



**BUSITEMA
UNIVERSITY**
Pursuing Excellence

**FACULTY OF ENGINEERING
DEPARTMENT OF AGRICULTURAL MECHANIZATION AND IRRIGATION
ENGINEERING**

**FINAL YEAR PROJECT REPORT
DESIGN AND FABRICATION OF A MOTORISED MAIZE SHELLER**

**BY
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ABSTRACT

Maize (*Zea mays* L) is one of the world's important cereal crops and a major staple food in East Africa. In addition to its being an important animal feed, it's also a source of income. Shelling is the process of removing seed or grain from their respective cobs for both human and industrial use. The bulk of the crop is shelled using the rudimentary traditional methods, which have low productivity and result into maize grain of low market value. Earlier studies conducted by National Agricultural Research Organization (NARO) in 1989 identified lack of appropriate maize sheller to meet the market demands of commercial farmers as one of the major constraints that mitigate the increased trends of maize production in Uganda. Responded by developing a motorized maize sheller, which had a mean output of 300kg/hr, shelling efficiency of 53% and mean damaged grain of 15%.

Designing and constructing of the various components of the maize sheller involved determining the appropriate angle of repose of maize grits, a suitable gate size for the hopper, determining the pneumatic pressure developed by the blower to remove chuff from the grains and analyzing forces acting on the components to prevent failure of the sheller during operation. Force analysis led to selection of proper materials to withstand the forces to avoid failure. Engineering drawings of the various components of the maize sheller were designed before the machine was constructed and assembled.

The performance of the sheller after construction was evaluated taking into consideration of capacity, efficiency and power requirement. The obtained results reveal that it is recommended to operate the sheller at a rotational speed of about 525 rpm, grain moisture content of 13%, sheller clearance of 3mm. Therefore, it is recommended that, this maize sheller should be manufactured and popularized for adoption in Uganda and will help reduce power consumption as well as increase profits to the maize producers.



DECLARATION

I KULE EDIRISA hereby declare that information in this document is to best of my knowledge and has not been used and submitted by anyone in any institution for any award and is entirely a result of my research.

DATE

SIGNATURE.....



APPROVAL

This research project is submitted to the Faculty of Engineering for examination with approval of my supervisors and the contents are satisfactory for the award of the degree

Supervisors

Eng. ODOGOLA CHARLES WILFRED

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DATE.....

Mr. ASHABAHEBWA AMBROSE

SIGNATURE..... 

DATE 

DEDICATION

I dedicate this report to my beloved parents Mr. **GAALI MANISULI** and Ms. **NAKIRYA HADIJA**, uncle **IRYAMA FREDRICK**, my brothers, sisters and friends in appreciation for their selfless care and unflinching support provided to me since childhood, and for the spirit of hard word, courage and determination instilled into me, which attributes I have cherished with firmness and which have indeed made me what I am today.

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CHAPTER ONE

1.0 INTRODUCTION

This chapter contains the background, problem statement, problem analysis, main objective, specific objective, purpose of study and justification.

1.1 Background

Maize (*Zea mays*) is one of the most important staple crops in the world. In Kenya, for example, 45% of the Population considers maize meal (ugali) to be their survival food, making it the most consumed food of the country for example schools, hospitals, prisons and so on.

Maize is the most important cereal grain in the world, after wheat and rice, providing an important source of carbohydrate, protein, iron, vitamin B and minerals. In Uganda, maize is consumed as a starchy base in wide variety of porridges and pastes. Green maize (fresh on the cob) is eaten parched, baked, roasted or boiled which play an important role in filling the huge gap after dry season International Institute for Tropical Agriculture (IITA, 1996). In rural communities, the dwellers use maize in production of porridge and paste (Aremu *et al.*, 2015). Owing to demand for maize to human diet, it's shelling and cleaning has been and remains a serious problem to local dwellers in their communities (Wenham, 1995). It is because of the important place of maize that it's handling, processing and preservation within the optimum conditions must be analyzed.

Maize is widely grown in Uganda covering about 50 districts. The main production agro-ecological areas are in the west, east, north, and southeast Uganda. The crop is cultivated by over 3.6 million households on about 1.5 million metric hectares of land (UBOS,2009). In the year 2007, Uganda produced about 1.2 million metric tons of maize(FAO,2009) In terms of area planted, maize is the third most grown crop after banana and beans. In some regions of the country, the crop has now become a staple food, replacing crops like sorghum, millet, cassava and banana. It is a growing source of household income and foreign exchange through exports. For example, maize is presently considered a major source of income in the districts of Kapchorwa, Mbale, Iganga, Masindi, and Kasese, with 75-95percent of household's harvest maize to earn money. Production of maize in Uganda currently is majorly for subsistence level except for a few commercial farmers. (Balirwa,1992)

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