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FINAL YEAR PROJECT REPORT

DESIGN AND CONSTRUCTION OF A SOYA BEAN MILK EXTRACTING MACHINE

BY

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BU/UG/2015/11

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A Fourth Year Project Report Submitted to The Department of Chemical and Process Engineering to The Award of Bachelor's Degree in Agro-Processing Engineering.
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ABSTRACT

Soya beans are one of the most important food plants of the world. It is an annual crop that is capable of supplying most nutrients and has a longer shelf life compared to cow milk. It can substitute for meat and to some extent for milk. The protein of soybean is called a complete protein, because it supplies sufficient amounts of the kinds of amino acids such as Lysine, Glycine required by the body for building and repair of tissues and supports to overcome malnutrition and supplies minerals mainly calcium that strengthens the bones.

Soya bean milk is obtained using different technologies such as use of mortars and pestles, blenders, soymilk production machines that are require high initial cost therefore local processors carry out extraction of soymilk by pounding and grinding soaked and pre-boiled soybeans as fine as possible with help of a home blender or mortar and pestle then later are mixed water then the liquid is filtered with a cloth ,This method produces milk that may have contaminants, ineffective and time consuming, thus with help of a soy bean milk extractor, local processors will be able to reduce on the level of contamination and time, therefore this created a need to design and construct a soya milk extracting machine to process to present the above challenges.

Conceptualization of the machine involved two inter-related units; the crushing unit and the mixing unit. Different components of the machine were designed basing on the physical, mechanical and chemical properties of the soya beans, the components include; the feed hopper, crushing rollers, screw conveyor, main shaft and roll shafts, soya milk collection chamber, main frame, driving mechanism and analyzing forces acting on the components to prevent failure. From the designs, crushing unit operates at a speed of 923.264rpm and the mixing and compressing unit at a speed of 759.43rpm with a total maximum transmitted power requirement of 3HP After fabrication, the performance and economic analysis of the machine were performed in terms of extraction efficiency of 57.8% ,crushing efficiency resulted into 71.7% .Machine's total cost; Ugx.1.166M, the pay back-period of 29days and its Net present value is 2,386,346, since its greater than 0, the project is viable, Owing to the performance and economic analysis of the machine, it achieves all its design purposes hence it is recommended for commercialization and adoption by the target groups.

DECLARATION

I **KEMIGISHA AGNES** declare to the best of my knowledge that this project proposal is as a result of my research and effort and it has never been presented or submitted to any institution or university for any academic award.

DATE ..15th. May-2019.....

SIGNATURE ..Kwigi.....

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APPROVAL

This proposal has been submitted to the department of Chemical and Process Engineering for examination with approval from the following supervisor:

MR. KIYEMBA ANDREW

SIGNATURE .....

DATE.....

DEDICATION

I dedicate this report to my parents **Mr. Kataasya Gerald** and **Mrs. Kataasya Florence** for their love and continued support in my education

ACKNOWLEDGEMENT

First and foremost, I thank the Almighty God who has enabled me to do this proposal and granted me healthy life.

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I extend my sincere gratitude to **Mr. Kiyemba Andrew**, my supervisor for the guidance, advice, encouragement and reading through my proposal.

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CHAPTER ONE

1.1 Background

The soybean is a member of the family *Leguminosae*and the subfamily*Papilionoideae*. The cultivated soybeans 'botanical name is *Glycine max*. (Ricker et al., 2009) and originated from East Asia(Ogundipe,2003), it is mainly grown in Egypt, South Africa, Nigeria Asia, Zimbabwe, china, India and Uganda. In Uganda it's mainly grown in the northern regions such as Lira district with the best relative productivity mean yield of 730 kg per acre while West Nile reported the least yield of 100 kg per acre. Farmers in Eastern, Western and Central region had mean yields of 259 kg per acre, respectively (Tukamuhabwa et al., 2016).

Soya beansare one of the most important food plants of the world. It is an annual crop and it contains 35% of carbohydrates, 5% of ash and produces more protein of above 40% and oil of 20% than almost any other crop (Mahesh et al., 2011).About 3/4 of the soybean protein and 55% of the fat is recovered in soybean milk. Almost all of the rest is recovered in the cake. The optimum harvest moisture range is 13-15% for maximum weight and minimum field losses

Oil and protein contents depend on variety, soil fertility, and weather conditions, it is a versatile food plant that, used in its various forms, is capable of supplying most nutrients and has a longer shelf life compared to cow milk. It can substitute for meat and to some extent for milk. It is a crop capable of reducing protein malnutrition. The protein of soybean is called a complete protein, because it supplies sufficient amounts of the kinds of amino acids such as Lysine, Glycine required by the body for building and repair of tissues and supports to overcome malnutrition and supplies minerals mainly calcium that strengthens the bones.

Production in Uganda steadily increased from 144,000 hectares in 2004 to 200,000 hectares in 2014 (Tukamuhabwa et al., 2016) , Soybean prices increased from 600 UGX per kg in 2008 to 1000 UGX per kg in 2011(SNV, 2011).

Their different varieties of soybeans are Maksoy 1N and Namsoy 4M(2004), Maksoy 2N (2008), Maksoy3N (2010), Maksoy 4N and Maksoy5N (2013) (Tukamuhabwa et al., 2016). These varieties have led to higher crop yields and greater marketing opportunities among farmers and processors. They are suited to soils with relatively high clay content, as they do notgrow very

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