
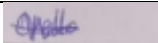
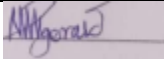




FACULTY OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF AGRICULTURAL MECHANIZATION AND IRRIGATION
ENGINEERING
DESIGN AND FABRICATION OF A FOOT WATER PUMP FOR SMALL SCALE
IRRIGATION SYSTEMS

FINAL YEAR PROJECT REORT

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 requirements for the award of Bachelor's degree in Agricultural Mechanization and irrigation engineering Busitema University

DECLARATION

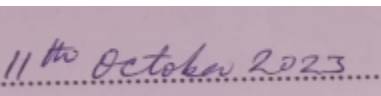
We the members of this group declare to the best of our knowledge that all the information regarding this report is as a result of our research and effort and has never been presented or submitted to any institution or university for such an academic award.

APPROVAL

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

PROF. WATMON TITUS BITEK

SIGNATURE..........

DATE..........

DEDICATION

ATTO PROSCOVIA

With great appreciation, I dedicate this final year project report to my mother Auma Josephine, my siblings Denis, Faith and Gladys for unconditional love and support they have rendered to me.

ANYARUA GERALD ADRIKO

In a special way, I dedicate this final year project report to my beloved father Mr. Alutu Leo Robert and my mother Afekuru Milka.

OKELLO RAYMONDO

With gratitude I dedicate this final year project report to my beloved mother Angee Hellen and my brother Oyet Jimmy.

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ABSTRACT

Irrigation farming is becoming more essential today because of the climate change which is evidenced by prolonged droughts in most parts of the country. Many farmers now depend on irrigation practices to produce crops and citrus fruits. The study looked at foot water pump being cheap and affordable for small scale farmers. The materials were sought locally, and the design and fabrication was done at Busitema University Faculty of Engineering workshop. The project had three objectives as stated below;

- i. To analyse design requirements for foot water pump for irrigation system.
- ii. To fabricate and assemble foot water pump for irrigation system for small to medium size farmers.
- iii. To evaluate the performance of the pump. The study was guided by the following research questions;
 - a) What are the best design specifications for a foot water pump components?
 - b) What manufacturing processes to follow for the pump assembly?
 - c) What is the capability and performance of the pump?

The first two objectives were all met and the perform of the foot water pump was carried out. Impressive results were obtained. In the first objective, it was discovered that the water discharge of the foot pump decreased with increase in suction depth, secondly, the discharge in the foot pump is not determined by the weight of the operator but by the number of cadence an operator is able to make. In conclusion, the use of a good seal and fast closing valve minimizes both internal and external leakages of pressure thereby increasing discharge and head of the foot pump.

Table of Contents	
DECLARATION	i
APPROVAL.....	ii
DEDICATION	iii
ACKNOWLEDGMENT.....	iv
ABSTRACT	v
LIST OF FIGURES	ix
LIST OF TABLES	x
CHAPTER ONE	1
1.0 Background	1
1.1 Problem statement.....	2
1.2 Main Objective.....	3
1.21 Specific Objectives	3
1.3 Research questions	3
1.4 Justification	3
1.5 Scope of study.....	5
1.51 Conceptual scope	5
1.52 Time scope	5
1.53 Geographical scope.....	5
CHAPTER TWO	6
2.0 Objective one	6
2.1 Advantages of using a foot water pump for small scale irrigation	6
2.11 Models of foot pumps available.....	7
2.12 Possibility of Problems in foot Pump and its solution	7
2.13 Pump specifications	9
2.2 Objective two	10
2.21 Cylinders	10
2.22 pump manifold	10
2.23 Piston assembly.....	10
2.24 Non-return valves.....	10
2.25 Foots.....	11
2.26 Pulley wheel and rope	11

2.27 Piston with Connecting Rod	11
2.28 Working procedure	11
2.3 Objective three	12
2.3.1 Pump performance	12
2.3.2 Efficiencies of a pump	13
2.3.3 Pump tests' classification.....	14
2.3.4 Ease of use of treadle pumps.....	15
CHAPTER THREE	16
3.1 Research design.....	16
3.2 Components of the foot water pump.....	16
3.3 Working procedure	17
3.4 Pump ergonomics.....	18
3.5 Determination of the diameter of the cylinder of a foot pump	18
3.6 Discharge rate, Q.....	19
3.7 Determination of the velocity of the water stream at the end of suction pipe	20
3.8 Force required to lift the piston.....	21
3.81 Time taken by the piston to cover the stroke length	22
3.9 Design of T handle for the foot pump.....	23
3.11 Determining the strength of the fiber rope.....	24
3.12 Determination of the foot pump's efficiency.....	24
3.13 Decision making using Pugh matrix	25
3.131 Potential design and fabrication.....	25
3.132 Selection of appropriate types of water pump	26
3.133 Valves selection	27
3.14 Selection of materials.....	27
3.15 Data collection procedure	28
CHAPTER FOUR	29
4.0 Discussions and analysis of Results.....	29
4.1 Discharge rate, Q.....	29
4.1.1 Force Analysis on Different Parts of a foot water Pump	29
4.1.2 Pulley	30
4.1.3 Piston rod	31

4.2 Area of piston.....	32
4.2.1 Velocity of the piston.....	32
4.2.3 The velocity of the water stream at the end of suction pipe.....	33
4.2.4 Final velocity of water	34
4.3 Force required to lift the piston.....	35
4.4 Parameters of the different pump parts used in the construction of the prototype.	35
4.5 Tools, Equipment and Machines for Fabrication of Components	36
4.6 System Performance and Pump Testing	37
CHAPTER FIVE.....	41
5.0 CONCLUSIONS AND RECOMMENDATIONS	41
5.1 CONCLUSIONS.....	41
5.2 LIMITATIONS.....	41
5.3 RECOMMENDATIONS TO INDUSTRIAL PRACTITIONERS.....	41
APPENDIX.....	42
REFERENCES.....	46

LIST OF FIGURES

<i>Figure 1 showing relationship between different variables.....</i>	<i>4</i>
<i>Figure 2 shows the efficiency trend of a treadle pump</i>	<i>14</i>
<i>Figure 3 Shows a conceptual drawing.....</i>	<i>16</i>
<i>Figure 4 Shows a Process diagram</i>	<i>18</i>
<i>Figure 5 showing the flow of water from the source to the field</i>	<i>20</i>
<i>Figure 6 showing different forces in the cylinder</i>	<i>21</i>
<i>Figure 7 showing forces on the pedal.....</i>	<i>23</i>
<i>Figure 8 showing a graph of weight against efficiency</i>	<i>39</i>
<i>Figure 9 showing a graph of discharge against suction depth.....</i>	<i>40</i>

LIST OF TABLES

<i>Table 1 showing potential pump problems and their solutions</i>	8
<i>Table 2 showing potential design and fabrication</i>	25
<i>Table 3 showing various options for pump designs</i>	26
<i>Table 4 showing the decision matrix for valve selection</i>	27
<i>Table 5 showing different parameters of the foot pump.</i>	35
<i>Table 6. Showing the different operations involved in the fabrication process and the tools, equipment and machines used to perform the operations</i>	36
<i>Table 7. Showing the material selection criteria and the materials selected for the machine components</i>	37
<i>Table 8 showing test results of the foot pump.</i>	38
<i>Table 9 shows the variations of discharge with suction depth.</i>	38

CHAPTER ONE

1.0 Background

The foot pump is a beautiful foot-operated human-powered water lifting device that draws water up to the ground surface from a depth of 0 to 8 meters in rivers, swamps, reservoirs, and shallow wells (hand-dug) for use by farmers for irrigation, domestic use, and other uses. Even a young kid, a woman, or an elderly person can operate the pump by shifting their body weight between two foot pedals, also known as fooms, while supporting themselves by clutching a wooden frame. Foot pumps often cost less than other types of pumps, like those operated by electricity or fuel. Because of this, they become a more viable choice for small-scale farmers who might not have the financial resources to invest in more expensive equipment. Foot pumps are also less expensive, which makes them easier to fix and maintain. This can help to increase their lifespan and guarantee that they continue to deliver dependable irrigation for many years. Overall, foot pumps are a realistic option for small-scale irrigation in rural regions due to their affordability.

The current population of Uganda is 48,582,334 in 2023, with an annual increase of not less than 2.8% every year. The growth in population has continued to demand for more food production and irrigation has been a significant option due the changes in climate, various water pumps like the dynamic and submersible pumps have been made to curb this challenge but still can't be afforded by poor communities due to the costs incurred to achieve them.

The agriculture sector in Uganda is dominated by small holder farmers who own on average 1-2 hectares of farmland. Women dominate farm employment in a sector that has limited mechanization and heavily dependent on rain and relatively fertile soils whose productivity is also declining due to over cultivation and low fertilizer application. Overall per capita agriculture production has been declining due to high population growth rate of (inasmuch as it dropped from an average 3.2% - 3.0% per annum) leading to annual food production deficits (UBOS 2014).

As the impact of climate change emerges as a serious challenge evidenced by prolonged droughts and severe flooding in most parts of the country, emergent response was required to put in place a policy framework on irrigation as core public investment to mitigate these effects and prevent the agriculture sector from further loss. It is against this background that Government of Uganda through the Ministry of Agriculture, Animal Industry and Fisheries and the Ministry of Water and

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