BUSITEMA UNIVERSITY
Pursuing Excellence

FACULTY OF ENGINEERING

DEPARTMENT OF CHEMICAL AND PROCESS ENGINEERING

FINAL YEAR PROJECT

DESIGN AND CONSTRUCTION OF AN APPRIOPRIATE TOMATO PACKAGING CONTAINER TO SOLVE MECHANICAL DAMAGES.

BY

KAUDHA SARAH

-

BU/UP/2014/189

+256750141448/+256779938573

SUPERVISORS:

MR. MUYINGO EMMANUEL

MS. KABASA MARY SALLY

A final year project submitted to the Department of Chemical and Process Engineering as a partial fulfillment of the requirements for the award of a Bachelor of Science degree in Agro-Processing Engineering

MAY 2018

ABSTRACT

The aim of this study was to design and construct an appropriate tomato packaging container to solve mechanical damages. A transport study was done to assess the performances of the appropriate container designed which is currently not yet in use in the system and the current ordinary wood packaging container which is the sole packaging container for tomato fruit handling. The results showed that 40%, 37.50% and 45% of the samples of tomato fruits from the top, middle and bottom of the ordinary package respectively were severely bruised after four hours of excitation (transportation). In the case of the appropriate container, the corresponding values were 44.18%, 30.23% and 18.60% for the samples taken from the top, middle and bottom of the container, respectively. The average bruise width of the damage samples packaged in the traditional basket was 24.36 mm while the average length was 36.67 mm. In the case of the appropriate container, the average bruise width was 15.18 mm and that of the length was 26.97 mm. The ANOVA shows that these mean values of bruise areas differed significantly ($p \leq 0.05$) between the two packaging containers. The appropriate container which is currently not used by the handlers of tomato fresh produce performed better in reducing mechanical damage resulting from impact (shock), cuts or punctures, compression (squeezing or squashing) and vibration (shaking) than the ordinary wooden container solely used in the transportation of fresh tomato fruits in Uganda.

ACKNOWLEDGEMENT

I would like to thank and acknowledge the following persons without those help this research would not have been a success. I give thanks to the almighty God for the gift of life that enabled me carry out this study, I have a special indebtedness to my beloved husband, Jonnathan Nyango prince for the financial support throughout the course and my daughter Angel Bernice Jonnathan my beloved mother Mrs.Nabirye Harriet, my father Mr. Tenywa Richard Fred and the entire family for their un-conditional support given to me though out my life.

I thank my supervisors Mr.Muyingo Emmanuel and Mrs. Kabasa Sally Mary for their help in writing this proposal report and big thanks goes to the entire department of agro processing engineering for the knowledge imparted to me up to this point. Thanks goes to the friends, my fellow students of Bachelor of Science in agro processing engineering class of 2014/2015 for they have boosted me spiritually, academically, socially and in very many other ways. May the almighty God bless you abundantly!

DECLARATION

I, KAUDHA SARAH, do declare that this dissertation proposal report is my original work and has never been presented for any award in any University

Signed .....

Date.....23rd/05/2018

Kaudha Sarah

APPROVAL

This dissertation was supervised and submitted for examination with the approval of the following as Busitema University supervisors:

Mr. Muyingo Emmanuel

Signature.....

Date.....

Mrs. Kabasa Sally Mary

Signature .....

Date .....

DEDICATION

This dissertation is dedicated to my beloved husband Jonnathan Nyango, my daughter Angel Bernice Jonnathan, my dad Tenywa Richard Fred and mummy Nabirye Harriet without those inspirations; I would not have been stood the test of the time.

Also to my dear brothers and sisters: Hellen, Aggy, Aidah, Prossy, Annet, Ronald, Christine and Besweri for the support rendered to me during this course of struggle.

LIST OF ACRONYMS

PV _ Present Value

FV _ Future Value

CF _ Cash Flow

NPV _ Net Present Value

TABLE OF CONTENTS

Contents

TABLE OF FIGURES

LIST OF TABLES

CHAPTER ONE: INTRODUCTON

This chapter includes the background of the study, the statement of the problem, the justification, the objectives, scope and the limitations of the study.

1.1 Back ground

Tomato *(Lycopersicon esculentum Mill.)* as vegetable and fruit occupy an important place in healthy daily diet **(Gupta, Kawatra and Sehgal, 2011).** The tomato (Lycopersicon esculenta) is said to be one of the most popular vegetable in the world **(Viskelis, Jankauskiene and Bobinaite, 2008).** Tomato is a climacteric fruit, having respiratory peak during their ripening process. Being a climacteric and perishable vegetable, tomatoes have a very short life span, usually 2–3 weeks **(Sammi and Masud, 2009).** It is botanically classified as fruit**(El-ramady *et al.*, 2015).** Tomatoes may be used in a variety of dishes such as sauces, casseroles, salads, and side dishes. Fresh tomatoes are delicious eaten raw on top of salads or in sandwiches. For a quick and easy sandwich, top slices of whole grain bread with sliced tomatoes, sprinkle with reduced fat cheese, and broil until the cheese melts. Tomatoes may be eaten either raw or cooked **(Description *et al.*, 2012).**

Tomatoes are packaged in open and closed fruit crates (tomato crates), tubs, cartons, trays and jointed boxes. Sometimes they are carefully arranged, sometimes randomly bulk-packed.
Packaging is the act of putting the produce inside a container along with packing materials to prevent movement and to cushion the produce such as plastic or moulded pulp trays, inserts, cushioning pads, plastic films, waxed liners, dividers, etc. and to protect it **(El-ramady *et al.*, 2015).** Packaging must satisfy three basic objectives: Contain product and facilitate handling and marketing by standardizing the number of units or weight inside the package, Protect product from injuries (impact, compression, abrasion and wounds) and adverse environmental conditions (temperature, relative humidity) during transport, storage and marketing and lastly provide information to buyers, such as variety, weight, number of units, selection or quality grade, producer's name, country and area of origin.