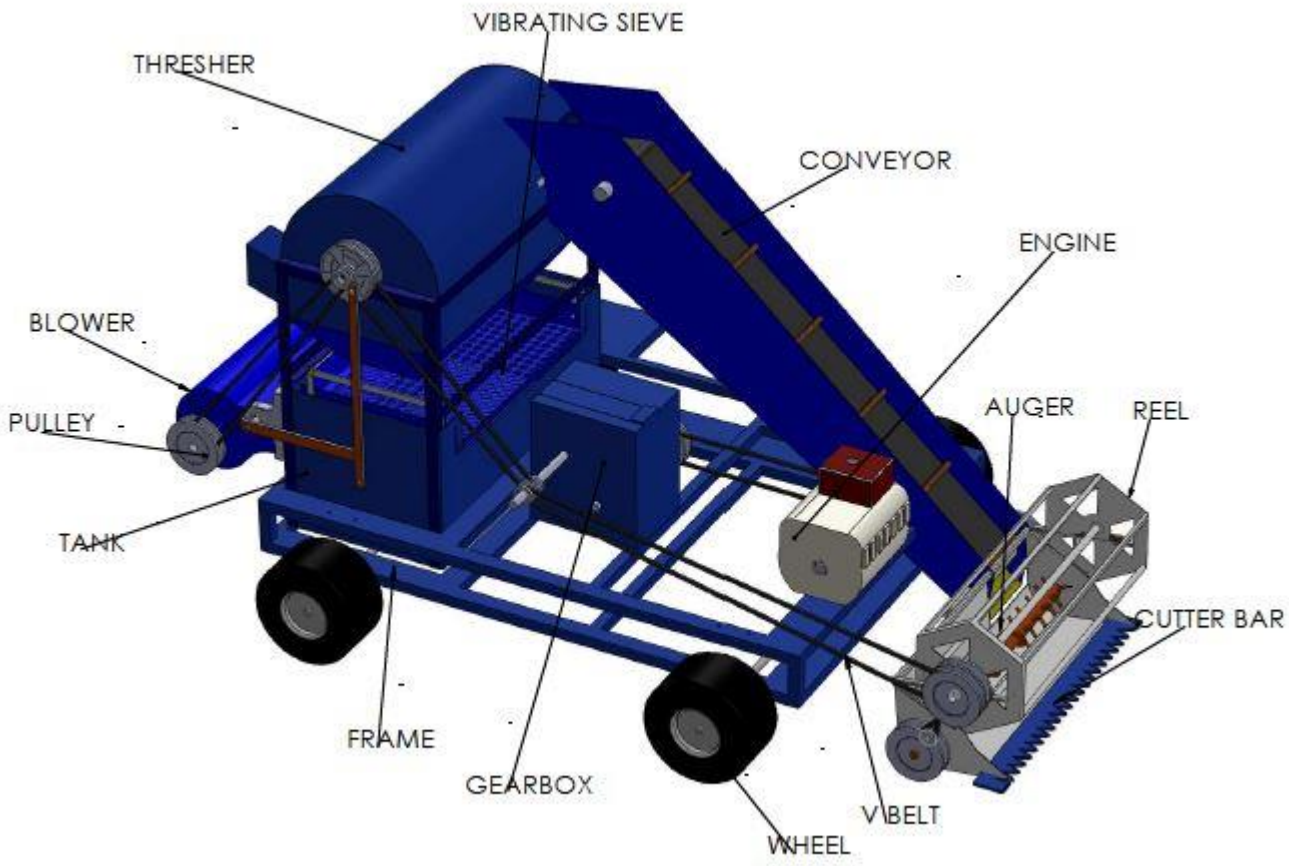
Rice is the seed of the grass species *Oryza sativa* (Asian rice) or *Oryza glaberrima* (African rice). Rice is a cereal grain and is the most widely consumed staple food of a large part of the world's human population, especially in Asia. Although its parent species are native to Asia and certain parts of Africa, centuries of trade and exportation have made it common place in many cultures worldwide (Wikipedia, 2016, as cited in Prasetya, 2017)). Rice being a monocot, is normally grown as an annual plant although in tropical areas it can survive as a perennial and can produce ratoon crop for up to 30 years (IRRI ,2009, as cited in Prasetya, 2017)). It is the agricultural commodity with the third-highest worldwide production after sugarcane and maize as recorded by FAOSTAT data (2012). Rice is the most important grain with regard to human nutrition and calorie intake providing more than one-fifth of the calories consumed worldwide by humans (Bruce ,1998, as cited in Prasetya, 2017)).

Rice (*Oryza sativa*) is an important crop that has been cultivated and consumed worldwide (Ojo et al., 2020). The total area under rice cultivation is globally estimated as 150,000,000 ha with annual production averaging 500 million metric tons (Tsuboi, 2004 as cited in Grace, 2018). Rice represents 29% of the total output of grain crops worldwide (Xu et al, 2003 as cited in Grace, 2018).

According to FAO (1996, as cited in Prasetya, 2017) Africa consumes a total of 11.6 million tonnes of milled rice per year, of which 3.3 million tonnes (33.6%) is imported. As many as 21 of the 39 rice producing countries in Africa import between 50 and 99 percent of their rice requirements. Rice production rose 30% on average in sub-Saharan Africa (SSA) in two years at the end of 2012, according to analysis by Africa Rice Centre (Africa Rice)

Today rice is grown mainly by small scale farmers almost throughout the country, with few large scale farmers in few places. Total production is estimated at over 165,000 metric tons. Most rice in Uganda is grown in Eastern Uganda followed by Western Uganda due to the presence of lowland with high moisture content throughout the growing season (Butter, n.d.).

In addition, also timely harvesting remains a major bottleneck to most small scale rice farmers in Uganda which results into reduction of yields due breakage of the rice grains which results from over drying of the paddy before harvest. Harvesting is the process of collecting the mature rice crop from the field. Harvesting



A-11 Shows the Assembled machine

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