

**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

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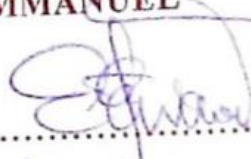
declare to the best of our knowledge that the piece of this project report was as a result of our research and effort and it has never been presented or submitted to any institution or university for an academic award.

APPROVAL

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

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14/02/2023

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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.

Table of Contents

DECLARATION	i
APPROVAL	ii
ACKNOWLEDGEMENT	iii
ABSTRACT	iv
LIST OF FIGURES	x
LIST OF TABLES	xii
CHAPTER ONE	1
1.0 INTRODUCTION	1
1.1 BACKGROUND	1
1.2 PROBLEM STATEMENT	3
1.3 OBJECTIVES	4
1.3.1 MAIN OBJECTIVE	4
1.3.2 SPECIFIC OBJECTIVES	4
1.5 JUSTIFICATION	4
1.6 SCOPE OF THE STUDY	5
CHAPTER TWO:	6
2.0 LITERATURE REVIEW	6
2.2 Description of rice	6
2.2.0 Physical description	6
2.3 Rice production and trends in Uganda	7
2.3.0 Major rice production areas:	7
2.3.1 Rice irrigation schemes in Uganda	7
2.3.2 Rice production un Uganda per region.	7
2.3.3 Rice varieties grown in Uganda.	8
2.3.4 Physical and mechanical properties of rice	8
2.3.5 Post- harvest practices of rice	10

2.4 Review on the existing Rice harvesting, conveying, threshing and cleaning techniques.	11
2.4.0 Traditional Harvesting techniques	11
2.4.1 Traditional/Manual threshing methods.	11
2.4.1.0 Trampling	11
2.4.1.1 Hand beating	12
2.4.2 Traditional winnowing	12
2.4.3 Mechanical methods	13
2.4.3.0 Rice threshing	14
2.4.3.1 Machine threshing	14
2.4.3.2 Pedal thresher	14
2.4.3.3 Large stationary threshers	15
2.4.4 Mechanical cleaning	16
2.4.4.0 Machine winnowing	16
2.4.4.1 Hand or Pedal-operated winnowers;	16
2.4.4.2 Motorized and engine-operated winnowers	16
2.4.4.3 Advantages and disadvantages of mechanical winnowers	17
2.5 COMBINE HARVER	18
2.5.0 COMPONENTS A COMBINE HARVESTER	18
2.5.1 The combine header	18
2.5.1.0 Types of Combine Headers	19
2.5.1.1 Draper Headers	19
2.5.1.2 Corn Headers	19
2.5.1.3 Sunflower Headers	20
2.5.1.4 Pick-Up Headers	21
2.5.1.5 Stripper headers	21
2.5.1.6 Grain headers	21
2.5.1.7 Header Augers (Intake Augers)	27

2.5.2 RICE CONVEYER	28
2.5.2.0 Parts of a Conveyor	29
2.5.2.1 Working principle of the conveyance system.....	29
2.5.2.2 Types of mechanical Conveyor System	29
2.5.3 The threshing unit	36
2.5.3.0 Main Components of thresher.....	36
2.5.3.1 Concave	36
2.5.3.2 Threshing cylinder.....	37
2.5.3.3 Spike/ peg tooth thresher	38
2.5.3.7 Design Consideration	45
2.5.3.8 Total grain input.....	45
2.5.3.9 Threshing efficiency	45
2.5.4The cleaning unit	46
2.5.4.1 Mechanical ways of rice cleaning.....	46
2.5.4.2 Components of the cleaning unit.....	46
2.5.4.3 Construction of Cleaning and collecting unit	47
2.5.4.4 Combine Grain Pan.....	47
2.5.4.5 Combine Top Sieve (Chaffer Sieve)	48
2.5.4.6 Combine Bottom Sieve	49
2.5.4.7 Fan	49
2.5.4.8 Design of the cleaning unit.....	51
2.5.4.9 SIEVE	53
2.5.4.10 Losses during harvesting.	53
2.5.5 Power transmission and support system	54
2.5.5.1 The support system.....	54
2.5.5.2 The power transmission system	55
2.5.5.3 Transmission belt.....	55

2.5.5.4 Types of Belts	55
2.5.5.5 Types of Belt Drives.....	56
2.5.5.6 Selection of the belt drives	56
2.5.5.7 Material used for Belts	57
2.5.5.8 The pulley driving Mechanism power	58
2.5.5.9 Designing for the speed of the belt	59
2.5.5.10 Design for the tension in the belt.....	59
2.5.5.11 CHAINS.....	60
2.5.5.13 Design of the shaft	62
2.5.5.14 The suspension system	65
2.5.5.15 The Main Frame	65
2.5.5.16 Design of Handle.....	66
2.5.5.17 Tires and wheels	66
2.5.5.19 Bearings, bolt and key ways	66
CHAPTER THREE.....	68
3.0 RESEARCH METHODOLOGY.....	68
3.1 Introduction	68
3.2 Machine Design.....	68
SPECIFIC OBJECTIVE ONE.....	70
3.3.0 Design and construction of different components of a mini combine harvester	70
3.3.2.0 The Combine header	71
3.3.3.0 The conveying unit.	76
3.3.4.0 The threshing unit	79
3.3.5.0 Cleaning unit.....	84
3.3.6 Material selection.....	87
SPECIFIC OBJECTIVE TWO.....	89
3.4.0 To construct the mini combine harvester.....	89

3.4.1 Tools, Equipment and Machines for Fabrication of Components	89
SPECIFIC OBJECTIVE THREE	90
3.5.0 To test the performance of the mini combine harvester under field conditions	90
3.5.1 The procedure for establishing the characteristics of the prototype performance	90
3.5.2 Performance evaluation	91
3.5.3 Procedure for determining the machine capacity, M_c (kg of clean grain/hour)	93
SPECIFIC OBJECTIVE FOUR	93
3.6.0 Carrying Out a Cost-Benefit Analysis of The Prototype	93
3.6.1 Introduction	93
3.6.2 Net Present Value (NPV) method	94
3.6.3 The Profitability Index, $P. I$	94
3.6.4 The payback period	94
3.6.5 Internal Rate of Return (IRR) Method	94
Proposed work plan and budget	Error! Bookmark not defined.
REFERENCES	129

LIST OF FIGURES

Figure 2.1 shows rice crop	6
Figure 2.2 shows the trend of rice production in the main season of 2014	7
Figure 2.3 shows the trend of rice production from 1980 - 2010	8
Figure 2.4 shows farmers harvesting rice	11
Figure 2.5 manual threshing.....	12
Figure 2.6 shows manual cleaning methods of winowing	13
Figure 2.8 shows a hand operated winnower.....	16
Figure 2.9 shows engine operated winnower.	17
Figure 2.10 shows a combine harvester	18
Figure 2.11 shows sunflower headers	20
Figure 2.12 shows headers	20
Figure 2.13 shows a header auger	22
Figure 2.14 shows the reel.....	23
Figure 2.15 shows reel orientation	23
Figure 2.16 shows cutter bar orientation	26
Figure 2.17 shows pendulum angle	27
Figure 2.18 shows the reel.....	28
Figure 2.19 shows a belt conveyor	32
Figure 2.20 shows a screw conveyor	35
Figure 2.21 type of threshing cylinders	37
Figure 2.22 shows an axial thresher	39
Figure 2.23 shows axial flow principle	39
Figure 2.24 shows the main parts of a thresher.....	44
Figure 2.25 parts of the cleaning unit.....	47
Figure 2.26 shows grain pan general construction.....	48
Figure 2.27 shows chaffer sieve design	48
Figure 2.28 shows graepel sieve.....	49
Figure 2.29 shows a centrifugal radial-flow fan	50
Figure 2.30 shows a cross-flow fan.....	51
Figure 2.31 shows an engine	55
Figure 2.32 shows a v-belt.....	56
Figure 2.33 shows the structure of a flat belt.....	58
Figure 2.34 shows a chain	60

Figure 2.35 shows a handle.....	65
Figure 2.36 shows a pneumatic rubber tire	66
Figure 2.37 shows a side view of a bearing.....	67

LIST OF TABLES

Table 2.1 shows rice varieties	9
Table 2.2 Table shows the peripheral speed of different crops (Goering et al., n.d.)	40
Table 2.3 shows power ratings of a simple roller chain	62
Table 3.4 Material Selection	87
Table 3.5Table Showing the different operations involved in the fabrication process and the tools, equipment and machines used to perform the operations.....	89
Table 6 Work Plan
Table 7 Showing Proposed Budget	123

CHAPTER ONE

1.0 INTRODUCTION

1.1 BACKGROUND

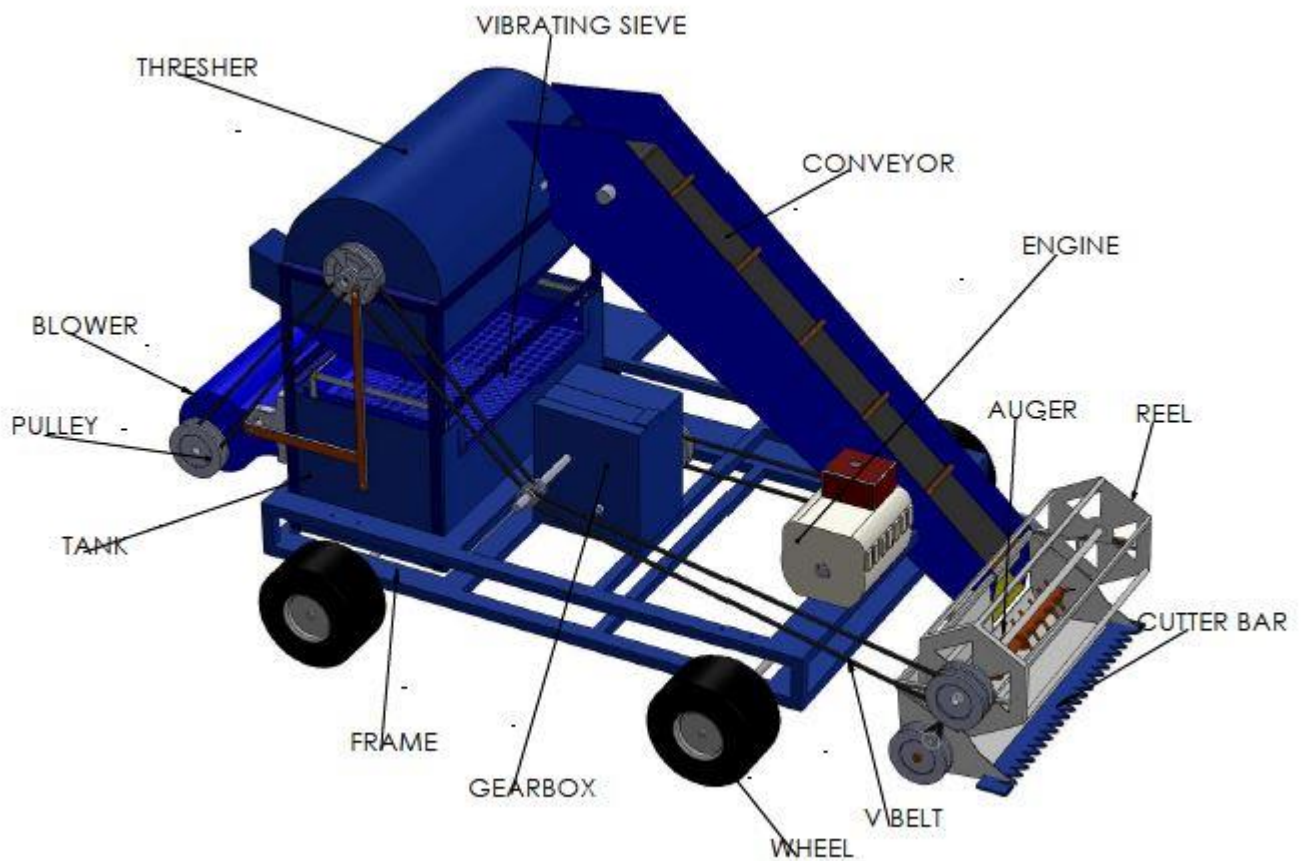
Rice is the seed of the grass species *Oryza sativa* (Asian rice) or *Oryza glaberrima* (African rice). Rice is a cereal grain and is the most widely consumed staple food of a large part of the world's human population, especially in Asia. Although its parent species are native to Asia and certain parts 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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