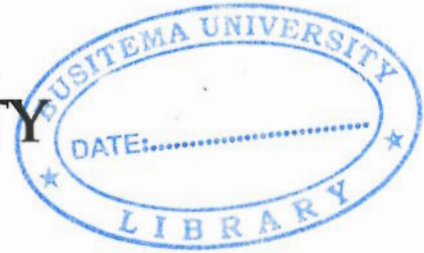


**BUSITEMA
UNIVERSITY**
Pursuing Excellence



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

DESIGN AND CONSTRUCTION OF A PEDAL POWERED WATER PUMP

By

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A research project report presented in partial fulfillment of the requirements for the award of
the degree of Bachelors of Agricultural Mechanization and Irrigation Engineering of
Busitema University.

MAY 2013

DECLARATION

I, Namubiru Beatrice Babirye, hereby declare to the best of my knowledge that this project report is an outcome of my own work and that it has not been presented for any academic award in any university, college or any other higher institution of learning. Throughout the work I have acknowledged all sources in its compilation

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APPROVAL

This final year project report has been submitted to Faculty of Engineering for examination with approval from the following supervisors:



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DEDICATION

I dedicate this project report to my dear parents Mr. and Mrs. Damulira Angelo of Kirumba Masaka, my sisters Oliver, Resty and Sarah not forgetting my uncles Swaibu and Ismail whose love, care, support, encouragement, patience and belief in me has got me this far.

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LIST OF ACRONYMS

FAO	Food and Agriculture Organization
NPV	Net Positive Value
VITA	Volunteers in Technical Assistance
ZITC	Zimbabwe Irrigation Technology Centre
NSPH	Net Positive Suction Head
HP	Horse Power
PVC	Polyvinyl Chloride
Rpm	Revolutions per minute
CAD	Computer Aided Drawing
B/C	Benefit Cost
BM	Bending Moment

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ABSTRACT

The needs of water in Uganda are increasingly becoming versatile. For example apart from using water for domestic purposes, water is also needed in farms for irrigation due to climatic change that does not make rainfall suffice crop growing throughout the year.

For most of the systems, supply of water calls for a means of pumping it to greater heights which in turn necessitates the availability of a pump. Various pumps are used world wide ranging from simple water lifts still being used in some parts of the world like Egypt and India to sophisticated modern water pumps.

This study proposes the development of a manual powered impeller water pump operated by pedals and cranks to help solve the water lifting and pumping problems in Uganda rural communities. Included is the general information relevant to the research topic while clearly showing the problem of interest for the intended research. It as well shows how this study will help reduce the water problem through the fulfilment of a number of objectives and activities.

Further more it gives the current situation of water abundance in Uganda, with the main source of information being the existing literatures written by other scholars that have been involved with design of water pumps of similar nature and magnitude giving an account of the existing models with emphasis on their draw backs, operation modes, testing and economic analysis with reference to the proposed pump prototype.

The study goes through the design and selection of the different components of the prototype and assembling of the prototype. After construction, it was tested and the preliminary testing results are also included in the text. The over all project evaluation and the weaknesses of the design are also included in here and the possible solutions in form of recommendations for future designers.

CHAPTER ONE

1. INTRODUCTION

This chapter briefly gives the general information relevant to the research topic whilst clearly showing the problem of interest for the intended research. It as well shows how this study will help reduce the problem through the fulfilment of a number of objectives and activities listed there in.

1.1 Background of the study

The New Vision published on the 11th day of October 2012 noted that Uganda's population has grown to 34.5 million. This is up from 33.8 million Ugandans in 2010. The population increase is coupled with an increase in the water needs among other basic needs. Today in Uganda some people do rain-water harvesting where by water is kept in surface, above ground or underground tanks to cater for the future-use.

Uganda has an abundance of surface water resources which include rivers, lakes and wetlands that cover about 20% of the total surface area on top of the underground water like springs or oasis (WaterWiki.net, September 2012). Continuous need of water for different activities like for agriculture, domestic use and for industrial use, calls for various ways of availing it to the scattered rural communities. Water can be conveyed by means of natural slopes, by lifting to a higher point and by means of pumps and pressurized pipelines. Devices for water lifting range from age-old indigenous water lift equipment to highly efficient pumps. These are operated by electric, petrol or diesel motors (Garg 1989; Michael 1990) in addition to natural resources like wind and solar energy.

According to Alex Weir (1980), the suitability of a particular type of power source to be used calls for its capital cost, simplicity and cost of operation, maintenance and repair. However for some field applications portability and capability for indigenous manufacturers to fabricate it at affordable prices is also desirable.

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