



**BUSITEMA
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Pursuing Excellence

FACULTY OF ENGINEERING

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

FINAL YEAR PROJECT REPORT

**DESIGN AND CONSTRUCTION OF AN ELECTRIC POWERED TOMATO SLICE
DRYER.**

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A final year project report submitted to the Department of Agricultural Mechanization and Irrigation Engineering as a partial fulfilment of the requirements for the award of a Bachelor of Agricultural Mechanization and Irrigation Engineering.

ABSTRACT

Uganda's economy is largely agro-based and with the developing technology has to meet the needs of the farmers. Uganda has merged to be a fruit surplus area and tomatoes are among the most important fruits grown annually around the world and most of them are consumed as processed tomatoes such as tomato paste, tomato sauce, tomato powdered and ketchup. In Uganda, the local processors still dry their tomatoes by sun energy. This method is unreliable since it depends on sun intensity which is highly affected by weather changes. Some tomato dryers do exist but they have very high initial costs and non-uniform drying rate. However, there is a need of tomato dryer that can be cheaply obtained, one that is not affected by weather changes, can increase the shelf life of tomatoes and ensure uniform drying rate.

Therefore, the objective of this study was to design and construct an electric powered tomato slice dryer which helps people to dry tomatoes to low moisture content without being affected by weather hence increasing their shelf life. Design and construction of the various components of the electric powered tomato dryer was carried out by analyzing forces acting on them so that components don't fail 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 dryer were drawn before the various components were constructed. Then machine assembly was done according to the engineering drawings and the performance of the machine was tested. In summary, the prototype development of an electric powered tomato dryer, provided a great remedy to the challenges faced during drying processes of tomatoes in Uganda. The tomatoes were dried to a low moisture content (30%) which enabled them to be stored longer than the refrigeration method.

Also tomatoes were able to be dried in one day compared to the sun drying methods which takes more than two days. Hence the dryer encouraged preservation of tomatoes in a dry state for a longer period of time.

DECLARATION

I ASALE LILIAN, hereby declare to the best of my knowledge that this report is an outcome of my original work and that it has not been presented to any institution of learning for an academic award.

Signature.....

Date.....

APPROVAL

This project report will be submitted for examination with approval of my supervisors:

Mr. Obeti Grism Lawrence.

Signature.....

Date.....

Mr. Kilama George.

Signature.....

Date

DEDICATION

This report is dedicated to my beloved parents in appreciation for their selfless care and steadfast support provided to me since childhood, and for the spirit of hard work, 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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I am so grateful to the Almighty God who has seen me through the years and equipped me with knowledge, wisdom, love, protection, mercy and grace that has kept me successful.

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CHAPTER ONE

1.0 INTRODUCTION

This chapter presents the introduction to the study by underscoring the problem to be addressed by the proposed study, the objectives and justification inclusive.

1.1 Background of the study

Tomatoes (*Solanum lycopersicum*) are members of the *Solanaceae* family, which includes peppers, eggplant, Irish potatoes and tobacco. Tomatoes can be used for a variety of recipes. It can be consumed fresh in salads, cooked in other dishes or processed into other food products like powder, sauce, dried slices (crisps). (Ahmed *et al.*, 2012; Ayandiji *et al.* 2011; Babolala *et al.* 2010; Grandillo *et al.* 1999). The tomato originated in the area extending from Equator to Chile in the western coastal plain of South America and was first domesticated in Mexico. The fruit was introduced to Europe in the mid-1500s.” With the passing of the centuries, the cultivation spread to Asia, and as of today, China and India are the top producers of tomato in the world with more than 400,000 acres of tomatoes being produced. The world’s yearly production exceeds 14 million tons (12.7 million metric tons), of which more than 12 million tons are processed into various products. Nigeria the largest producer of tomato in Africa and thirtieth largest in the world, produces 1.701 million tonnes of tomato annually at an average of 25-30 tons per hectare (FAO 2010) with an annual total area of one million hectares reportedly used for its cultivation. Tomatoes make up about 18 percent of the average daily consumption of vegetables in Nigerian homes (Chidi 2012). In Uganda, tomatoes are among the most important and prominent horticultural crops grown for both home consumption and the domestic market (Kennedy, 2008). Tomatoes in Uganda are mainly grown in the districts of Kasese, Kabale, Mbale, Kapchorwa, Mubende, Masaka, Mpigi. Production of tomatoes in rural areas of the country has increased employment and improved farmers’ livelihoods (Kennedy, 2008). The tomato is considered to be a top priority for production, and is viewed as the main income vegetable compared to other vegetables (Goldman and Kathleen, 2002; NARO, 1999; Valera, 1995), and is grown (Mukiibi, 2001; Mwaule, 1995). A (Kennedy, 2008). Tomatoes are of great importance in human nutrition as they supply essential vitamins and minerals which are necessary to maintain good health in the diet, provide variety to the food and

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