ASSESSMENT OF SMALL-SCALE CASHEW NUT PROCESSORS' CAPABILITY IN RUANGWA DISTRICT

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EXTENDED ABSTRACT

Cashew (*Anacardium Occidentale* L.), a multipurpose crop, is tropical tree native to South America. Cashew is an important crop for nutrition and income generation. It is among the important export crops in Tanzania, others being tobacco, coffee and cotton. Farmers are advised to add value to their crops/crop produces before they take them the market. A cross-sectional survey was conducted in Ruangwa district during the 2020-2021 whereby five wards were selected and in each wads two villages were selected to assess small-scale cashew nut processors' capability. Specifically, the study aimed at assessing small-scale cashew nut processors' processing practices, determine factors promoting small-scale processors' use of recommended processing practices, and identify challenges facing small-scale cashew nut processors. A sample size of 180 respondents was used. A structured questionnaire which was written in English and then translated into Kiswahili, was developed and used to collect the data. It was pre-tested with 20 small-scale cashew nuts processors in Ruangwa District in February 2021. Other methods of data collection included Focus Group Discussions, Key Informant Interviews and documentary review.

Quantitative data were analyzed using the IBM Statistical Package for Social Sciences (SPSS) version 20 software, while qualitative data were analyzed by using descriptive statistics and content analysis respectively. In addition, Binary logistic regression was used to determine factors promoting small-scale processors' use of recommended processing practices. It was found that more than half (64.5%) of small-scale cashew nut processors have low capability in cashew nut processing. Education level, average income, age group and yield were factors promoting small-scale cashew nut processors to use recommended processing practices. Challenges facing small-scale cashew nut processor included use of inefficient local processing tools, less availability of appropriate

equipment and machine for processing, lack of money to acquire new technology, and lack of investment and working capital. Other challenges were the availability of raw materials, lack of market information on kernel, lack of reliable training facilities, and lack of government initiative support on cashew nut processing.

The study recommends that more efforts are needed to provide training and guidance to small-scale cashew nut processors and cashew farmers from production, management and processing and building market centres for selling kernels. It is also suggested that Financial Institutions should conform to the provision of credit to the demand and situation of small-scale cashew nut processors in the rural context.

DECLARATION

I, NEMGANGA SALIMU MGONJA, do declare to neither the Senate of Sokoine University of Agriculture that, this dissertation is my own original work done within the period of registration and that it has neither been submitted nor being concurrently submitted in any other institution.

_____ _____

Nemganga Salimu Mgonja, Date

(Msc. students)

The above declaration is confirmed by;

_____ _____

Dr. G. L. Shausi Date

(Supervisor)

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For all that I am, and will be, Glory be to the ALMIGHTY GOD who strengthens me.

DEDICATION

I dedicate this work to my lovely husband Mdasia Joseph Maheke, for his heartfelt support and encouragement during my Masters degree study.

LIST OF PAPER CHAPTERS

Factors promoting small-scale cashew nut processors' use of recommended processing practices in Ruangwa district, Tanzania

Challenges facing small-scale cashew nut processors in Ruangwa district, Tanzania: An implication for policy change

TABLE OF CONTENTS

EXTENDED ABSTRACT.....ii

DECLARATION.....iv

COPYRIGHT.....v

AKNOWLEDGEMENT.....vi

DEDICATION.....vii

LIST OF PAPER CHAPTERS.....viii

TABLE OF CONTENTS.....ix

LIST OF FIGURES.....xv

LIST OF ABBREVIATIONS.....xvi

CHAPTER ONE.....1

GENERAL INTRODUCTION.....1

1.1 Background Information.....1

1.2 Problem Statement.....5

1.3 Justification of Study.....7

1.4 Research Objectives.....7

1.4.1 General objective.....7

1.4.2 Specific objectives.....7

1.5 Research Questions.....7

1.6 Limitations of the Study.....8

1.7 Organization of the Report.....9

1.8 Reference.....10

CHAPTER TWO.....14

LITERATURE REVIEW.....14

2.1 Overview.....14

2.2 Definition of the Key Terms.....14

2.2.1 Cashew nut processing.....14

2.2.2 Small-scale processors.....14

2.2.3 Processing groups.....14

2.2.4 Value addition.....15

2.2.5 Value addition in cashew production.....15

2.2.6 Capability.....15

2.2.7 Capability in cashew nut processing.....15

2.2.8 Challenges/limitations.....16

2.3 Empirical Literature Review.....16

2.3.1 The status of cashew nut production in the world.....16

2.3.2 The status of cashew nut production in Africa.....16

2.3.3 Status of cashew nut production in Tanzania.....17

2.3.4 Status of raw cashew nut processing worldwide.....17

2.3.5 Status of cashew nut processing in Tanzania.....18

2.3.6 The status of small scale cashew nut processing in Tanzania.....19

2.4 Empirical Studies.....20

2.4.1 Common small-scale cashew nut processors' practices.....20

2.4.2 Factors promoting the use of recommended cashew nut processing practices/ technologies.....21

2.4.3 Challenges facing small-scale cashew nut processors.....21

2.5 Research Gap.....22

2.6 References.....23

CHAPTER THREE.....26

PAPER ONE.....26

3 Factors promoting small-scale cashew nut processors' use of recommended processing practices in Ruangwa district, Tanzania.....26

3.1 Abstract.....27

3.2 Introduction.....28

3.2.1 Theoretical framework.....33

3.2.2 Conceptual framework.....34

3.3 Methodology.....35

3.3.1 Description of the study area.....35

3.4 Research Design.....38

3.5 Population of the Study.....38

3.6 Sampling procedure and Sample Size.....38

3.6.1 Sampling procedure.....38

3.6.2 Sample size.....39

3.7 Data Processing and Analysis.....39

3.8 Results and Discussion.....40

3.8.1 Demographics characteristics of respondents.....40

3.8.2 Small-scale Cashew Nut Processors' Processing Practices.....46

3.8.2.1 Respondents' level of use recommended processing practices....46

3.8.2.2 Extent of small-scale cashew nut processors' processing practices.....47

3.9 Factors Promoting Use of Recommended Small-Scale Cashew Nut Processing Practices.....53

3.9.1 Education level.....54

3.9.2 Level of income.....55

3.9.3 Age of respondents.....55

3.9.4 Crop yields.....56

3.10 Conclusion and Recommendations.....57

3.11 References.....58

CHAPTER FOUR.....58

PEPER TWO.....63

4 Challenges facing small-scale cashew nut processors in Ruangwa district, Tanzania: An implication for policy change.....63

Abstract.....64

4.1 Introduction.....65

4.1.1 Status of cashew nut processing in Tanzania.....67

4.1.2 Problem statement.....68

4.2 Methodology.....70

4.3 Results and Discussion.....73

4.3.1 Demographics characteristics of respondents.....73

4.3.2 Challenges facing small-scale cashew nut processors.....77

4.3.2.1 Challenge related to use of recommended processing practices.....78

4.3.2.2 Challenges on availability of raw materials and market access include.....81

4.3.2.3 Challenge on government policy, regulation and managerial skills.....83

4.4 Conclusions and Recommendations.....85

4.4.1 Conclusions.....85

4.4.2 Recommendations.....86

4.5 References.....87

CHAPTER FIVE.....91

5.0 GENERAL CONCLUSIONS AND RECOMMENDATIONS.....91

5.1 Overview.....91

5.2 Conclusions.....91

5.3 Recommendations.....92

5.4 Suggestion for Future Research.....93

APPENDICES.....94

LIST OF TABLES

Table 2.1: *Top Ten Raw Cashew nut Producing Countries in the world in 2018*.....16

Table 3.1: *Respondents' demographic characteristics* 42

Table 3.2: *Percentage distribution of respondents by the main source of income, ownership of cashew nut farm, experiences in processing on years* 44

Table 3.3: *Respondents score on the practices of cashew nut processing* 48

Table 3.4: *Capability on availability of raw materials for small-scale cashew processors* 51

Table 3.5: *Capability on processing capacity per day of small-scale cashew nut processors* 52

Table 3.6: *Capability on accessibility of raw materials for small-scale cashew nut processors* 52

Table 3.7: *General capabilities levels for small-scale cashew nut processors* 53

Table 3.8: *Binary logistic regression results on factors promoting the use of recommended processing practices* 54

Table 4.1: *Respondents Demographic Characteristics of Respondents* 75

Table 4.2: *Challenges related to use of recommended processing practices* 79

Table 4.3: *Challenges on availability of raw materials and market access* 82

Table 4.4: Challenges on government’s policy, regulation and managerial skills 84

LIST OF FIGURES

Figure 3.1: The Conceptual Framework of the study.....35

Figure 3.2: Map showing the location of the study area.....37

Figure 3.3: Capability of small-scale cashew processors.....47

Figure 4.1: Map showing the location of the study area.....71

LIST OF ABBREVIATIONS

AMCOS	Agricultural Marketing Cooperative Society
ANSAF	Agricultural Non State Actors Forum
CBT	Cashew nut Board of Tanzania
DAICO	District Agricultural Irrigation and Cooperative Office
DCO	District Cooperative Officer
FAO	Food and Agricultural Organization
FGD	Focus Group Discussion
Mt	Metric tones
NARI	Naliendele Agricultural Research Institute
SACCOS	Saving and Credit Cooperative Society
SIDO	Small Industries Development Organization
SME	Small and Medium Enterprise
SPSS	Small and Medium Enterprise
TDV	Tanzania Development Vision
Tshs	Tanzania Shillings
URT	United Republic of Tanzania
WRS	Warehouse Receipt System

CHAPTER ONE

GENERAL INTRODUCTION

1.1 Background Information

Cashew (*Anacardium Occidentale* L.), a multipurpose crop, is tropical tree native to South America. Cashew was introduced in Asia and Africa by European explorers in the 16th century and gradually expanded throughout the world. Today, it has been widely grown mainly as source of income in most tropical region with the largest covered found in Brazil, India, Vietnam and several other countries in West and East Africa (Tola and Mazengia, 2019). The world production of raw cashew nut (RCN) has grown from 0.29 million tones in 1961 to 4.41 million tones in 2015 with the shifting production capacity in different countries. Vietnam is the top producer of raw nuts, and India is the largest processor and exporter of processed nuts (Dendena and Corsi, 2014; Elakkiya *et al.*, 2017).

Cashew trees were first introduced in Tanzania in the sixteenth century by Portuguese and now widely cultivated. The crop was initially introduced for soil conservation and reforestation (Assenga *et a*l., 2020). The country production has been increasing in recent years and reached about 155 244.65, 265 237.85, 313 826.39, 224 521.05 and 232 682 tones in 2015/2016, 2016/2017, 2017/2018, 2018/2018 and 2019/2020 respectively (CBT, 2020).

Cashew is an important crop for nutrition and income generation. It is among the important export crops in Tanzania, others being tobacco, coffee and cotton (FAOSTAT, 2011; George and Rwegasira, 2017; Asenga *et al.,* 2020). Cashew industry earned the country US$340.9 million in the 2016/17, US$ 565 million in the 2017/18 season and US$ 251 million in 2018/19 season (CBT, 2019). The main cashew production regions

include Mtwara region, which produces 71% of the total raw cashew output in the country followed by Lindi (18%), Coast (8%) with the remaining 3% coming from the minor producer regions (mainly Ruvuma and Tanga) (Kilama, 2013).

Cashew is a leading source of income for over 400 000 households in South-Eastern part of Tanzania rely on cashew production to meet household income and food security (Majune *et a*l., 2018). The most important products derived from cashew trees are cashew nuts, which are then processed to get kernel. Cashew nuts are a valuable source of macro and micronutrients, such as protein (18g/100g), fats (44g/100g) and iron (7g/100g) (Visalberghi *et al.,* 2016). They also contain high levels of magnesium, zinc, copper, manganese and essential fatty acids (FAO, 2015). The cashew apples are important in making juice, jam, alcoholic and soft drinks. Cashew trees can also be used for firewood, charcoal and in carpentry for manufacturing of different furniture.

Farmers are advised to add value to their crops/crop produces before they take them the market. Value addition refers to the process of undertaking further processing on certain product which are in raw form whereas they are processed further to add value to them by a company or individual before the product is offered to customers (Lori, 2017). It always applies to the items and goods, which require undertaking certain industrial processing to guarantee that they reach the compulsory standard and thus are proper for consumption. In cashew nut industries the process of value addition involves the kernels being graded, heat treaded, shelled roasted, and packaged. It is generally time consuming and labour intensive (Chimbyangu, 2020). Most of the cashew nut processors in Tanzania are small-scale processors who constitute the Small and Micro Enterprises (SMEs).

The Small and micro enterprise (SME) Development Policy is one of several policies that underpin the country's Vision 2025. The vision envisions that "Tanzanians will have graduated from a least developed country to a middle income country by the year 2025

with a high level of human development. Besides, Sustainable Industrial Development Policy (SIDP) 1996-2020 which emphasis employment opportunities. Furthermore the priority is given to resources-based enterprises particularly activities that add value to agricultural products (URT, 2002). There is a great diversity of agro-processing worldwide accounting for more than 60% of the employment in some countries. In sub-Saharan Africa, food processing represents between 30% and 50% of total manufacturing food value added (FAO, 2017).

Cashew nut processing increases farm gate price as well as earnings from export and provides employment opportunities (Dendena and Corsi, 2014). It also reduces the exportation of raw cashew nuts hence encouraging local consumption and exportation of processed products (Nkwabi *et al.*, 2019). The most important products derived from cashew trees are cashew nuts, which are then processed to kernel (Assenga *et a*l., 2020). Small-scale cashew nut processing enterprise is important in meeting the needs of the local processors and strategic in the current transformation agenda of the world (Lindbom *et al.*, 2015).

Cashew nut processing involves several stages including cleaning, soaking, roasting, shelling, sorting, grading and packing (Karthickumar and Sinija, 2017). Cleaning is usually done manually to eliminate unwanted extraneous materials such as stones, sand, and leaves before any further processing. Soaking of nuts in water helps to avoid scorching during the roasting operation. Roasting of nuts makes the shell brittle and loosens the kernel from the shell. The next step is shelling which is the removal of the roasted outer cover. Separation of cashew kernels from broken shell pieces and unshelled kernels is the next stage. A sorting operation is required to segregate the kernels into whole, broken and splits. Cashew kernels are finally graded based on size, colour and other standards and then parked for storage or transportation (Karthickumar and

Sinija, 2017). Processing needs some technical know-how and capability. Thus, to succeed, any individual/group of processors needs to have the required capacities/capabilities.

Nowadays, having capability in terms of knowledge and skills is necessary for any firm, organization or personal business, to be successful in the field of work. In any enterprise or field, the capability is highly regarded as a determining factor for a group or a person to attain the goals. It is for this reason, and others, that it is important at any time to know the capability of any person or organization engaged in any business, thus a need for its assessment. Capability assessment is high on the agenda of several countries and organizations as part of their risk management and disaster awareness (Tarighi and Hamidi, 2017). Capability is defined as capacity, in terms of the financial, technical, effective policy, institutional, leadership and human resource capacities that firms, or individuals must have in order to perform certain activities (Wang and Zeng, 2017). In processing capability refers to the measure of the ability of an entity (department, organization, person, system) to achieve its objectives, especially in relation to its overall mission (NABARD, 2014).

In cashew nut processing capability involves essential series of unit operations, which can be mechanical or manual. Small-scale processors are said to lack ability or power in their implementation of processing activities (Mutayoba and Kusiluka, 2018). The capability of small-scale cashew nut processors is looked at in different dimensions, which include the availability of raw materials, access to raw materials, type of processing technology and processing capacity.

Efforts have been made to improve capability of small-scale cashew nut processors. India as first country to enter the global cashew trade, encourage cashew nut processing by increase number of cashew processing firm from 170 units in 1959 to over 3500 in

2008 (Mohod *et al.,* 2010). Also, India introduced effective utilization of solar energy and biomass gasification technology for energy generation during processing activities for small-scale cashew nut processors. This industry employs about 0.5 million people and about 95% of them are women (Karthickumar *et al.*, 2014).

In Africa interventions have been made to improve capability of small-scale processors by improving processing equipment, an increase in the farm-gate price as a percentage of the export price from 50% in 2012 to over 60% in 2016, and the increase in the domestic raw cashew processing rate from 5% in 2012 to 8% in 2016 (Nicholson *et al.*, 2019).

Cashew nut processing in Tanzania is done by small, medium and large-scale processors, whereby, small-scale processors who operate manually constitute a larger proportion (Azam-Ali and Judge, 2001). Usually they process below one tone per day with most of the raw materials coming from their own farms. Several initiatives have been taken to improve capability of small-scale cashew nut processors in Ruangwa district. These include the establishment of a processing organization known as *Wabanguaji Korosho Ruangwa* (WAKORU), provision of small manual processing machines by Cashew nut Board of Tanzania (CBT) and building of cashew nut processing infrastructures. Despite these efforts, the status of small-scale cashew nut processors in Tanzania particularly in Ruangwa district is still low.

1.2 Problem Statement

Although the production of cashew nuts and demand for processed cashew nuts both for local and international markets have been increasing, still cashew nut processing remains very low in Tanzania (Nkonya and Barreiro-Hurle, 2013; Nkwabi, *et al.,* 2019). For example, only 15-20% of produced cashew nuts are processed locally for both domestic and international markets making about 80-85% of the total output to be

exported as raw cashew nuts (Akyoo and Mpenda, 2014 ; Nkwabi *et al.,* 2019). As a result, for the period from 2008 to 2012, Tanzania got a loss of 551 million US$ which is equal to 110 million US$ per annum by exporting in-shell cashew nuts instead of processing them or adding value (Rukonge, 2013).

In its efforts to encourage in-country processing, the Government of Tanzania imposed an export tax on raw cashew nuts and introduced the Warehouse Receipt System (WRS) under Act no. 10 of 2005 of the Cashew nut Board of Tanzania. The WRS requires that all raw cashew nuts be marketed through Agricultural Marketing Cooperative Society (AMCOS) at auction to prevent exploitation of farmers and to enhance the competitiveness of processors. Additionally, the government policy of promoting agro-processing and value addition of crops and their by-products, have been a leaven to promotion and improvement of small-scale cashew nut processing (Nkonya and Barreiro-Hurle, 2013).

Despite all the efforts made, still, the export of processed cashew nuts have been declining compared to raw cashew nuts (FAO, 2015), which is associated with the capability of processors. It is reported that Tanzania small-scale cashew nut processors' capability is still stumpy, not well explained and not properly addressed in its contextual realities (UNIDO, 2011). For example, we still do not know their ability (capability) on cashew nut processing, the technology used for processing cashew nuts, availability of raw materials and accessibility of raw materials. Therefore, this study aimed at bridging this knowledge gap by assessing the capability of small-scale cashew nut processors in Ruangwa District.

1.3 Justification of study

It was hypothesized that understanding of the capability of small-scale processors will enhance the policy makers and development planners to plan and prioritize efforts to increase the small-scale cashew nut processing firms, which will help to increase the capacity in cashew processing in the country (ANSAF, 2013). Increased internal cashew processing will eventually contribute to reduced exportation of raw cashew nuts while increasing exportation of processed cashew nuts, internal market, employment opportunities and income to rural communities (Fitzpatrick, 2012). This is in line with the Tanzania Development Vision (TDV) 2025, which emphasizes on diversification of economy to be based on dynamic industrialization through programme focusing on local resource-based industries (agro-industries) (URT, 2000).

1.4 Research Objectives

1.4.1 General objective

The overall objective of the study was to assess small-scale cashew nut processors' capabilities in Ruangwa District.

1.4.2 Specific objectives

The specific objectives of the study were:

i. Assess small-scale cashew nut processors processing practices in Ruangwa district.

ii. Examine factors promoting the use of small-scale cashew nut recommended processing practices in Ruangwa district.

iii. 1dentify challenges facing small-scale cashew nut processors in Ruangwa district.

1.5 Research Questions

i. How small-scale cashew nut processors practices undertake their cashew nut processing?

ii. Which recommended practices are used by small-scale cashew nut processors?

iii. What factors influence small-scale cashew nut processors' choice of recommended processing practices?

iv. What challenges do small-scale cashew nut processors in Ruangwa district face?

1.6 Limitations of the Study

This Dissertation has some limitations. Firstly, the use of qualitative approaches such as the use of focus group discussions and key informant interviews slow down the ability to generalize the research findings. Second, the cross-section nature of data used in this study does not make causal inferences rather correlations. Therefore, there is a need for further research using longitudinal data that could measure causal relationships and control for unobserved factors. Example measure production of cashew nuts per acre for three consecutive seasons and amount of cashew processed per day.

The third limitation of the study is the nature of processors. Many farmers mainly female farmers who depend much on farming activities are also engaged in sesame farming which forces them to shift during cultivation to new virgin land according to their perception leaving their permanent settlements and coming back on weekends. This forced the researcher to revisit some of the households more than once to conduct interviews. To overcome this problem, sometimes data collection was done very late in the evening mostly on Saturdays and Sundays.

Finally, primary data collection was mainly through personal interviews with cashew nut processors whose findings were subjected to error due to inadequate knowledge or faulty memory of interviewees.

1.7 Organization of the Report

This dissertation is organized into five chapters. The first chapter presents a general introduction to the study. The second chapter provides a review of relevant literature. Chapter three which is the first manuscript presents the factors promoting small-scale cashew nut processors' use of recommended processing practices. Chapter four presents second manuscript present the challenges facing small-scale cashew nut processors' and finally conclusions and recommendations presented in chapter five.

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CHAPTER TWO

LITERATURE REVIEW

2.1 Overview

This chapter presents a review of literature on fields that are closely related to the objectives of the study. For the sake of convenience, the reviews are presented under the following sub-headings: definition of key terms and concepts, theoretical literature, the empirical reviews and the identified research gap of a study.

2.2 Definition of the Key Terms

2.2.1 Cashew nut processing

Cashew nut processing refers to separating raw nut from the shell by using hot oil baths or drum, followed by automated cutting or impact shelling machine seed extraction of its kernel (Enwelu *et al.*, 2014). The cashew processing steps are steaming the raw nuts, cooling, cutting to separate shell from kernel, peeling, sorting the kernels grading (Thangata, 2016).

2.2.2 Small-scale processors

In this study, small-scale processors are defined as those who employ an average of 4 people with processing capacity of less than one metric tone of raw nuts into kernels per day (Kimambo, 2005; Enwelu *et al.*, 2014; Salisu *et al.*, 2019).

2.2.3 Processing groups

Processing groups are few farmers' groups that have ventured into the processing of cashew nuts locally though their number is still low (Nkwab*i et al.*, 2019).

2.2.4 Value addition

Value addition refers to the process of undertaking further processing on certain produces which are in raw form whereas they are processed further to add value to them (Hacker, 2011; Adesanya, 2021).

2.2.5 Value addition in cashew production

Value-addition is the process through which a product passes from the primary (initial) production to final delivery to the consumer. Value addition involves processing raw cashew kernel into nuts. The main objectives of value addition on processing of raw cashew nuts perhaps are to give it more economic value and better acceptability in the export market (Adesanya *et al.*, 2021).

2.2.6 Capability

Capability defined as a set of tasks that a system or person is potentially able to perform (acquired skills) at a certain performance level (available capacity) often only with the use of external resources (López-Cabarcos *et a*l., 2015). Also capability can become an ability (acquired skills) if it is done frequently and can be very pure when it points to high performance or extremes (Azam-Ali and Judge 2001; Wang and Zeng, 2017).

2.2.7 Capability in cashew nut processing

Capability in cashew nut processing is the process where small-scale cashew nut processors can practice/follow all processes during cashew nut processing to come up with good products (Wang and Zeng, 2017: Marques and Camargo, 2016; Chen *et al.*, 2019).

2.2.8 Challenges/limitations

Are obstacles or things that hinder the performance of certain firms or activities to achieve their goals (Agwu and Emeti, 2014).

2.3 Empirical Literature Review

2.3.1 The status of cashew nut production in the world

The world cashew nut production shows an increase from 1961 to 2018. In 1961 the production was 287 535 metric tones, in 1980 was 464 215 metric tones, in 1990 was 606 681 metric tones, in 2000 was 1 215 210 metric tones and production rose to 313 826 386 tones in the 2018 (CBT, 2018).

Table 2.1: Top Ten Raw Cashew nut Producing Countries in the world in 2018

Cashew nut Producers countries	Production (metric tones)
Vietnam	1 220 000
India	745 000
Côte d'Ivoire	711 000
Tanzania	313 000
Nigeria	220 000
Philippines	216 400
Guinea-Bissau	155 953
Benin	151 836
Mozambique	139 000
Brazil	133 465
Others	286 871
Total	**4 292 525**

2.3.2 The status of cashew nut production in Africa

Generally, it is reported that, in Africa, raw cashew nut production fluctuates from 1961 when it was 246 360 tones and dropped to 144 795 in 1985. However, it rose to 432 955 tones in 2000 (FAO, 2001). As presented in Table 2.1, cashew nut cultivation is spread all over the region, with three main producing areas in Africa: the Central area (Côte d'Ivoire, Ghana, Burkina Faso, Guinea, Mali and Togo), the Eastern Area (Nigeria and Benin), and the Western area (Guinea Bissau, Senegal and The Gambia) (Nitidae, 2019).

2.3.3 Status of cashew nut production in Tanzania

Tanzania started growing cashew nut in the 1960s. Presently, about 95 councils from 20 regions are growing cashew nut in the country. The traditional cashew nut growing regions are Mtwara, Lindi, Ruvuma, Coastal and Tanga. Others include Mbeya and Morogoro (Jiwaji, 2016). New areas are Singida, Dodoma, Iringa, Njombe, Songwe, Katavi, Tabora, Shinyanga, Kilimanjaro, Kigoma, Rukwa, Simiyu and Mwanza. These regions have started growing cashews after successes obtained by farmers from the traditional cashew growing regions (Chimbyangu, 2020).

Looking at the trend, Tanzania was used to make over 20% of global cashew production in the 1970s peaking at 145 080 Mt in 1973/1974. Since then, the production started to decline recording as low as 16 500 Mt in 1986/1987. The production regained to 122 290 Mt in the year 2000/2001. The new record was set in the year 2017/2018 when 313 826 tones were produced (CBT, 2018). Whereby in the 2018 season, the raw cashew nut production around the world was estimated at 4 300 000 Mt, with Vietnam (1 200 000 Mt) leading as the main producer, followed by India (745 000 Mt) and Cote d'Ivoire (710 000 Mt). Tanzania ranked fourth after producing 313 826 Mt (CBT, 2018).

2.3.4 Status of raw cashew nut processing worldwide

The processing of cashew nuts involves many steps including cleaning and grading, humidifying, roasting, shelling, drying, peeling off the testa, sorting of whole and broken kernels and grading into the international standards, based on size and colour (URT, 2006; Dhanushkodi *et al.,* 2016). According to Porto (2005), the exportation of raw nuts supports developments elsewhere rather than in the area of production. This is because cashew nut is one of the crops with high price in the world market, but that producers are earning little from the sale of their produces.

India and Vietnam which are the top cashew processing countries in the word, example India accounts for 65 per cent of total cashew nut exports in the world and export cashew to more than 60 countries. The country is hub for processing of cashew nut due to availability of skilled labour (Adesanya, 2021).

In India, the processing of cashew is a manual and highly labour-intensive process. The cashew industry is highly organized and scattered. Women constitute almost 90 per cent of the labour force in the cashew industry. Mechanization in cashew processing is picking up slowly (NABARAD, 2014). Small-scale cashew nut processing in India is well implemented whereby raw cashew nuts are dried in sun and stored in gunny bags. The stored raw cashews are boiled by using steam with the boiler. There are manufacturers of small-scale boilers available for boiling cashew nuts in most of the cashew processing areas. The boiling helps in softening the cashew shell. Also, boiling facilitate the removal of the nut inside the cashew seed. The shell of steamed cashew nut is detached by skilled labour by using cashew cutting hand-operated equipment. The cashew shell is used to extract cashew nut shell liquid (CNSL), which is an important by-product of the cashew industry. The cashew kernels obtained are dried in a cabinet dryer. After drying, the outer reddish skin (testa) is removed to obtain the kernel. Cashew nut is graded based on the colour and kernel size, then packaging and labelling are done ready for marketing. Packing materials like polythene bags and second-hand corrugated boxes are available for locally packaging (NABARD, 2014).

2.3.5 Status of cashew nut processing in Tanzania

Value addition in Tanzania began in the 1960s when a private company established a simple processing factory in Dar es Salaam. In the 1970s the Government of Tanzania secured funds from the World Bank to construct 12 Cashew processing factories with a

capacity to process 116 000 tones. All the factories were large scale mechanized using Italian or Japanese technology. The factories were built in Newala (2), Lindi (1), Masasi (1), Mtwara (2), Tunduru (1), Mtama (1), Nachingwea (1), Dar es Salaam (2), and Kibaha (1). The numbers in the brackets indicate the number of factories. Following inefficiencies in the operation of the factories, the Government of Tanzania decided to sell the 12 factories to private firms. Since then, the privatized factories have remained underutilized to their established capacities and hence grounded. There are, however, about 40 small and medium factories processing cashew in Tanzania with limited capacities, skills and lack of competition to secure the needed materials and markets (Chimbyangu, 2020).

Currently CBT's data shows intended capacity of the cashew factories in the country is 179 000 Mt of which installed capacity is 58 000 Mt (32%) and current operating/utilized capacity is 14 662 Mt (25%) per annum. Apart from these, there are about 240 small-scale processors in Local Government Authorities (LGAs) who operate individually or in groups, shelling, peeling and roasting cashew kernels by hand for sale in streets, roadside and at bus stands. The marketing and sale of the products is supervised and monitored by the Cashew nut Board of Tanzania with assistance through various farmer cooperatives in place specifically in the production areas (Skinner, 2015).

2.3.6 The status of small scale cashew nut processing in Tanzania

Techno serve Tanzania (2004) reported that there are 144 small-scale processing groups in Tanzania of which 103(72%) groups are located in the Coastal Region. The information from processing officer from CBT says that; the number of small-scale processors group now has increase up to 188, these processors do the processing under traditional ways (local conditions) and sell their kernel either along the road as

Machingas while few of them sell their kernels during national festivals such as *Sabasaba* and *Nanenane* days. He added that, around 50% of the kernel sent to the market during these occasions is not sold **(**Mkulia J., personal communication, 2021).

2.4 Empirical Studies

2.4.1 Common small-scale cashew nut processors' practices

Karthicumar *et al.* (2014) conducted a study on the Indian cashew processing industry. The objective of the study was to explore common small-scale cashew processors practices. Their study revealed that small-scale processing practices like cleaning are usually done manually and this eliminates unwanted extraneous materials such as stones and sand. Soaking nuts in water helps to avoid scorching during the roasting operation. The roasting of nuts makes the shell brittle and loosens the kernel from the shell. Most common methods of roasting include: open pan method, drum roasting method and oil bath method. The next step is shelling, is the removal of the roasted outer cover. Separation of cashew kernels from broken shell pieces and unshelled kernels is the next requirement. A sorting operation is required to segregate the kernels into whole, broken and splits. Cashew kernels are finally graded based on size, colour and other standards.

According to Thangata (2016) who conducted a study on Farmer-Led Successful Business Cases: Smallholder Cashew Business Model in Mtwara, Tanzania, small-scale processing practices include raw nuts placed onto the heated pan, and then heated with constant stirring to prevent burning. Alternatively, raw nuts are opened and boiled and then are allowed to cool. Later, the shells are removed from the nut. He further reports that sometimes women processors use a mallet to break the hard outer shell. Peeling is done manually after which the cashew nuts are graded, sorted and then cleaned. Finally, the cashew nuts are packaged in different packaging materials.

2.4.2 Factors promoting the use of recommended cashew nut processing practices/technologies

A study by Khoza *et al*. (2018) on factors influencing choice of smallholder farmers/processors to participate in agro processing industries in South Africa reveled that factors such as educational level (years of schooling), land tenure, agro-processing training and information have positive influence on small-scale processors /smallholder farmer to participate on agro- processing .Also Moses *et al.* (2020) who analyzed factors contributing on cashew nut processing to small-scale processors in Nigeria and found that, cost of purchasing, cost of labour, cost of fire wood and cost of frying pan are the most important factors during cashew nut processing. This is because value addition of the products is guaranteed in the area by farmers and other stakeholders, resulting in farmers' economic boost. Despite Tanzania's substantial cashew nut production, which ranks 4th in Africa and 8th globally, farmers have reaped less benefit from the crop due to poor value addition, which has a significant impact on marketing and production as a whole.

2.4.3 Challenges facing small-scale cashew nut processors

Fitzpatrick (2011) conducted a study on cashew nut processing equipment in five countries, whose objective was on assessment of challenges facing African small and medium processors. According to this study, the challenges that face small-scale cashew nut processors include lack of information on the equipment and suppliers' poor financial services, lack of expertise in using and maintaining the available machinery and lack of skills in procurement strategies.

URT (2013) through the ministry of Finance conducted a study on Cashew nut Industry Strategy in Tanzania. The study involved a review of challenges facing small-scale cashew nut processors. Results show that some equipment are expensive, practices need skills and knowledge on use of recommended processing practices, low knowledge on

business skills, lack principles for food safety, scalability (how easily the equipment fit to processors), durability and efficiency. Since that is the case, it has been difficult to promote transformation towards large scale farming in cashew nut processing which facilitate the development of the agro processing sector and the beneficiaries at large. However, the study further recommended that it is necessary to conduct capability assessment of small-scale cashew nut processors (value addition) as little studies have been conducted on the venture necessitating its conduct to fill the gap. Furthermore, Mutayoba and Kusiluka (2018) conducted study on Linkage among cashew nut processors in Mtwara region, Tanzania. The studies concentrated on assess volume, quality optimization and efficiencies between small-scale cashew nut processors and large- scale cashew nut processors. Results show that synergetic linkage between small-scale and large scale processors, limited availability of raw materials, limited financial capacity, and managerial skills among small-scale processors are challenges facing small-scale cashew nut processors'.

2.5 Research Gap

Various studies have been conducted on small-scale cashew nut processing for example Mutayoba and Kusiluka (2018) conducted study on Linkage among cashew nut processors in Mtwara region, Tanzania and Thangata (2016) study on processing practice among small-scale cashew nut processors in Mtwara. The studies concentrated on assessing volume, quality optimization and efficiencies between small-scale cashew nut processors and large- scale cashew nut processors. Thus, it can be observed that there is limited study on small-scale cashew nut addressing their challenges, processing volume and efficiencies. Similarly, no study has been done to assess small-scale cashew nut processors' capability. Therefore in order to bridge this knowledge gap, this study aimed at assessing capability of small-scale cashew nuts processors especially in Ruangwa district.

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CHAPTER THREE

PAPER ONE

3 Factors promoting small-scale cashew nut processors' use of recommended processing practices in Ruangwa district, Tanzania

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3.1 Abstract

Knowledge of factors that affect a particular situation is important for its improvement. This study was carried out in Ruangwa District, Tanzania, to assess factors that influence small-scale cashew nut processors use of recommended processing practices. The study employed a cross-section research design, whereby a sample size of 180 respondents was used. A questionnaire, Focus Group Discussions, Key Informant Interviews and documentary review were used to collect data. Quantitative and qualitative data were analyzed by using descriptive statistics and content analysis respectively. In addition, Binary logistic regression was used to determine factors promoting small-scale processors' use of recommended processing practices. It was found that more than half (64.5%) of small-scale cashew nut processors have low capability in cashew nut processing. Education level, average income, age group and yield were the factors that influenced small-scale cashew nut processors' use of recommended processing practices. The study recommends strategies that enhance people in the study area to attend formal education, strategies that enables them to increase their income, and the initiatives and/or cashew nut processing programmes should target the youths as compared to their elder counterparts.

Key words: Factors, recommended, small-scale, processors, Ruangwa

3.2 Introduction

Cashew (*Anacardium Occidentale* L.), a multipurpose crop, is tropical tree native to South America. Cashew was introduced in Asia and Africa by European explorers in the 16th century and gradually expanded throughout the world. Today, it has been widely grown mainly as source of income in most tropical region with the largest covered found in Brazil, India, Vietnam and Several countries in West and East Africa (Tola and Mazengia, 2019). The world production of raw cashew nut (RCN) has grown from 0.29 million tones in 1961 to 4.41 million tones in 2015 with the shifting production capacity in different countries. Vietnam is the top producer of raw nuts, and India is the largest processor and exporter of processed nuts (Dendena and Corsi, 2014; Elakkiya *et al.*, 2017).

Cashew was first introduced in Tanzania in the sixteenth century by the Portuguese and is now widely cultivated. The crop was initially introduced for soil conservation and reforestation (Assenga *et al*., 2020). The country production has been increasing in recent years and reached about 155 244.65, 265 237.85, 313 826.39, 224 521.05 and 232 682 tones for the years 2015/2016, 2016/2017, 2017/2018, 2018/2018 and 2019/2020 respectively (CBT, 2020). Cashew is an important crop for nutrition and income generation. It is among the important export crops in Tanzania, others being tobacco, coffee and cotton (FAOSTAT, 2011; George and Rwegasira, 2017; Asenga *et al.*, 2020). Cashew industry earned the country US$340.9 million in the 2016/17, US$ 565 million in the 2017/18 season and US$ 251 million in 2018/19 season (CBT, 2019). The main cashew production regions include Mtwara region, which produces 71% of the total raw cashew output in the country followed by Lindi (18%), Coast (8%) with the remaining 3% coming from the minor producer regions (mainly Ruvuma and Tanga) (Kilama, 2013).

Cashew is a leading source of income for over 400 000 households in South-Eastern part of Tanzania rely on cashew production to meet household income and food security (Majune *et a*l., 2018). The most important products derived from cashew trees are cashew nuts, which are then processed to get kernel. Cashew nuts are a valuable source of macro and micronutrients, such as protein (18g/100g), fats (44g/100g) and iron (7g/100g) (Visalberghi *et al.*, 2016). They also contain high levels of magnesium, zinc, copper, manganese and essential fatty acids (FAO, 2015). The cashew apples are important in making juice, jam, alcoholic and soft drinks. Cashew trees can also be used for firewood, charcoal and in carpentry for manufacturing of different furniture.

Farmers are advised to add value to their crops/crop produces before they take them the market. Value addition refers to the process of undertaking further processing on certain product which are in raw form whereas they are processed further to add value to them by a company or individual before the product is offered to customers (Lori, 2017). It always applies to the items and goods, which require undertaking certain industrial processing to guarantee that they reach the compulsory standard and thus are proper for consumption. In cashew nut industries the process of value addition involves the kernels being graded, heat treaded, shelled roasted, and packaged. It is generally time consuming and labour intensive (Chimbyangu, 2020). Most of the cashew nut processors in Tanzania are small-scale processors who constitute the Small and Micro Enterprises (SMEs).

The Small and micro an enterprise (SME) Development Policy is one of several policies that underpin the country's Vision 2025. The vision envisions that "Tanzanians will have graduated from a least developed country to a middle income country by the year 2025 with a high level of human development and Sustainable Industrial Development Policy (SIDP) 1996-2020 which emphasis employment. Further, the priority is given to resources-based enterprises particularly activities that add value to agricultural products

(URT, 2002). There is a great diversity of agro-processing worldwide accounting for more than 60% of the employment in some countries. In sub-Saharan Africa, food processing represents between 30% and 50% of total manufacturing food value added (FAO, 2017).

Cashew nut processing increases farm gate price as well as earnings from export and provides employment opportunities (Dendena and Corsi, 2014). It also reduces the exportation of raw cashew nuts hence encouraging local consumption and exportation of processed products (Nkwabi *et al.*, 2019). The most important products derived from cashew trees are cashew nuts, which are then processed to kernel (Assenga *et a*l., 2020). Small-scale cashew nut processing enterprise is important in meeting the needs of the local processors and strategic in the current transformation agenda of the world (Lindbom *et al.*, 2015).

Cashew nut processing involves several stages including cleaning, soaking, roasting, shelling, sorting, grading and packing (Karthickumar and Sinija, 2017). Cleaning is usually done manually to eliminate unwanted extraneous materials such as stones, sand, and leaves before any further processing. Soaking of nuts in water helps to avoid scorching during the roasting operation. Roasting of nuts makes the shell brittle and loosens the kernel from the shell. The next step is shelling which is the removal of the roasted outer cover. Separation of cashew kernels from broken shell pieces and unshelled kernels is the next stage. A sorting operation is required to segregate the kernels into whole, broken and splits. Cashew kernels are finally graded based on size, colour and other standards and then parked for storage or transportation (Karthickumar and Sinija, 2017). Processing needs some technical know-how and capability. Thus, to succeed, any individual/group of processors needs to have the equal capacities.

Nowadays, having capability in terms of knowledge and skills is necessary for any firm, organization or personal business, to be successful in the field of work. In any enterprise or field, the capability is highly regarded as a determining factor for a group or a person to attain the goals. It is for this reason, and others, that it is important at any time to know the capability of any person or organization engaged in any business, thus a need for its assessment. Capability assessment is high on the agenda of several countries and organizations as part of their risk management and disaster awareness (Tarighi and Hamidi, 2017). Capability is defined as capacity, in terms of the financial, technical, effective policy, institutional, leadership and human resource capacities that firms or individuals must have to perform certain activities (Wang and Zeng, 2017). In processing, capability refers to the measure of the ability of an entity (department, organization and person, system) to achieve its objectives, especially in relation to its overall mission (NABARD, 2014).

In cashew nut processing, capability involves essential series of unit operations, which can be mechanical or manual. Small-scale processors are said to lack ability or power in their implementation of processing activities (Mutayoba and Kusiluka, 2018). The capability of small-scale cashew nut processors is looked at in different dimensions, which include the availability of raw materials, access to raw materials, type of processing technology and processing capacity.

Efforts have been made to improve the capability of small-scale cashew nut processors. India, as the first country to enter the global cashew trade, encouraged cashew nut processing by increasing the number of cashew processing firms from 170 units in 1959 to over 3500 in 2008 (Mohod *et al.,* 2010). Also, India introduced effective utilization of solar energy and biomass gasification technology for energy generation during processing

activities for small-scale cashew nuts processors. This industry employs regards 0.5 million people and about 95% of them are women (Karthickumar *et al.,* 2014).

In Africa, interventions have been made to improve the capability of small-scale processors by improving processing equipment, increasing farm-gate price as a percentage of the export price from 50% in 2012 to over 60% in 2016, and increasing the domestic raw cashew processing rate from 5% in 2012 to 8% in 2016 (Nicholson *et al.,* 2019).

Cashew nut processing in Tanzania is done by small, medium and large-scale processors, whereby, small-scale processors who operate manually constitute a larger proportion (Azam-Ali and Judge, 2001). Usually they process below one tone per day with most of the raw materials coming from their own farms. Techno serve Tanzania (2004) reported that there are 144 small-scale processing groups in Tanzania of which 103(72%) groups are located in the Coastal Region. The information from processing officer from CBT says that; the number of small-scale processors group now has increased up to 188, these processors do the processing under traditional ways (local conditions) and sell their kernel either along the road as *Machingas* while few of them sell their kernels during national festivals such as *Sabasaba* and *Nanenane* days.

For example, only 15-20% of produced cashew nuts are processed locally for both domestic and international market making about 80-85% of the total output to be exported as raw cashew nuts (Mkwabi, *et al*., 2019). As a result, for the period from 2008 to 2012, Tanzania got a loss of 551 million US$ which is equal to 110 million US$ per annum by exporting in-shell cashew nuts instead of processing them or adding value (Rukonge, 2013).

Several initiatives have been taken to improve capability of small-scale cashew nut processors in Ruangwa district. These include establishment of a processing organization known as *Wabanguaji Korosho Ruangwa* (WAKORU), provision of small manual processing machines by Cashew nut Board of Tanzania (CBT) and building of cashew nut processing infrastructures. Despite these efforts, the status of small-scale cashew nut processors in Tanzania particularly in Ruangwa district is still low. This situation is attributed to the low use of recommended processing practices (UNIDO, 2011). Therefore, this study aimed at assessing the factors that influence small-scale cashew nut processors use of recommended processing practices. Knowledge of these factors will a better planning for cashew nut processing industry in the study area and the country at large.

3.2.1 Theoretical framework

This study was guided by the Amatya Sen's capability theory. This theory focuses on the quality of life that individuals are able to achieve. Quality of life is analyzed in terms of the core concepts of 'functions' and 'capability'. According to this theory *Functionings* are states of 'being and doing' while *Capability* refers to the set of valuable functioning that a person has effective access to. Thus, a person's capability represents the effective freedom of an individual to choose between different functioning combinations kinds of life that she/he has reason to value. In the context of access to Raw Cashew Nuts (RCN) both internal and external buyers are pulled together to compete for RCN. However small-scale processors are subjected to the same pull without considering their capability.

In this study the Sen's capability theory is well connected because cashew nut production in Tanzania is an activity which is business oriented for the farmers because the crop is mostly exported to the foreign jurisdictions. However, although the activity has been in place for several years still there has been less progress with high level of retardation which is a problem. Small-scale cashew nut processors compete by larger competitors to get raw materials for processing. Farmer/processor should be encouraged to sell processed cashew nuts instead of raw nuts so as to increase their income. This is the case with the fact that value addition in the business has been very low and poor to the extent that it has greatly affected the activity which has caused the study to be undertaken so as to assess capability of processors.

3.2.2 Conceptual framework

The conceptual framework is a modal which indicates the relationship between variables as derived from the theory or theories that guide the study and from reviewed literature. The model is in form of sketch describing the variables both independent and dependent ones as presented in Figure 1. For this study the conceptual framework presents various variables that are associated with small-scale cashew nut processor's processing capability. Construction of the conceptual framework was informed by the Sen's capability theory as well as the review of various literatures. The independent variables of this study are access to raw materials, financial resources, managerial skills, technology used, market accessibility and government policy and regulations. The capability of small-scale processors is the dependent variable, which means that in order for a small-scale processor to be capable, he/she needs access to financial resources, availability of raw materials, the adequate/appropriate technology, availability favorable policy, market accessibility of raw materials and enough processing capacity.

Independent variables **Dependent variable**

Technology	(Description) Knowledge Skills Appropriate equipment and machinery Complexity and compatibility Process and market innovation
Availability Raw Materials	Own farm From fellow farmer From auction
Market Access	Access Training Access to information Demand forecasting Transport infrastructure Promotion
Financial Resources	Working capital Cash managerial skills Access to credits Collateral requirements from finical sources Interest rate charged by financial sources Loan application procedures of financial sources
Government Policy	Buying and selling policy Legal certification by TBS Registration and licensing (BRELA, TRA, LGAs) Government initiative to support our activities
Managerial skills	Organization Effective communication Access to training Ability to strategic business planning

Capability of Small-scale processors

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of people depend on crop

wa District Profile, 2019).

The district enjoys monsoon winds that are Northeast winds from June to October and Southeast winds from November to May each year. It rains from mid-November to May annually. Most parts of the district receive rainfall between 800mm and 1200mm per year. The rainfall is very essential for the onset of cashew nuts flowering from June to July. Agriculture is the main income-generating activity for most people whereby more than 90% of the population engages in the production of food crops, cash crops and livestock keeping. Food crops include maize, sorghum, paddy, cassava, pigeon peas,

cowpeas and groundnuts. Cash crops include cashew nuts, sesame, onions, tomatoes, sunflower and groundnuts.

The cashew nut production/cultivation is the main income-generating activity performed by most people in Ruangwa District. More than 70% of the population is engaged in cashew nut production. Most of the farmers engaged in cashew nut production are smallholder farmers who manage to cultivate not more than 4 acres of cashew nut farm (Ruangwa District profile, 2018).

Apart from cashew cultivation, also smallholder cashew nut farmers in Ruangwa have been engaged in cashew nut processing (value addition) since 2010. Processing activities are performed both by individuals and groups. WAKORU is the only association that is involved in cashew nut processing in Ruangwa District. At its formation, WAKORU member groups were 12 groups but now the number has increased up to 25 groups with 323 small-scale cashew nut processors out of which 207 are females and 116 males (Ruangwa District profile, 2020). Therefore, the district was purposively selected because of its potentiality for agricultural production, cashew nut being the major cash crop, but also the presence of the organized small-scale cashew nut processors.

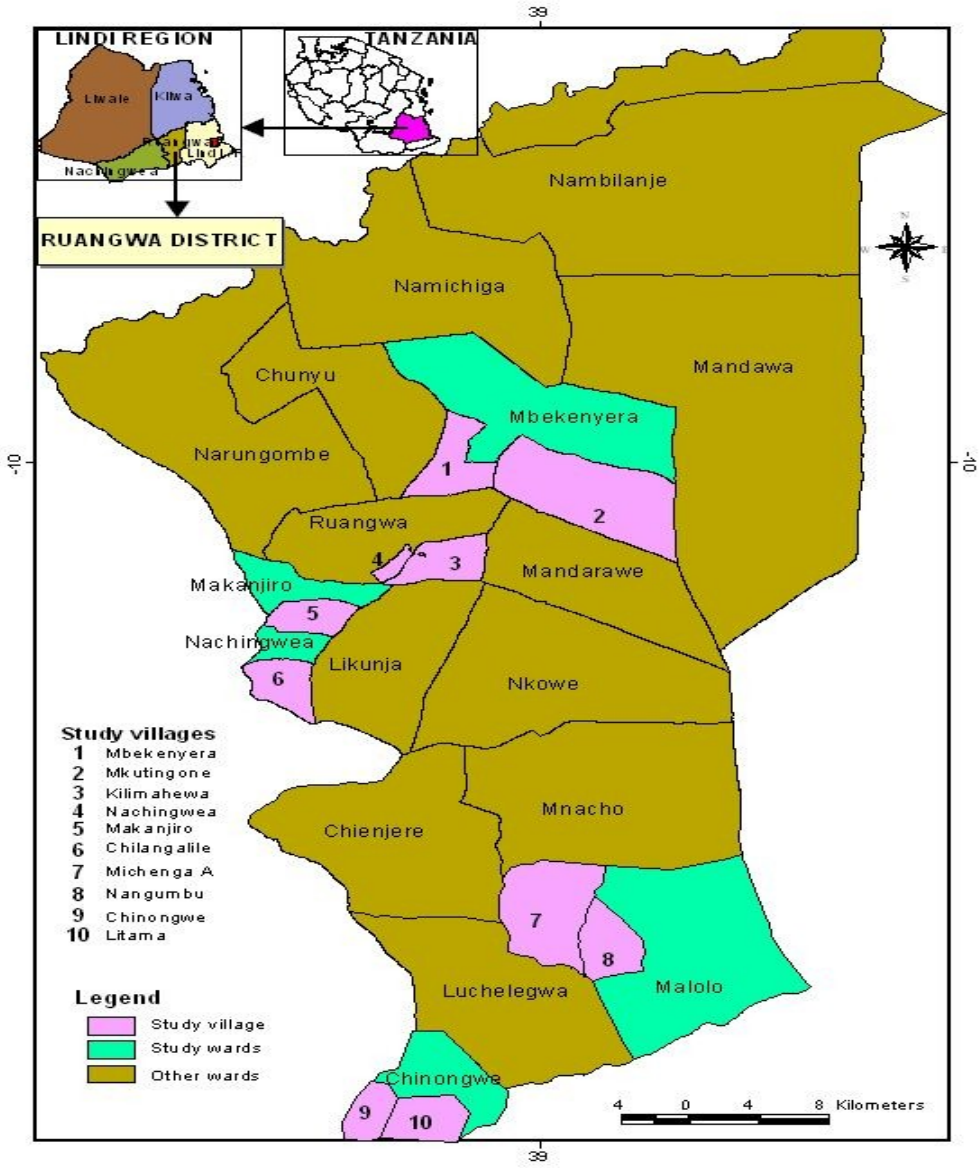

Figure 3.2: Map showing the location of the study area

Source: Researcher (2021)

3.4 Research Design

A cross-sectional research design was adopted for the study. The design allowed data collection at once without repetition. In addition, the design has the benefit of measuring present attitudes and providing information in a short period without repetitions (Bryman, 2012).

3.5 Population of the Study

All small-scale cashew nut processors in the WAKORU association in Ruangwa District constituted the study population.

3.6 Sampling procedure and Sample Size

3.6.1 Sampling procedure

The study adopted a multistage sampling technique as suggested by Verstraete and Meirvenne (2008). The first stage was the selection of five wards (Nachingwea, Mbekenyera, Makanjiro, Malolo and Chinongwe). Then, two villages were randomly selected from each ward as follows: Nachingwea Ward (Kilimahewa and Nachingwea villages), Mbekenyera Ward (Mbekenyera and Mkutingome villages), Makanjiro ward (Makanjiro and Chilanagalile villages) Malolo ward (Nangumbu and Michenga 'A' villages), and Chinongwe ward (Litama and Chinongwe 'A' village). At the village level sampling, in each village, a register was used as the sampling frame. The list of 323 small-scale cashew nut processors from the WAKORU association was used as a sampling frame to draw a sample of the study. The WAKORU association was purposively selected based on the fact that it is the only association that has been engaged in cashew nut processing since 2010 to date. Eighteen small-scale cashew nut processors were randomly selected from each village by using simple random sampling techniques to constitute 180 surveyed respondents. Kothari (2004) subscribes that a simple random sampling procedure provides an equal chance for all study population samples on members being selected in the study.

3.6.2 Sample size

The sample size was obtained by using the formula suggested by Cochran (1977),

$$n = \frac{N}{1+N(e)^2}$$

Where,

n = sample size,

N = Total number of WAKORU members,

e (acceptance sampling error) = 0.05,

$$n = \frac{323}{1+323\,(0.05)^2}$$

Therefore, = 179

179 ÷ 10 = 17.9 ~ 18, then in each selected village 18 processors were selected to make a total of 180 study respondents.

3.7 Data Processing and Analysis

Quantitative data were coded, entered into the computer, cleaned and analyzed using the IBM Statistical Package for Social Science (SPSS) version 20 software. Descriptive statistics such as frequencies, means, standard deviation, percentages and multiple responses were used to make inferences. Qualitative data were analyzed by using content analysis technique.

Quantitative data were coded, entered into the computer, cleaned and analyzed using the IBM Statistical Package for Social Science (SPSS) version 20 software. Descriptive statistics such as frequencies, means, standard deviation, percentages and multiple responses were used to make inferences. The Binary logistic regression was used to measure the nature and strength of statistical relationship between binary dependent (effect) variable and each independent (causal) variable. The dependent variable was 'the use of recommended practices' while the independent variables were grouped as **Social economic factors** (Age, Sex, Marital status, Income level, Education level, Household size), **Production and asset factors** (Farm ownership, Acres owned, Yields), and **Knowledge on using recommended practices** (attending workshops).

3.8 Results and Discussion

3.8.1 Demographics characteristics of respondents

Study findings (Table 3.1) show that respondents' age ranged from 21 to 77 years with the average of 45.6 years and standard deviation of 12.69. Majority (87.7%) of respondents were in the economically active age group, i.e. less than 60 years whereas the remaining (12.3%) were in the dependent age group, i.e. 60 years and above. Since cashew nut processing is considered a demanding activity, these findings likely to imply that those involved were physically energetic and able to supply the required labour so as to meet responsibilities and goals. The findings disagree with Enwelu *et al.* (2014) study on gender roles and challenges of small-scale cashew nut processing enterprise in Enugu North Nigeria found that most of processors were youth with mean age of 33 years.

Seventy-one respondents 71(39.4%) were men and 109 (60.6%) were women (Table 1) Traditionally in the study area cashew nut processing activities are dominated by women. The dominance of women was also demonstrated by membership in WAKORU (*Wabanguaji Korosho Ruangwa*) group where about 64% of members were women. During FGD with women, one participant had this to say,

> "*Cashew nut processing is a tedious work, which needs to be tolerant. Women in nature are tolerant as may be seen in the way like taking care of the family. Also, traditionally, they believe cashew nut processing is a woman's* work". (FGD, Nachingwea Village; April 14, 2021).

Similarly, another woman was quoted arguing on the same that, "*only few me are engaged in cashew nut processing because of lack of permanent market for kernel*".

The current study findings resonate well with Moses *et al*. (2020) who found that in Benue state Nigeria, more processors participating in cashew nut processing were woman.

The study advised male forks to participate in cashew nut processing as it is profits and processors should seek support from the government to facilitate them to but processing machines. On the other hand, the findings disagree with Salau *et al.* (2018) whose study was on the analysis of cashew nut marketing in Kwara state, Nigeria and revealed that most (81.1%) of wholesale marketers and processors were male.

It was also found that 119(66.1%) of respondents had primary school education, 35(19.4%) completed secondary school, 5(2.8%) had university/college education and 21(11.7%) had no formal education (Table 3.1). Education is perceived as among the factors that influence an individual's perception of an intervention before making decision to take part. It is believed to impart desire to the individual to learn more, attend training and seek information regarding agricultural and non-agricultural activities. These findings may imply that the majority of respondents were able to follow training and instructions as they could read and write in Kiswahili (the National language of Tanzania). These findings are in line with Moses *et al* (2020) who found that majority of cashew nut processors in Benue state Nigeria at least had attained primary education.

Table 3.1: Respondents' demographic characteristics (N=180)

Variables		Frequency (F)	Percentage (%)	Mean
Age of respondent	18-30 Years	26	14.4	
	31-40 Years	36	20.0	
	41-50 Years	56	31.1	45.59
	51-60 Years	40	22.2	
	61 Years and above	22	12.3	
	Male	71	39.4	
Sex of respondent	Female	109	60.6	
Education level	Non formal education	21	11.7	
	Primary	119	66.1	
	Secondary	35	19.4	
	University/College	5	2.8	
Marital status	Married	124	68.9	
	Single	35	19.4	
	Widowed	5	2.8	
	Divorced/Separate	16	8.9	
Household size	1-3	87	48.3	
	4-6	81	45.0	3.7
	7 and Above	12	6.7	
Income per month (tshs)	50001-200000	99	55.0	225
	200001-350000	68	37.8	333.3
	350001-500000	7	3.9	
	500001-650000	4	2.2	
	650001 and Above	2	1.1	

Majority 124(68.9%) of respondent were married, 35(19.4%) were single, 16(8.9%) were divorced/separated and few 5(2.8%) were widowed. Marriage promotes participation of couples in the formation of economic groupings. Marriage couples are more likely to be productive than singles. It is expected that married people are less mobile and have

obligations hence due to this they remain in the village doing agricultural activities including crop value addition. Findings for this study are in line with Mallya (2013) whose study on social economic factors affecting cashew nut production in Ruangwa Tanzania found that majority of cashew nut farmers were married. This is expected because married people are supposed to provide to provide a daily meal to their children. Also, the result agree with Salau *et al.* (2017) who analysed cashew nuts marketing in Kwara state, Nigeria, found that majority (92.8%) of marketers were married. This means there is a chance of involving family labour in cashew nut processing and marketing.

The findings show that the smallest household had only one member while the largest had eight members with an average of 3.71 members and a standard deviation of 1.574. Household size denotes the availability of labour force for cashew nut processing at the family level. During FGD it was agreed that the household with less than three members is categorized as small, the one with four to six is categorized as medium and the one with more than six members was categorized as large household. About 87(48.3%) of the sampled households were small, 81(45%) were medium sized whereas few 12(6.7%) were large. On average 48.3% of the sampled households were small-sized (with one to three members). This may imply that less labour is available for cashew nut processing in the area. These findings disagree with Moses *et al*. (2020) who found that in Benue state Nigeria majority of household were large, which an indication of availability of labour for cashew nut is processing.

Income of respondents was measured on monthly basis and expressed in Tanzanian shillings (Tshs). The study found that 99(55%) of respondents earned income between (Tshs) 50,001/= and 200,000/= per month; 68(37.8%) earned between Tshs 200,001/= and 350,000/=; 7(3.9%) earned between 350,001/= and 500,000/=; while 4(2.2%) earned between 500,001/= and 650 000/=. Low income, as indicated in Table 3.1 is a

manifestation of crop yield since farmers (processors) may fail to get enough cash to purchase inputs required for crop production. This can lead to low raw materials to processors as majority obtained raw materials from their own farms. It was also reported during FGD2 as one participant said:

> *"Because of low income/capital, most small-scale processors fail to buy inputs as compared with their neighbor farmers in Newala and Tandahimba who practice early weeding and other agricultural practices, hence leading to high yield. Similarly, the majority of processors in these areas get one tone per year which is quite unlikely for the processors in Ruangwa. Also, low income hinders processors to buy raw materials from auctions and hence majority of us are not engaged in cashew nut processing throughout the year due to lack of raw materials and improved equipment (*FGD, Nachingwea Village; April 14, 2021*).*

The study findings are in line with Ibrahimu (2015) who made a study on cashew nut production technologies and their effects to cashew nut production in Mkinga Tanzania and found that low income caused low crop yield.

Table 3.2: Percentage distribution of respondents by the main source of income, ownership of cashew nut farm, experiences in processing on years (N=180)

Variables		F	%
The main source of income	Cashew nut processing	7	3.9
	Farming	131	72.8
	Salary work	8	4.4
	Livestock keeping	5	2.8
	Livestock keeping and farming	14	7.8
	Entrepreneurship	15	8.3
If own cashew farm	No	56	31.1
	Yes	124	68.9
Experiences in processing on years	Less than a year	8	4.4
	1 to 2 years	65	36.1
	3 to 4 years	24	13.3
	5 to 10 years	83	46.1

The result from Table 3.2 shows almost three quarters 131(72.8%) of the small-scale cashew nut processors depend on farming. This implies that the majority of small-scale cashew nut processors depend on farming activities as their main source of income. The result is in line with Nnunduma (2010) who study on the economic potential of small-scale cashew nut processing in Lindi, Tanzania and found that only 6.7% of small-scale cashew nut processors depend on cashew processing because the government does not put more emphasis on the processing although it pays a lot.

Results in Table 3.2 show that the majority (68.9 %) of processors own a cashew nut farm, whereas the remaining few (31.1%) do not. These results imply that the majority of small-scale cashew nut processors in the study area get raw materials from their farms while only a few get it from other sources like purchasing. During FGD one respondent said:

> *We get most of the raw materials for processing mainly on farms. It is only during the periods of low yield when we buy them. In most cases, low yield is a result of planting local varieties. During this period, we buy cashew nuts for processing from our fellow farmers, although this is illegal (FGD, Nachingwea Village; April 14, 2021).*

These results disagree with Njau (2010) who conducted a study on consumer demand for traditionally processed cashew nuts in Morogoro and Coast regions and found that small-scale processors are not farmers and they do not own cashew nut farms. They buy raw materials from their fellow farmers during harvesting time.

Results in Table 3.2 show that almost half 83(46.1%) of small-scale processors had experience from five to 10 years in cashew nut processing. The results further show that mean processing experience was five years which is an indication that processers had

enough experience in the cashew nut processing industry. This is advantageous because experience is believed to be a good teacher. The results are in line with Salau *et al.* (2018) whose study was about the analysis of cashew nut marketing in Kwara state, Nigeria and reported that more experienced processors are knowledgeable and more likely to adopt new techniques on processing.

3.8.2 Small-scale Cashew Nut Processors' Processing Practices

3.8.2.1 Respondents' level of use recommended processing practices

To determine the level of cashew nut processing practice, ten standard/practices statements were presented to respondents to specify (state) to what extent they practiced them. These statements are part of the Cashew nut Board of Tanzania (CBT) guideline version 1 of 2017, which set criteria for small-scale cashew nut processing (Abdallah, 2017). The extent to which the processor was able to follow/practice this guideline determined his/her capability in cashew nut processing and this was expressed in percentage. That is, how many out of the ten standard statements/practices, the small-scale processor followed/practiced. The practicing level below 50% was considered as low capability, 50% to70% moderate capability and 80% to 100% high capability.

The findings (Figure 3.3) show that 19.3% of the respondents had high capability on cashew nut processing, 30.0% had moderate capability and 50.7% had low capability. These results imply that about half of respondents in the study area had low capability. Having low capability automatically leads to low daily cashew nut processing. These findings confirm a study by Oluwale (2017), which found that production capability in the cashew processing industries in Nigeria was low.

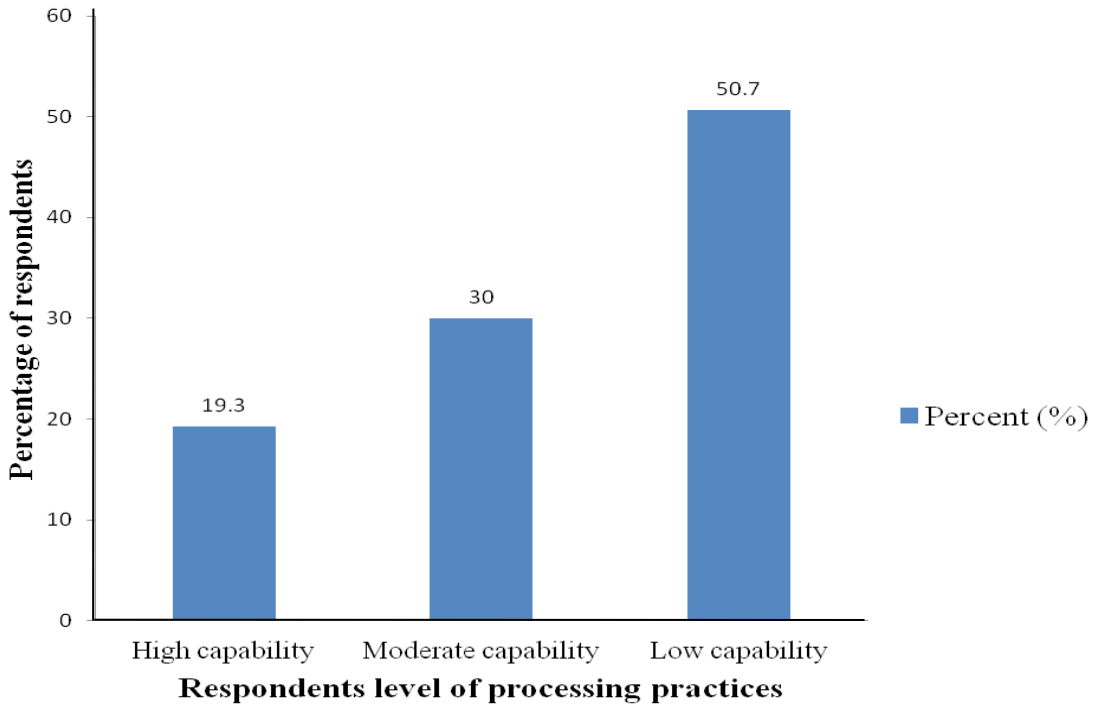

Figure 3.3: Capability of small-scale cashew processors

3.8.2.2 Extent of small-scale cashew nut processors' processing practices

To understand what exact practice had been highly, moderately or lowly practiced by processors, statement-wise analysis was carried out: The mean score of each practice was obtained by summing up the weights given to the standard by respondent divided by the total number of respondents. The mean score was worked out for each practice and rank positions were assigned based on the mean score obtained after calculation.

Table 3.3*: Respondents score on the practices of cashew nut processing (N=180)*

Recommended Practices required	Poorly Practised (1)		Moderately Practised (2)		Highly Practised (3)		Total Score	Mean Score	Rank
	F	%	F	%	F	%			
Drying of RCN (days used)	22	12.2	32	17.8	126	70	464	2.58	1
Cooling (hours used)	76	42.2	61	33.9	43	23.9	327	1.82	2
Peeling (method)	89	49.4	48	26.7	43	23.9	314	1.74	3
De-shelling (method used)	107	59.4	20	11.1	53	29.4	306	1.7	4
Verify quality (method used)	84	46.7	68	37.8	28	15.6	304	1.69	5
Drying of kernel (method used)	88	48.9	70	38.9	22	12.2	294	1.63	6
Grade RCN (Grade number)	98	54.4	67	37.2	15	8.3	277	1.54	7
Grade kernels (grade type)	105	58.3	69	38.3	6	3.3	261	1.45	8
Packaging (materials used)	115	63.9	59	32.8	6	3.3	251	1.39	9
Roasting (method used)	128	71.1	47	26.1	5	2.8	237	1.32	10

Results in Table 3.3 show that the highest mean score (*2.58*) was for the practice, "*Drying raw cashew nuts in an open-sun for at least three days*". These results imply that drying raw cashew nuts is important for cashew nut processors. The advantage of doing this is to reduce moisture; this moisture content slows down or completely prevents deterioration of the raw cashew nut and increases its shelf life. During FGD one respondent said:

> *After harvesting the RCN, we are advised to immediately dry them for 2-3 days before they are stored in the sack for processing or selling to the auctions. The aim is to prevent deterioration* (FGD in Nachingwea Village, April 14, 2021).

The study findings mean that processors were highly knowledgeable on practice which has a direct effect on the marketability of the product. Similarly, Mohod *et al*. (2010) study on energy options for small scale cashew nut processing in India and found that the

raw cashew nuts after harvest are sun-dried for 2-3 days to reduce the moisture from 25% -8% and stored in a gunny bag. The well-dried cashew nut seeds are stored in the 80kg capacity gunny bags for further processing.

The second-highest ranked practice with a mean score of 1.82 was *"Cooling of the kernel for 4-6 hours before pealing*". This was categorized as *moderately practised practice as shown in* Table 3.3. The process is done to bring down the temperature of kernels after drying so as to facilitate the peeling process. During FGD it was noted by one respondent that*:*

> *After kernel drying, we use equipment such as a wide pan, basin, mat, and winnowing basket and spread kernel for more than four (4) hours for cooling, then start peeling. The process is done to prevent the breakage of the kernel during peeling"* (FGD, Chinongwe Village; April 21, 2021).

Cooling is a significant technique (practices) in cashew nut processing since it makes the testa brittle and loose, making it easier to peel and increasing the entire kernel output. In line with the findings of the current study, Dhanushkodi *et al.* (2016) did an energy analysis of small-scale cashew nut processors in India. The result discovered that once the kernel is withdrawn from the drying process, it must be allowed to cool for two to four hours before peeling. Cooling the kernel allows for easier peeling and reduces broken/damaged kernels.

The third highest ranked practice was "*Peeling of the kernel by both gently rubbing with fingers and using special pealing knife"*. This had a mean score of 1.74 and was reported

as among the moderately practised practices as shown in Table 3.3. The process is done to remove the testa from the kernels. During FGD one respondent said,

> *On the training of cashew nuts processing, we were emphasized (advised) to peel kernel manually instead of using only a peeling machine. i.e gentle rubbing with fingers and finish removing by using a peeling knife to obtain good nuts which attract customers compared to unpeeling kernel"* (FGD in Nachingwea Village, April 14, 2021).

Although some respondents are reported to be peeling by using free hands only, it is important to remember that, effective peeling should use both/combine manual peeling and machine to get a good kernel. This occurs because most peeling machines do not peel all of the kernels the first time, so nuts often have to be run through the machine two or three times.

Nevertheless, the study findings agree with Kusiluka and Mutayoba (2018) who found that in Mtwara cashew nut peeling involves the use of special peeling knives or machine methods. Other methods are as indicated in Table 3.3 in their order of importance.

These other practices were lowly practised because the majority of processors use local equipment or the traditional way of roasting their cashew nuts. They mainly used the open pan method and boiling while only a few used the boiler. Based on FGDs 1 and 2 the common roasting methods used in the area were the open pan method, boiling and steaming (using boiler). One participant commented on this by saying,

> *During our cashew nut processing training, we were advised that using a boiler (steam) to roast the cashew nuts was a good and safe way because it decreases the thick acrid fumes produced, which could pollute the environment. It also reduces the use of direct heat on raw cashew nuts, which has an impact on the*

texture, colour, flavour, and overall appearance of the finished product. So we're still using these other ways (boiling and open pan) solely because we do not have a boiler" (FGD, Chinongwe Village; April 21, 2021).

These findings disagree with Moses *et al.* (2020) who found that in Nigeria most small-scale processors on cashew nut processing units in rural level use mechanization on processing like roasting and de-shelling and most other processing steps remain as tedious and manual operations.

Table 3.4*: Capability on availability of raw materials for small-scale cashew processors (N=180)*

Capability level	F	%
High capability	11	8.9
Moderate capability	46	37.1
Low capability	67	54.0

To determine the capability level on availability of raw materials for small-scale cashew nut processors, each respondent was required to state the number of cashew nuts harvested per one acre (productivity) on average. According to CBT (2021), the Annual Cashew nut Industries Stakeholder General meeting shows that one acre of cashew can produce 10 to 20 kg of raw cashew nuts at an average tree age of eight to ten years. Thus, processors whose yield per acre was below 400kg was considered as low capability, 400 kg -600 kg was considered moderate capability, above 600kg high capability.

The findings (Table 3.4) show that only 8.9% of the respondents had high capability on availability of raw materials. These results imply that about half (54.0%) of the respondents in the study area had low capability on availability of raw materials for processing activities which lead to not processing cashew nuts throughout the year.

These findings confirm a study by Aware *et al.* (2021) which found that small-scale cashew nut processors in India had low capability on availability of raw materials which lead to export raw materials from other countries for processing.

Table 3.5: Capability on processing capacity per day of small-scale cashew nut processors *(N=180)*

Capability level	F	%
High capability	9	5
Moderate capability	32	17.8
Low capability	139	77.2

To determine capability level on processing capacity for small-scale cashew processors, each respondent was required to state the average amount of raw cashew nut she/he processes per day. As shown by SIDO and CBT, a foot/hand lifted machine for small-scale processors has a capacity of processing above 50 kg of raw cashew nut per day. The processing level below 30 kg was considered as low capability, 30 kg to 50 kg moderate capability and above 50 kg was high capability. The findings (Table 4.5) show that only five percent of respondents had high capability on processing capacity per day. These results imply that the majority of respondents process their raw cashew nuts under the processing capacity required by a lifted foot/hand processing machine per day. The findings confirm a study by Adzanyo *et al.* (2019) on cashew nut processing equipment in Vietnam, India and Brazil which found that most small-scale processors had a low processing capacity of RCN per day

Table 3.6: Capability on accessibility of raw materials *for small-scale cashew nut processors (N=180)*

Capability level	F	%
High capability	13	7.2
Moderate capability	30	16.7
Low capability	137	76.1

To determine the level of capability on the accessibility of raw materials, each respondent was required to state his /her earned income per month. The income is directly associated with capability to access raw materials for cashew nut processing. The wage/ salary indicator database (2019) shows that an income below 350 000/= Tsh is considered as low income, from 350 000Tsh to 545 000/=Tsh is a moderate income and the income above 545 000/= Tsh considered as high income. The findings (Table 3.6) show that more than three-quarters (76.1%) of respondents had less income on buying/obtaining raw materials. The low income implies low capability and not vice versal. The study finding is in line with Thangata (2016) study in TANECU which found that due to the current organization of the chain in terms of WRS and auctioning, small-scale cashew nut processors especially women had low capability on the accessibility of raw materials.

Table 3.7: General capabilities levels for small-scale cashew nut processors *(N=180)*

SN	Capabilities dimensions (operationalisation)	Capability levels					
		High capability		Moderate capability		Low capability	
		F	%	F	%	F	%
1	Type of processing technology/practices	35	19.3	54	30.0	91	50.7
2	Availability of raw materials	11	8.9	46	37.1	67	54.0
3	Processing capacity per day	9	5	32	17.8	139	77.2
4	Accessibility to raw materials	13	7.2	30	16.7	137	76.1
	Mean performance capability (MPC)	**17**	**10.1**	**40.5**	**25.4**	**108.5**	**64.5**

Findings, as presented in Table 3.7, show that the Mean Performance Capability (MPC) of respondents had 10.1% high capability in general, 25.4% moderate capability and 64.5% low capability. The findings are in line with Marques and Camargo (2016) who found that technological capability on internationalization of the company and new product in Brazil was low.

3.9 Factors Promoting Use of Recommended Small-Scale Cashew Nut Processing Practices

To determine factors promoting the use of recommended small-scale cashew nut processing practices, the Binary logistic regression was used. The dependent variable was "the use of recommended practices" and the independent variables were grouped based on social-economic factors (age, sex, marital status, level income, education level, household size), production and asset factors (farm ownership, farm size) and knowledge on using recommended practices like attending the workshop. The model was fitted at 95% of confidence level and the p-value of model fit was found to be Prob > chi^2 = 0.0004 which showed that the model was significant and used to show association on valuables. Study findings (Table 4.8) indicate that education level, average income, age group and yield (Kilogram harvested per acres) significantly influenced the use of recommended cashew nut processing practices.

Table 3.8: Binary logistic regression results on factors promoting the use of recommended processing practices (N=126)

Use recommended Practices	Coeff.	S.E.	D.f	Sig	Odds ratio	95% C.I. for EXP(B)	
						Lower	Upper
Sex of respondent	0.391	0.504	1	0.438	1.478	0.551	3.966
Education level	0.815	0.378	1	0.031	2.260	1.078	4.741
Marital status	0.433	0.258	1	0.094	1.542	0.929	2.560
Own cashew farm	0.129	0.526	1	0.807	1.137	0.406	3.187
Number of house hold	0.012	0.158	1	0.938	1.012	0.742	1.381
Average income	-0.571	0.150	1	0.000	.565	0.421	0.758
Owned acres of cashew	0.414	0.543	1	0.446	1.512	0.522	4.383
Yield (Kilogram harvested per acre)	0.012	0.003	1	0.000	1.012	1.007	1.017
Age group	-0.534	0.244	1	0.029	0.586	0.364	0.946
Attending workshop	-0.287	0.524	1	0.584	0.751	0.269	2.096

On the other hand, the influence of each variable on the use of recommended cashew nut processing practices differs from one another as explained below.

3.9.1 Education level

Study findings show that the likelihood of using the recommended cashew nut processing practices increases as one upgrades from none or lower to a higher level of education (Table 3.8). The model coefficient (Table 3.8) is positive (0.815), and the odds ratio is above 1 (2.260); thus, a 0.815 unit increase indicates the use of recommended cashew nut processing practices among small-scale processors as one upgrading the level of education. This implies that more educated small-scale cashew nut processors (secondary to university) are more likely to use recommended practices compared to no formal educated (none to primary education). Therefore, the probability of using recommended processing practices increase with an increased level of education. These findings are in line with Magani (2013) who revealed that more educated small-scale processors were more efficient in processing cashew nuts than their less-educated counterparts. Efficiency in cashew nut processing can directly be associated with the use of recommended processing practices.

3.9.2 Level of income

Furthermore, study findings (Table 3.8) revealed that as one's income increase from low (Tsh 50 000 to 200 000) to the high level (above Tsh 200 000) the likelihood of using recommended cashew nut processing practice decreases. The negative (-0.571) model coefficient and odds ratio of less than 1 (0.565) and negative (-0.571) unit reflect the decrease in the use of recommended practices usage among small scale processors per unit increase in income. This implies that small-scale processors with high income are not interested in using recommended practices compared to those with low income. During FGD one respondent argued that small-scale processors with high-income harvest more cashew nuts and feel it is tedious to process hence sell in bulky as raw in an auction. However, the study findings differ from Lawala (2010)'s study on the Profitability of value addition to cashew farming households in Nigeria where it was found that value

addition improves income and shelf life of the product. Similarly, the study findings disagree with Misal *et al*. (2017) who found that small-scale cashew nut processing in India with high-income use recommended practices as compared to those with low income.

3.9.3 Age of respondents

In addition, study findings (Table 3.8) indicate that as one grows and move from one age group to another (18-28, 29-35,… up to 60+) there is a significant decrease in the use of recommended practices. The model coefficient with a negative value of (-0.534), the odds ratio is less than 1 (0.586) and 0.534 unit decrease indicate a decrease in the use of recommended practices among small scale processors per unit change in age category. This implies that the application of recommended cashew nut processing practices is inverse proportional to the age of small-scale cashew nut processors. During FGD, respondents indicated that young aged processors use new technology such as boiler and oven to process cashew nut compared to older processors who use traditional techniques such as roasting using open pan and sunlight drying. Similar findings were obtained by Magani (2013) who studied the adoption of improved cashew nut production technology by smallholder farmers in Mtwara. He found that the age of a farmer/ can increase or decrease the likelihood of adopting agricultural innovation.

3.9.4 Crop yields

Study finding (Table 3.8) exposes a significant rise in yields corresponding to the use of recommended small-scale cashew nut processing practice. The model coefficient with a positive value of (0.012) and odds ratio above 1 (1.012) indicate a 0.012 unit increase in recommended processing practices among small-scale processors per unit increase in yield amount. During FGD conducted at Nachingwea Village on 14th April 2021, one respondent remarked that;

“The use of recommended practices provide good yield on the whole kernel which fetch high market prices than broken nuts. Also it attracts customers during marketing”.

Study findings confirm with a study done by Thusyanthin and Sanothavan (2018) on factors affecting the adoption of recommended agricultural practices by cashew growers in the Manner district of Sri Lanka who showed that farmers have an incentive to adopt management practices (including processing) that increase profitability due to increase in yield.

3.10 Conclusion and Recommendations

The study assessed factors that influence small-scale cashew nut processors’ use of recommended processing practices in Ruangwa district. Specifically, it assessed the technology used for processing, the procedure following in processing, availability and accessibility of raw materials, and the small-scale processors’ capabilities. Finally the study determined factors that promote small-scale processors’ use of recommended processing practices

The study concludes that, about half of small-scale cashew nut processors had low capability on processing cashew nuts, which may cause low daily cashew nut processing. Most practices found include grading of raw cashew nuts, grading of kernels, packaging and roasting of cashew nuts. These practices were lowly implemented because majority of processors use local equipment or traditional ways, example in roasting their cashew nuts they mainly used open pan method and boiling while only a few used boiler. It is also concluded that education level, average income, age of respondent and farm yield (Kilogram harvested per acres) significantly influenced small-scale processors’ use of recommended cashew nut processing practices.

The study recommends that, Regional Governments through their respective District Councils with collaboration with CBT may help traditional processors and sellers by giving them guidelines and regulations and policies which enable them to easily obtain raw materials from auctions. Similarly, TARI- Naliendele SIDO and CBT should train both processors and sellers on modern technology on business and marketing skills to enable them compete with similar products produced by advanced/bigger processors.

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CHAPTER FOUR

PAPER TWO

4 Challenges facing small-scale cashew nut processors in Ruangwa district, Tanzania: An implication for policy change

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Abstract

This study was carried out to assess the challenges faced by small-scale cashew nut processors in Ruangwa District, Tanzania. The study employed a correlational research design using a survey, whereby a sample size of 180 respondents was used whereby data were collected through questionnaire administration, focus group discussions, key informant interviews and documentary reviews. Quantitative and qualitative data were analyzed by using descriptive statistics and content analysis respectively. The study revealed the following challenges that face small-scale cashew nut processors: use of inefficient local processing tools, less availability of appropriate equipment and machine for processing, lack of money to acquire new technology, and lack of investment and working capital. Other challenges were the availability of raw materials, lack of market information on kernel, lack of reliable training facilities, and lack of government initiative support on cashew nut processing. The study recommends improvement and facilitation of modern processing equipment, training processors on improved processing techniques and improvement of domestic and international cashew nut markets.

Key words: Cashew nut, small-scale, processors, Ruangwa

4.1 Introduction

Cashew (*Anacardium Occidentale* L.), a multipurpose crop, is tropical tree native to South America. Cashew was introduced in Asia and Africa by European explorers in the 16th century and gradually expanded throughout the world. Today, it has been widely grown mainly as source of income in most tropical regions including Brazil, India, Vietnam and Several countries in West and East Africa (Tola and Mazengia, 2019).

Cashew trees were first introduced in Tanzania in the sixteenth century by Portuguese and now widely cultivated. The crop was initially introduced for soil conservation and reforestation (Assenga *et a*l., 2020). The country production has been increasing in recent years and reached about 155245, 265238 and 313826 tones for the years 2015/2016, 2016/2017 and 2017/2018 respectively (CBT, 2018).

Cashew industry earned the country US$ 340.9 million, US$ 565 million and US$ 251 million in the 2016/17, 2017/18 and 2018/19 seasons respectively (CBT, 2019). The main cashew production regions include Mtwara region, which produces 71% of the total raw cashew output in the country followed by Lindi (18%), Coast (8%), with the remaining 3% coming from the minor producer regions (mainly Ruvuma and Tanga) (Kilama, 2013).

The most important products derived from cashew trees are cashew nuts, which are then processed to get kernel. Cashew nuts are a valuable source of macro and micro nutrients, such as protein (18g/100g), fats (44g/100g) and iron (7g/100g) (Assenga *et a*l., 2020; Visalberghi *et al.*, 2016). They also contain high levels of magnesium, zinc, copper, manganese and essential fatty acids (FAO, 2015). The cashew apples are important in

making juice, jam, alcoholic and soft drinks. Cashew trees can also be used for firewood, charcoal and in carpentry for manufacturing of different furniture.

Farmers are advised to add value to their crops/crop produces before they take them the market. Value addition refers to processing of products or produces into forms that have higher market value (Lori, 2017). Cashew nut processing increases farm gate price as well as earnings from export and provides employment opportunities (Dendena and Corsi, 2014). It also reduces the exportation of raw cashew nuts hence encouraging local consumption and exportation of processed products (Nkwabi *et al.*, 2019).

Cashew nut processing in Tanzania is mostly done by small-scale processors who constitute the Small and Micro Enterprises (SMEs). The country has the Small and Micro enterprise (SME) Development Policy as one of several policies that underpin the country's Vision 2025. The latter envisions that "Tanzania will have graduated from a least developed country to a middle income country by the year 2025 with a high level of human development. Similarly, the country has the Sustainable Industrial Development Policy (SIDP) 1996-2020 which emphasizes employment creation. Here the priority is given to resources-based enterprises particularly activities that add value to agricultural products (URT, 2002).

Cashew nut processing involves several stages including cleaning, soaking, roasting, shelling, sorting, grading and packing (Karthickumar and Sinija, 2017). Cleaning is usually done manually to eliminate unwanted extraneous materials such as stones, sand, and leaves before any further processing. Soaking of nuts in water helps to avoid scorching during the roasting operation. Roasting of nuts makes the shell brittle and loosens the kernel from the shell. The next step is shelling which is the removal of the

roasted outer cover. Separation of cashew kernels from broken shell pieces and unshelled kernels is the next stage. A sorting operation is required to segregate the kernels into whole, broken and splits. Cashew kernels are finally graded based on size, colour and other standards and then parked for storage or transportation (Karthickumar and Sinija, 2017).

4.1.1 Status of cashew nut processing in Tanzania

Cashew nut value addition in Tanzania began in the 1960s when a private company established a simple processing factory in Dar es Salaam. In the 1970s the Government of Tanzania secured funds from the World Bank to construct 12 Cashew processing factories with a capacity to process 116 000 tones. All the factories were large scale mechanized using Italian or Japanese technology. The factories were built in Newala (2), Lindi (1), Masasi (1), Mtwara (2), Tunduru (1), Mtama (1), Nachingwea (1), Dar es Salaam (2), and Kibaha (1). The numbers in the brackets indicate the number of factories. Following inefficiencies in the operation of the factories, the Government of Tanzania decided to sell the 12 factories to private firms. Since then, the privatized factories have remained underutilized to their established capacities and hence grounded. There are, however, about 40 small and medium factories processing cashew in Tanzania with limited capacities, skills and lack of competition to secure the needed materials and markets (Chimbyangu, 2020).

Currently, the Cashew nut Board of Tanzania (CBT's) data shows intended capacity of the cashew factories in the country is 179 000 Mt of which installed capacity is 58 000 Mt (32%) and the operating/utilized capacity is 14 662 Mt (25%) per annum. Apart from these there are about 240 small-scale processors in Local Government Authorities (LGAs) who operate individually or in groups, shelling, peeling and roasting cashew kernels by

hand for sale in streets, roadside and at bus stands. The marketing and sale of the products is supervised and monitored by CBT with assistance through various farmer cooperatives in place specifically in the production areas (Skinner, 2015).

Techno serve Tanzania (2004) reported that there are 144 small-scale processing groups in Tanzania of which 103(72%) groups are located in the Coastal Region. The information from processing officer from CBT says that the number of small-scale processors groups now has increased up to 188. These processors do the processing under traditional ways (local conditions) and sell their kernel either along the road as *Machingas* while few of them sell their kernels during national festivals such as *Sabasaba* and *Nanenane* days. He added that, around 50% of the kernel sent to the market during these occasions is not sold (Mkulia J., personal communication, 2021).

4.1.2 Problem statement

Although production of cashew nuts and demand for processed cashew nuts both for local and international markets has been increasing, still cashew nut processing remains very low in Tanzania (Nkonya and Barreiro-Hurle, 2013). For example, only 15-20% of produced cashew nuts are processed locally for both domestic and international market making about 80-85% of the total output to be exported as raw cashew nuts (Mkwabi, *et al*., 2019). As a result, for the period from 2008 to 2012, Tanzania got a loss of 551 million US$ which is equal to 110 million US$ per annum by exporting in-shell cashew nuts instead of processing them or adding value (Rukonge, 2013).

In its efforts to encourage in-country processing, the Government of Tanzania imposed an export tax on raw cashew nuts and introduced the Warehouse Receipt System (WRS) under the Act no. 10 of 2005 of Cashew nut Board of Tanzania (FAO, 2015).

The WRS requires that all raw cashew nuts are marketed through Agricultural Marketing Cooperative Society (AMCOS) at auctions with the aim of preventing exploitation of farmers and to enhance competitiveness of processors. Additionally, the government policy of promoting agro-processing and value addition of agricultural crops and its by-products have been a leaven to promotion and improvement of small-scale cashew nut processing (Nkonya and Barreiro-Hurle, 2013).

Despite all the efforts made, still the export of processed cashew nuts have actually been declining compared to raw cashew nuts (FAO, 2015), which is associated with the challenges that might be facing the small scale processors. For example, we still don't know their ability (capability) on cashew nut processing, technology used for processing cashew nuts, availability of raw materials and accessibility of raw materials. Therefore, this study aimed at bridging this knowledge gap by assessing the challenges faced by small-scale cashew nut processors in Ruangwa District.

Understanding of the challenges faced by small-scale cashew nut processors will enhance the policy makers and development planners to plan and prioritize efforts to address them. This will lead to increase in cashew nut processing in the country specifically in the study area. Increased internal cashew processing will eventually contribute to reduced exportation of raw cashew nuts, while increasing exportation of processed cashew nuts, internal market, employment opportunities and income to rural communities (Fitzpatrick, 2012). This is in line with the Tanzania Development Vision (TDV) 2025, which emphasizes on diversification of economy to be based on dynamic industrialization through programme focusing on local resource-based industries (agro-industries) (URT, 2000).

4.2 Methodology

The study was conducted in Ruangwa District in Lindi region (Figure 2). The District is located between Latitude 9.5^0 S and 10^0 S and Longitude 38.5^0E and 39.5^0E, with a total area of 2560 km^2 which is approximately equal to 256 036 hectares. According to the Tanzania 2012 population and housing census report, the District has a population of 131 080 people of which 63 265 are males and 67 815 are females. Administratively, the District consists of three divisions, 22 wards, 90 villages and 436 hamlets. The majority of people depend on crop production and livestock keeping for their livelihood (Ruangwa District Profile, 2019).

Cashew nut production is the main income generating activity performed by most people in Ruangwa district, which occupies ore than 70% of the population. Most cashew nut producers are smallholder farmers whose farms are 4 acres on average (Ruangwa District profile, 2018). These smallholder cashew nut farmers have been engaged in cashew nut processing (value addition) since 2010. Processing activities are performed both by individuals and groups. These groups form an association called WAKORU, which currently has 25 groups with a total of 323 small-scale cashew nut processors (Ruangwa District profile, 2020).

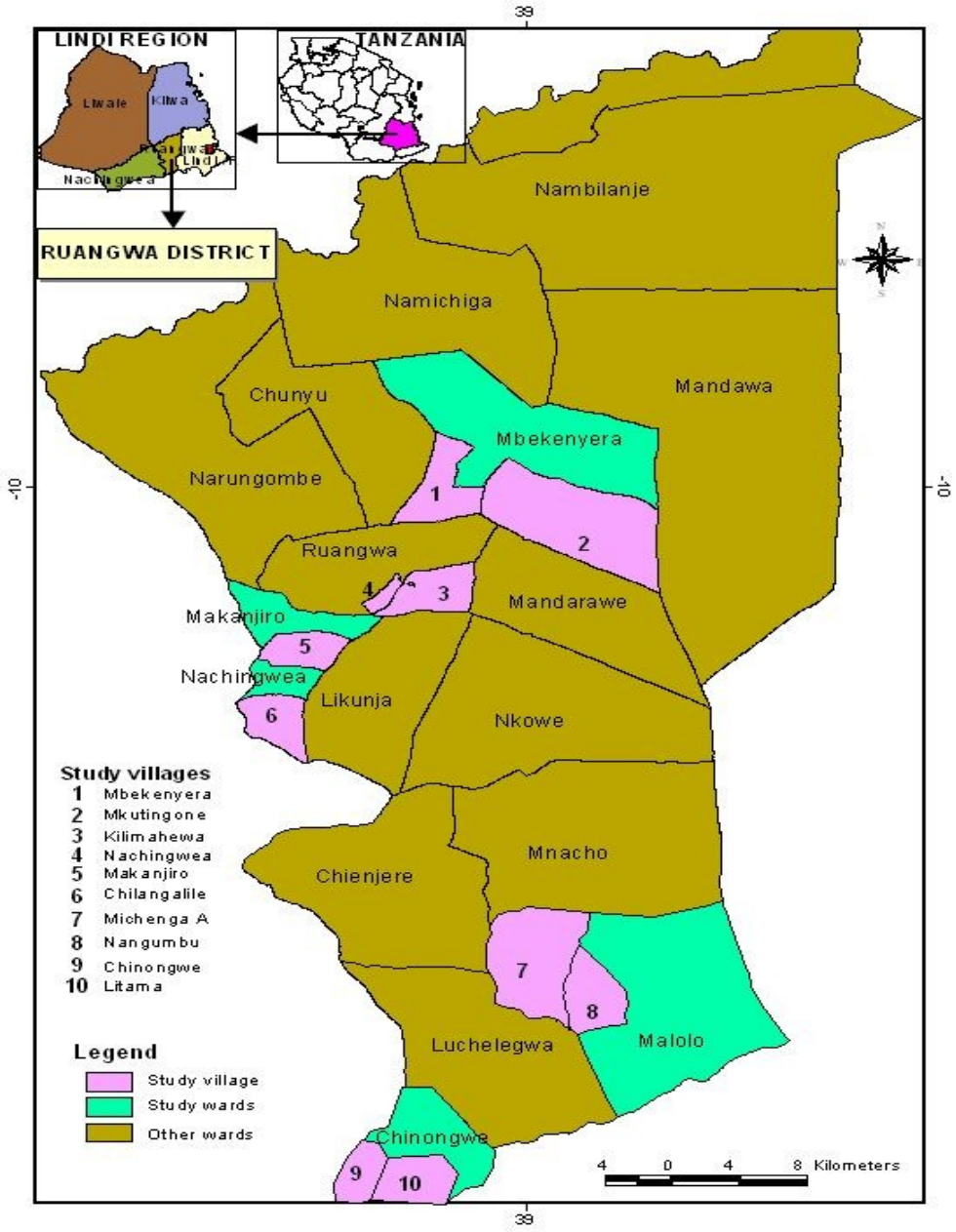

Figure 4.1: Map showing the location of the study area.

All small-scale cashew nut processors in the WAKORU association in Ruangwa District constituted the study population. The study adopted a multistage sampling technique as suggested by Verstraete and Meirvenne (2008). The first stage was the selection of five wards (Nachingwea, Mbekenyera, Makanjiro, Malolo and Chinongwe). Then two villages were randomly selected from each ward as follows: Nachingwea Ward (Kilimahewa and Nachingwea villages), Mbekenyera Ward (Mbekenyera and Mkutingome villages), Makanjiro ward (Makanjiro and Chilanagalile villages), Malolo ward (Nangumbu and Michenga 'A' villages) and Chinongwe ward (Litama and Chinongwe 'A' village). With respect to village level sampling, in each village, a register was used as the sampling frame. The list of 323 small-scale cashew nut processors from WAKORU association was used as a sampling frame to draw the study sample. Eighteen small-scale cashew nut processors were randomly selected from each village by using simple random sampling technique to constitute 180 study respondents.

The sample size was obtained by using the formula suggested by Cochran (1999),

$$n = \frac{N}{1 + N(e)^2}$$

Where, n = sample size; N = Total number of WAKORU members; *e* (acceptance sampling error) = 0.05.

Therefore $n = \frac{323}{1+323(0.05)^2}$ = 179; 179 ÷ 10 = 17.9 ~ 18, then in each selected village 18 processors were selected for the study.

In order to achieve triangulation and increase validity of the results, both qualitative and quantitative methods of data collection were used. Qualitative methods included semi-structured interviews with key informants and focus group discussions.

The quantitative method used was household survey, which used a semi-structured questionnaire consisting of both closed and open-ended questions. Key Informant Interviews (KII) and focus group discussion were also used to collect data from some purposively selected people. Household interviews were conducted at the respondents' homes while the FGDs and KIIs were conducted in the arranged places. The entire data collection took place between April 20th and May 2nd 2021.

Quantitative data were coded, entered into the computer, cleaned and analyzed using the IBM Statistical Package for Social Science (SPSS) version 20 software. Descriptive statistics such as frequencies, means, standard deviation, percentages and multiple responses were used to make inferences. Qualitative data were analyzed by using content analysis technique.

4.3 Results and Discussion

4.3.1 Demographics characteristics of respondents

Study findings (Table 4.1) show that respondents' age ranged from 21 to 77 years with the average of 45.6 years and standard deviation of 12.69. Majority (87.7%) of respondents were in the economically active age group, i.e. less than 60 years whereas the remaining (12.3%) were in the dependent age group, i.e. 60 years and above. Age is an important variables because it determines various inter–household and intra household personalities including possessions and organization of resource such as land and household assets. Age may also provide an image of household's labour. These findings are likely to imply cashew nut processing is considered a demanding activity, therefore those involved were physically energetic and able to supply the required labour so as to meet responsibilities and goals. The study findings disagree with Enwelu *et al.* (2014) whose study on gender roles and challenges of small-scale cashew nut processing

enterprise in Enugu North Nigeria found that most of processors were youth with mean age of 33 years.

Seventy-one respondents (39.4%) were men and 109 (60.6%) were women (Table 4.1). Traditionally in the study area cashew nut processing activities are dominated by women. The dominance of women was also demonstrated by membership in WAKORU (*Wabanguaji Korosho Ruangwa*) group where about 64% of members were women. During FGD with women, one participant had this to say;

> *"Cashew nut processing is a tedious work, which needs to be tolerant. Women in nature are tolerant as may be seen in the way like taking care of the family. Also, traditionally, they believe cashew nut processing is a woman's work". (FGD, Nachingwea Village; April 14, 2021).*

Similarly, another woman was quoted arguing on the same that, "*only few me are engaged in cashew nut processing because of lack of permanent market for kernel*". These findings resonate well with Moses *et al.* (2020) who found that in Benue state Nigeria, more women participated in cashew nut processing than their male counterparts. On the other hand, the findings disagree with Salau *et al.* (2018) who analyzed cashew nut marketing in Kwara state, Nigeria and revealed that, most (81.1%) of wholesale marketers and processors were males.

Table 4.1: Respondents Demographic Characteristics of Respondents (N=180)

Variables		Frequency (F)	Percentage (%)	Mean
Age of respondent	18-30 Years	26	14.4	
	31-40 Years	36	20.0	
	41-50 Years	56	31.1	45.59
	51-60 Years	40	22.2	
	61 Years and above	22	12.3	
	Male	71	39.4	
Sex of respondent	Female	109	60.6	
Education level	Non formal education	21	11.7	
	Primary	119	66.1	
	Secondary	35	19.4	
	University/College	5	2.8	
Marital status	Married	124	68.9	
	Single	35	19.4	
	Widowed,	5	2.8	
	Divorced/Separate	16	8.9	
Household size	1-3	87	48.3	
	4-6	81	45.0	3.7
	7 and Above	12	6.7	
Income per month (tshs)	50001-200000	99	55.0	225
	200001-350000	68	37.8	333.3
	350001-500000	7	3.9	
	500001-650000	4	2.2	
	650001 and Above	2	1.1	

It was also found that 119(66.1%) of respondents had primary school education, 35(19.4%) completed secondary school, 5(2.8%) had university/college education and 21(11.7%) had no formal education (Table 4.1). Education is perceived as among the factors that influence an individual's perception of an intervention before making decision to take part. It is believed to impart desire to the individual to learn more, attend training and seek information regarding agricultural and non-agricultural activities. These findings may imply that the majority of respondents were able to follow training and instructions as they could read and write in Kiswahili (the National language of Tanzania). These findings are in line with Moses *et al.* (2020) who found that majority of cashew nut processors in Benue state Nigeria at least had attained primary education.

Majority 124(68.9%) of respondent were married, 35(19.4%) were single, 16(8.9%) were divorced/separated and few 5(2.8%) were widowed. Marriage promotes participation of couples in the formation of economic groupings. Marriage couples are more likely to be productive than singles. It is expected that married people are less mobile and have obligations hence due to this they remain in the village doing agricultural activities including crop value addition. Findings for this study are in line with Mallya (2013) whose study on social economic factors affecting cashew nut production in Ruangwa Tanzania found that majority of cashew nut farmers were married. Similarly, Salau *et al.* (2017) whose study was on analysis of cashew nut marketing in Kwara state, Nigeria, found that majority (92.8%) of marketers were married. This indicates a higher chance of involving family labour in cashew nut marketing.

The findings show that the smallest household had only one member while the largest had eight members with an average of 3.7 members and a standard deviation of 1.574. Household size denotes the availability of labour force for cashew nut processing at the family level. During FGD it was agreed that the household with less than three members is categorized as small, the one with four to six is categorized as medium and the one with more than six members was categorized as large household. About 87(48.3%) of the sampled households were small, 81(45%) were medium sized whereas few 12(6.7%) were large. On average 48.3% of the sampled households were small-sized (with one to three members). This may imply that less labour is available for cashew nut processing in the area. As compared to other countries, these findings disagree with Moses *et al.* (2020) who found that in Benue state Nigeria majority of household were large, which is an indication of availability of labour for cashew nut is processing.

Income of respondents was measured on monthly basis and expressed in Tanzanian shillings (Tshs). The study found that 99(55%) of respondents earned income between (Tshs) 50,001/= and 200,000/= per month; 68(37.8%) earned between Tshs 200,001/= and 350,000/=; 7(3.9%) earned between 350,001/= and 500,000/=; while 4(2.2%) earned between 500,001/= and 650 000/=. Low income is a manifestation of crop yield since farmers (processors) may fail to get enough cash to purchase inputs required for crop production. This can lead to low raw materials to processors as majority obtained raw materials from their own farms. One FGD participant saying emphasized this,

> *"Because of low income/capital, most small-scale processors fail to buy inputs as compared with their neighbor farmers in Newala and Tandahimba who practice early weeding and other agricultural practices. This leads to high yield. Also low income hinders processors to buy raw materials from auctions and hence majority of us are not engaged in cashew nut processing throughout the year. This is due to lack of raw materials and improved equipment (*FGD, Nachingwea Village; April 14, 2021*).*

The study findings are in line with Ibrahim (2015) who made a study on cashew nut production technologies and their effects to cashew nut production in Mkinga Tanzania and found that low income caused low crop yield.

4.3.2 Challenges facing small-scale cashew nut processors

Small-scale cashew nut processors tend to grow and become more popular among smallholder cashew growers in Ruangwa District. However, in the efforts to increase the processing level in the area, there are some challenges that are encountered. Analytical findings indicated that the main challenges that faced small-scale cashew nut processors are divide into three groups (i) Challenge related to the use of recommended processing

practices, which include: use of inefficient local processing tools, less availability of appropriate equipment and machine for processing, and lack of money to acquire new technology; (ii) Challenge related to the availability of raw materials and market access, which include: lack of investment and working capital, availability of raw material, and lack of market information on kernel; (iii) Challenge related to government policy and managerial skills, which include: lack of accessible information on government regulations about processing business, lack of reliable training facilities, and lack of government initiatives support to processors.

4.3.2.1 Challenge related to use of recommended processing practices

(i) Use of inefficient local processing tools

The study findings showed that the first challenge encountered by small-scale cashew nut processers on use of recommended processing practices is the use of inefficient local processing tools. As it can be seen in Table 4.2 majority of respondents agreed that there is use of inefficient local processing tools which lead to low quality processed product. This was also reveled during FGD as shown in the remark from one participant,

> *''We use traditional tools/equipment during processing because we lack the improved one. For example, the mostly used hand lifted processing machines are poor, which can process less than 20kg of raw cashew nuts. Also use of open pan method during roasting which employ direct heat to the nuts produces scorched kernels, which are considered of poor quality. Apart from that, manual packaging due to lack of sealing machine increases deterioration of kernels and reduce flavor hence kernel fetch low market price". (FGD, Chinongwe Village; 21st April 2021).*

These findings are in line with that of Oluwale *et al.* (2017) who conducted a study on Technological capability building in Nigeria cashew nut processing industries and found that failure to procure right equipment during processing causes low product quality and affects investment capability in the cashew industries. Similarly, Karthickumar *et al.* (2014) informed that mostly, small-scale processing unit follows traditional processing methods because of problem of technology transfer, which lead to inferior quality cashew nut. In addition to that one key informant suggested that CBT as the main institution, which deal with cashew nut, together with Local government, should supply equipment and machines with high processing capacity at least above 40kg of raw cashew nuts per day. If these are available to small-scale processors, they can enhance improvement in cashew nut processing (KII, Ruangwa District April 23, 2021).

Table 4.2*: Challenges related to use of recommended processing practices (N=180)*

	Responses			Rank
	F	% (Contribution to 100)	% (Multiple responses)	
Use of inefficient local processing tools	176	14.0	98	1
Less availability of appropriate equipment and machine for processing	171	13.6	95	2
Lack of money to acquire new technology	168	13.3	93	3
Poor storage facilities	165	13.1	92	4
Lack of technology on use of recommended processing practices	155	12.3	86	5
Unable to select proper technology	150	11.9	83	6
Lack of skills on use of recommended processing practice	142	11.3	79	7
Complexity of technology	132	10.5	73	8
Total		100.0		

(ii) Less availability of appropriate equipment and machine for processing

Apart from using inefficient local processing tools**,** the study (Table 4.2) reveled that less availability of appropriate equipment and machine for processing was ranked as second challenge encountered by small-scale cashew nut processors. This can be caused by lack of capital among processors to buy more improved equipment (modern) and increase

availability of processing equipment. In these regard one FGD participant had this to say,

> *"Although we are engaged in cashew nut processing, most of us don't own processing machine instead we borrow from organizations which are very few. Similarly, a large number of processors use pieces of wood and stones during de-shelling instead of processing machine which lead to inferior quality of cashew nuts with high level of contamination'' (FGD in Nachingwea Village, April 14, 2021).*

The findings call attention to the government and other cashew nut stakeholders to provide enough capital for processors so as to help on buying improved equipment and processing tools in order to increase their processing capacity. Similarly, URT (2013) through the ministry of Finance, conducted a study on small-scale processors Cashew nut Industry Strategy in Tanzania and the results reveled that some equipment are expensive. Apart from that the present study findings are in line with that of Salau *et al.* (2017) who reported that marketing of cashew nuts is mostly affected by poor storage and processing facilities.

(iii) Lack of money to acquire new technology

Findings (Table 4.2) show that lack of money to acquire new technology ranked the third challenge on small-scale cashew nut processors' use of recommended processing practices. Their main reported problem has been lack of enough capital to acquire new technology. One FGD participant who had these to say also pointed this out,

> *It is difficult to acquire new technology on cashew nut processing because most of technologies are provided far from our residential areas, for example, from SIDO*

in Lindi and Naliendele Reseach Istitution in Mtwara, so need enough capital to attend the workshop (FGD, Chinongwe Village; 21st April 2021).

These findings are in line with Swai (2017) whose study on Factors affect growth of sunflower oil small-scale processors in Dodoma reported that lack of funds to acquire new technology and lack of skills to handle new technology were the biggest challenges facing sunflower oil processors in the region.

4.3.2.2 Challenges on availability of raw materials and market access include

(i) Lack of investment and working capital

The study respondents ranked lack of investment and working capital as the first challenge facing small-scale cashew nut processers, which eventually affect availability of raw materials and market access (Table 4.3). This ranking is an indication that small-scale cashew nut processors are highly affected by lack of financial resources. It came out during FGDs that most small-scale processors don't manage to get loans until the enterprise is up and running, thus affecting the whole agro-processing business in the area. One FGD participant made this clear by saying,

"We're still facing challenges related to financial resources due to high collateral requirement from banks and other lending institutions, and high interest rates charged by banks and other lending institutions. Not only that, but also loan application procedures for the majority of banks and other lending institutions are too complicated for us to manage'' (FGD, Nachingwea Village; April 14, 2021).

These findings correlate with the study by Njau (2010) who found that small-scale cashew nuts processors in Morogoro and Coastal regions were greatly constrained by lack of processing knowledge, lack of working capital and competition from the same product

from big processors. Similarly, Costa (2019) who studied on Cashew value chain in Mozambique, reported that lack of enough income (capital) lead to low cashew nut processing capacity by small-scale cashew nut processors.

Table 4.3*: Challenges on availability of raw materials and market access (N=180)*

	Responses			Rank
	Frequency	% (Contribution to 100)	% (Multiple responses)	
Lack investment and working capital	176	15.5	98	1
Availability of raw material	170	15.0	94	2
Lack market information on kernel	167	14.7	93	3
Less availability on access to credit	166	14.6	92	4
Lack of cashew management skills	157	13.8	87	5
Lack of access to raw materials	153	13.5	85	6
Unsatisfying quality of raw materials	147	12.9	82	7
		100.0		

(ii) Availability of raw materials

Findings of the study (Table 4.3) show that, the respondents ranked availability of raw materials as the second challenge for the growth of small-scale cashew nut processors. This is related both to supply and quality of raw materials. Because larger numbers of food processing MSEs are very much dependent on the input of raw materials, farm-level constraints can have a large impact on the non-farm sector. Availability of raw materials can be influenced by change in weather conditions, whereby drought severely affects agricultural output and seasonality of a crop. To get more insights, this was one of the topics in FGDs in one of which a participant had these to say:

> *"Inadequacy of raw materials for processing is because about 30% to 40% cashew trees found in our area are local varieties which produce small nuts. Lack of funds for purchasing raw cashew nuts from the auctions causes processors not to engage in cashew nut processing throughout the year" (FGD, Nachingwea Village; April 14, 2021).*

The present findings agree with Mutayoba and Kusiluka (2018) whose study on the linkage among cashew nut processors in Mtwara region, Quality optimization and volume, found that failure to utilize full capacity is due to lack of raw materials caused by insufficient fund for purchasing the raw cashew nuts as well as production coast. They added that when funds are available processors face limited availability of raw materials due to high competitions on auctions. Similarly, these findings resonate well with Bharat *et al.* (2018) whose study on Economic analysis of cashew nut units in Srikakulam district India found that cost of raw materials reduce capacity of cashew processing firms.

(iii) Lack market information on kernel

It is shown in Table 4.3 that unavailability of market ranked the third challenge facing small-scale cashew nut processors. This challenge can be caused by inadequate market for the products, lack of demand forecasting and absence of relationship with the organization that would conduct marketing research. The current study findings are in line with Swai (2017) who found that inadequate market information for product, difficult on searching new market and lack of demand forecasting are challenges facing growth of sunflower oil processors in Dodoma region, Tanzania.

4.3.2.3 Challenge on government policy, regulation and managerial skills

(i) Lack of accessible information on government policy and regulation about processing business

Study findings (Table 4.4) show that lack of accessible information on government policy and regulation is one of the challenges facing small-scale cashew nut processors in the study area. This is an indication that strict regulations imposed by authorities have limited small-scale processors from accessing information on cashew nut processing. Possibly this has significantly affected their growth, and thus minimized their profit.

These findings confirm what is reported by Ekblom (2016) that, sunflower oil processors in Babati, Tanzania, are facing a challenge in accessing information on government policy. The study also reported that failure to access government regulations and directives significantly effect the growth of the firm.

Table 4.4: Challenges on government's *policy, regulation and managerial skills (N=180)*

	Responses			Rank
	Frequency	% (Contribution to 100)	% (Multiple responses)	
Lack of accessible information on government regulation about processing business	156	30.4	**87**	1
Inadequate reliable training	152	29.6	**84**	2
Lack of government initiative support on processors	142	27.7	**79**	3
Complication of TBS certification processes	63	12.3	**35**	4
Total		**100.0**		

(ii) Inadequate reliable training on processing

Study respondents ranked lack of reliable training facilities as second challenge facing small–scale cashew nut processors under government policy, regulation and managerial skills. During FGDs it was revealed that more than half of respondents attended training more than ten years ago. These trainings were organized by WAKORU, CBT and other research institutions. This may imply that processors should be provided with new training to update their knowledge on cashew nut processing.

The findings of the study are in line with that of Njau (2010) whose study on consumer demand for tradition processed nuts in Morogoro and Coast region revealed that small-scale processor are constrained by lack of processing technology, lack of working capital and competition, some from advanced big processors. This significantly affects their performance.

(iii) Lack of government initiative support for processors

Lack of government initiative support on processors was ranked the last challenge facing small-scale cashew processors under government policy, regulation and managerial skills. Findings in Table 4.4 show that majority of participants agreed that they are hardly getting government support on processing activities. During FGDs one participant said:

> *"The government should introduce enough strategies on cashew nuts from production level to processing and emphasize on improving equipment and marketing for kernel''(FGD, Nachingwea Village; April 14, 2021).*

Regular training is likely to improve processing practices and increases processing capacity of small-scale cashew nut processors. These findings are in line with Chales *et al.* (2016) whose study on a review of the challenges affecting the agro-processing sector in Tanzania found that inadequate support from the government are among the challenges facing agro-processing.

4.4 Conclusions and Recommendations

4.4.1 Conclusions

This study assessed the challenges facing small-scale cashew nut processors in Ruangwa district. Based on the study findings, the following main conclusions are made: The challenges facing cashew nut small-scale processors were mainly grouped in three categories. Firstly, challenges on use of recommended processing practices, which include, use of inefficient local processing tools, less availability of appropriate equipment and machine for processing and lack of money to acquire new technology.

Secondly, challenges on availability of raw materials and market access including lack of investment and working capital, unavailability of raw materials and lack market information on kernel. Lastly, challenges on Government policy and managerial skills, which include lack of accessible information on government regulations about processing

business, lack of reliable training facilities, and lack of government initiative support on processors.

4.4.2 Recommendations

Based on the above conclusions, the study recommends that,

i. Government through Ministry of Agricultural, Food and Cooperative, Ministry of Industrial and Marketing together with CBT should continue providing training and guidance to small-scale cashew nut processors and cashew farmers from production, management, processing (value addition). The government should also build marketing centers for selling cashew kernels.

ii. Small-scale cashew nut processors depended on capital from own savings and from relative and friend whereby this capital has not enabled them to fulfill their financial needs. Local government (through women, youth and people with disabilities development fund) should undertake deliberate policy measures to support small-scale cashew nut processors. This can be achieved through policy measures aiming at improving and regulating the availability of credits for these groups. This will facilitate the purchase of raw materials and modern equipment to foster cashew nut processing, hence increase employment generation, food security and poverty alleviation.

iii. Regional Governments through their respective District Councils with collaboration with CBT may help traditional processors and sellers by giving them guidelines and regulations and policies which fever small-scale processors to easily obtain raw materials from auctions.

iv. TARI- Naliendele SIDO and CBT should train both processors and sellers on modern technology on business and marketing skills to enable them compete with similar products produced by advanced/bigger processors.

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CHAPTER FIVE

5.0 GENERAL CONCLUSIONS AND RECOMMENDATIONS

5.1 Overview

This chapter presents the conclusions and recommendations of the study based on the findings. The chapter is structured into three sections: conclusions, recommendations and suggestions for further research.

5.2 Conclusions

Generally, the study assessed small-scale cashew nut processors' capabilities in terms of ability (capability) on cashew nut processing, technology used for processing cashew nuts, availability of raw materials and accessibility of raw materials. It assessed small-scale cashew nut processors processing practice, determined factors that promote their use of recommended processing practices, and finally the study identified challenges facing small-scale cashew nut processors in Ruangwa district.

Based on the study findings, the following are the main conclusions:

(i) In general, about half of small-scale cashew nut processors had low capability on processing cashew nuts, which may cause low daily cashew nut processing. Most practices found include grading of raw cashew nuts, grading of kernels, packaging and roasting of cashew nuts. These practices were lowly implemented because majority of processors use local equipment or traditional ways, example in roasting their cashew nuts they mainly used open pan method and boiling while only a few used boiler.

(ii) Education level, average income, age of respondent and farm yield (Kilogram harvested per acres) significantly influenced small-scale processors' use of recommended cashew nut processing practices.

(iii) The challenges facing cashew nut small-scale processors were mainly grouped in three categories. Firstly, challenges on use of recommended processing practices which include, use of inefficient local processing tools, less availability of appropriate equipment and machine for processing and lack of money to acquire new technology. Secondly, challenges on availability of raw materials and market access including lack of investment and working capital, unavailability of raw materials and lack market information on kernel. Lastly, challenges on Government policy and managerial skills, which include lack of accessible information on government regulations about processing business, lack of reliable training facilities, and lack of government initiative support on processors.

5.3 Recommendations

Based on the above conclusions, the study recommends the following:

(i) Government through Ministry of Agricultural, Food and Cooperatives, Ministry of Industrial and Marketing together with CBT should continue providing training and guidance to small-scale cashew nut processors and cashew farmers from production, management, processing (value addition). The government should also build marketing centres for selling cashew kernels.

(ii) The study urges Ruangwa District council in collaboration with the WAKORU Association and Financial Institutions to conform to the provision of credit to the demand and situation of small-scale cashew nut processors in the rural context. This has especially taken into account accessibility and reduced conditionality.

In reality, these small-scale processors demand credit to finance their processing practices.

(iii) Ruangwa District Councils in collaboration with CBT should help traditional processors and sellers by giving them guidelines and regulations and policies which fever small-scale processors to easily obtain raw materials from auctions.

(iv) TARI- Naliendele SIDO and CBT should train both processors and sellers on modern technology on business and marketing skills to enable them compete with similar products produced by advanced/bigger processors.

5.4 Suggestion for Future Research

Research regarding to this study has almost not been carried out in Tanzania. It was thus very difficult to access relevant materials to the theme of study. Most data were obtained mainly through interviewing farmer whose replies were subject to inadequate knowledge or faulty memories on the types of processors available in the area. So it is recommended that similar studies should be conducted in other areas especially with high production and processing of cashew nuts. This will help in building a more database on cashew nut processing as well as for comparison purposes.

APPENDICES

Appendix 1: Questionnaire

Questionnaire for Small-Scale Cashew Nut Processors Title: **Assessment of small-scale cashew processors' capability in Ruangwa district**

Dear respondent,

This questionnaire is for an MSc study whose purpose is an assessment of small-scale cashew nuts processors 'capability in Ruangwa District Council. You have been selected to participate by giving sincere views on this issue. I, therefore, kindly request your participation. Feel free to give your opinions. Your response will be treated with confidentiality. Do you have any questions about the study or what I have said?

[**Please, ask participant, if he/she consents to participate in the study by ticking on the box**]

Are you ready to participate?

YES	NO

Section (A) General Information

A1 Date of interview……A3 Name of the ward..... A4 Name of the village

A2Name of division ..... ……..... A5Questionnaire No.....

Section B: Socio-Economic Characteristics of Respondents (*Put the appropriate number in the brackets provided*)

B1. Age of respondent in years ……

B2. Sex of respondent

1. Male
2. Female ( )

B3. What is your highest level of education?

1. None
2. Primary Education

3. Secondary Education ( )
4. Tertiary Education
5. University/ College

B4. What is your marital status?

1. Married
2. Single ( )
3. Widowed
4. Divorced/Separate

B5. How many people are living in your household and sharing the same pot?

B6. What is your main source of income?

1. Cashew nut processing
2. Cashew nut farming
3. Salary work ( )
4. Livestock keeping
5. Livestock keeping and farming
6. Horticultural farming
7. Other (mention) ……

B7. What is your average monthly income? _____(Tshs)

Section C: Small-Scale Cashew Nut Processors Processing Practices

C1.Do you own a cashew nut farm?

1. Yes ( )
2. No ( )

C2. If yes, In total how many acres of cashew trees under harvest do you own?

1. 0.5 to 10 acre ( )
1 11 to 20 acre ( )
2 21 to 30 acre ( )
3 31 to 40 acre ( )
4 41acre and above ( )

C3. What is the total number of cashew trees under harvest do own? ……..

C4. What is the total number of cashew trees under harvest from other farms? .....

C5. What is the total average yield of cashew nuts in kilograms per acre do you harvest?

C6. How many kilograms of cashew nuts are sold in raw (unprocessed form)? ……

C7. How many kilograms of cashew nuts are sold in processed form?

C8. Why do you decide to sell processed nuts (kernel) instead of raw nuts?

1. …….
2. …….
3. …….
4. …….

C9. How many kilograms of raw cashew nuts do you process per day?

C10. If the answer in C1is No, where do you get raw cashew nuts for processing?

1. Buy from neighbors ( )
2. Buy from warehouse through auctions ( )
3. From rented farm ( )
4. From other sources (mention) …… ( )

C11. Have you ever attended any workshop/training to learn about cashew nut processing technologies and practices?

1. Yes ( )
2. No (go to question number C9 ( )

C12. If the answer in C11 is yes, which organization(s) provided the workshop or training on cashew nuts processing.

1. SIDO ( )
2. CBT ( )
3. Research center ( )
4. Others specify ……. ( )

C13. If the answer in C11 is No, How did you know to process cashew nuts?

1. Learned from parents/ relatives ( )
2. Learned from neighbor ( )
3. From exhibition, reading books/brochures/leaflets ( )
4. Others (mention)…… ( )

C14. Where do you sell your processed cashew nuts?

1. Street vendors ( )
2. Shops/supermarkets ( )

3. Sell outside the district/region ( )
4. Export outside the country ( )
5. To other processing factories ( )
6. Others (mention) ( )

C15.In each step/practice explain which method or hour is used during processing practices.

i. How many days (open sun drying) do you use to dry raw cashew nuts?
ii. What method do you use to measure or verify the quality of raw cashew nuts?
iii. How many grades (according to size) do you arrange your raw cashew nuts for processing?
iv. What type of roasting method did you use to roast your kernel?
v. Which method do you use in de-shelling raw cashew nuts?
vi. What method do you use to dry the kernel before peeling?
vii. How many hours do you use for cooling kernels before peeling?
viii. Which method is used for peeling kernels?
ix. How many grades do you arrange for the kernel?
x. What type of packaging material do you us

C16.Which method do you use to grade your raw cashew nuts?

1. Manual ( )
2. Semi-Mechanized (mix of manual and automatic) ( )
3. Mechanized ( )

C17. Do you humidify (spray/soak) with water the raw cashew nuts during processing?

1. Yes ( )
2. No ( )

C18.How do you protect your hand skin from cashew nut shell liquid during shelling?

1. Ribbing hands with cooking oil ( )
2. Putting on glove ( )
3. Left bare
4. Others (mention)……..

C19. What method(s) do you use during cooling your kernel?

1. Special room prepared for cooling ( )
2. Room with fan (humidifier) ( )
3. Other (mention) ……

C20. How do you grade your cashew kernel?

1. Manual grading (hand grading) ( )
2. Machine grading ( )

C21.How many grades do you grade your cashew kernel (mention)

1. …….. ( )
2. …….. ( )
3. …….. ( )

C22.Read the statements in the table and evaluate by indicating how you agree or disagree on the way you grade cashew kernel by cycling accordingly. Use **5** = strongly agree, **4** = agree, **3** = disagree, **2** = strongly disagree and **1** = undecided.

Grading statement	SA	AG	DA	SD	U
I separate white whole kernels	5	4	3	2	1
I separate scorched whole kernels	5	4	3	2	1
I separate spotted whole kernels	5	4	3	2	1
I separate broken kernels	5	4	3	2	1

C23.Read the statements in the table and evaluate by indicating how you agree or disagree on the way you grade the whole white cashew kernel by cycling accordingly. Use

5 = strongly agree, **4** = agree, **3** = disagree, **2** = strongly disagree and **1** = undecided.

Grading statement	SA	AG	DA	SD	U
I grade white whole kernels into WW 180	5	4	3	2	1
I grade white whole kernels into WW 210	5	4	3	2	1
I grade white whole kernels into WW 240	5	4	3	2	1
I grade white whole kernels into WW 320	5	4	3	2	1
I grade white whole kernels into WW 450	5	4	3	2	1
I grade white whole kernels into WW 500	5	4	3	2	1

C24.Do you pack your kernel after grading?

1. Yes ( )
2. No ( )

C25.If no in C24, What are the reasons for not parking cashew kernels?

1. Packaging material are not easily available ( )

2. Packaging materials are expensive ( )
3. Lack of knowledge on packing of cashew kernels ( )
4. Others (mention)

C26.If the answer is Yes in C24, what method do you use to pack your cashew kernel?

1. Manual packaging by small pack bags ( )
2. Vacuum packing by semi-automated machine ( )
3. Vacuum/normal bag packing by automated machine ( )
4. Other specify ……

Section D: Factors Promoting Use of Recommended Small-Scale Cashew Nut Processing Practices

D1. Do you engage yourself in cashew nut processing throughout the year?

1. Yes
2. No ( )

D2. If the answer in D1is No, what is the reason?

1. ……
2. ……

D3. How many years (experience) did you engage yourself in cashew nut processing

1. Less than a year
2. 1 to 2 years
3. 3 to 4 years ( )
4. 5 to 10 years

D4. How many kilograms of raw cashew nuts do you process per day

1. 1 to 5kg
2. 6 to 10kg ( )
3. 11 to 15 kg
4. 16 and above

D5.What is your capacity (potential) on row cashew nut processed per year

D6.Do you know the recommended practices for small scale cashew nut processing?

1. Yes
2. No ( )

D7. If the answer in D6 is Yes, do you use recommended small-scale cashew nut processing practices?

1. Yes

2. No ( )

D8. If the answer in D6 is Yes, tick reasons for using recommended practices

1. Easily to use ( )
2. Not expensive ( )
3. Provide good product ( )
4. Equipment or materials used are available ( )
5. Others (mention)……

D9. If the answer in D7is No, choose (tick) the major reasons for not using recommended practices *(tick all that apply*)

1. Expensive ( )
2. Equipment `or materials used not available **( )**
3. No enough knowledge of using it ( )
4. Complicated ( )
5. Others [Mention three of them]…….

D10. In each step choose practice which you use or not use and explain the reason and methods used

S/NO	Recommended processing practices	Yes	*No*	If Yes which method do you use?	Reason for doing this
i.	Drying on raw RCN				
ii.	Pre-treatment of RCN (cleaning and calibration)				
iii.	Roasting				
iv.	De-shelling				
v.	Drying				
vi.	Cooling				
vii.	Peeling				
viii.	Grading				
ix.	Packaging				

Section E: Challenge Facing Small-Scale Cashew Nut Processors

E1. Are you aware of advantages of using recommended small-scale cashew nut processing practices?

1. Yes
2. No ( )

E2. If yes what are those advantages (list)

1. ……...
2. ……

E3. Read the statements in the table and evaluate them in relation to your business by putting a tick mark (√) accordingly. Use**5**= strongly agree, **4** = agree, **3** = disagree **2**= strongly disagree1= undecided

S/NO	**Challenge facing small-scale cashew nut processors on use of recommended processing practices**	**1**	**2**	**3**	**4**	**5**
i.	Lack of technology on the use of recommended processing					
ii.	Lack of skills on the use of recommended processing practices					
iii.	Some of the recommended technology is not easy to use (complexity)					
iv.	Less availability of appropriate equipment and machinery					
v.	Use of inefficient local processing tools					
vi.	Poor storage facilities					
vii.	Lack of money to acquire new technology					
viii.	Unable to select the proper technology					
ix.	Others (specify)					

E4. Challenge facing small-scale cashew nut processors on availability of raw material and market access

S/NO	Challenges on availability of raw material and market access	**Responses**		**Provide reasons for your answer**
		Yes	**No**	
i.	Lack of investment and working capital			
ii.	Availability of raw materials			
iii.	Lack of access to raw materials for processing activities			
iv.	Lack of market information on kernels			
v.	Less availability on access to credits			
vi.	Lack of cashew management skills			
vii.	The quality of the raw materials supplied is materials not satisfied for the processing			
viii.	The high price of the raw materials			
ix.	Others (specify)			

E5. Challenge facing small-scale cashew nut processors on government policy and managerial skills. After you read each of the factors, evaluate them with your business and then put a tick mark (√) under the choices below. Where, **1**= strongly agree, **2** = agree, **3** = undecided, **4**= disagree and **5**= strongly disagree.

S/NO	**Challenges on government policy and managerial skills**

		1	2	**3**	**4**	**5**
i.	A complication of TBS certification processes is a constraint to the growth of the firm					
ii.	Lack of government initiative to support small-scale cashew nut processors					
iii.	Lack of accessible information on government regulations about the business					
iv.	Lack of reliable training facilities					

Appendix 2: Checklist for Government Officials (Agriculture and Cooperative Department)

Date of Interview _____/___/____ Place of Interview_____

1. Is there any program that supports small-scale cashew nut processing in your area?
2. If yes, what kind of support?
3. Mention CBOs/NGOs that are dealing with income-generating activities in this community?
4. What are the policies supporting small-scale cashew nut processing?
5. What challenges/limitations are facing the small-scale cashew nut processing business in the community?
6. What support is provided by the Government to ensure the sustainability of small-scale cashew nut processing?
7. Suggest measures to support small-scale cashew nut processors to become sustainable

Appendix 3: Focus Group Discussion for WAKORU Group Leader and Some Group Members

1. Is the WAKORU group officially registered?
2. If yes, what is the license/registration number?
3. What is the total number of group members?
4. Where do you get raw cashew nuts used for processing?
5. Why do the WAKORU members not engage in cashew nut processing throughout the year?
6. Which types of methods/practices do you use during cashew nut processing and why?
7. What were the reasons for you to engage in the cashew nut processing business?
8. Why are men not much engaged in cashew nut processing as compared to women?
9. What should be done to make more people engage in cashew nut processing in this area?
10. What challenges are facing the WAKORU group members on processing activities?
11. Have the WAKORU group members received any training on business undertakings or technical knowledge related to the group activities?
12. What kind of support has the group received from the government or any other development institution?