THE IMPACT OF PRICE FLUCTUATION ON PRODUCTION OF CASHEWNUTS IN TANZANIA

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A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENT DEGREE OF SCIENCE IN ECONOMICS OF THE OPEN UNIVERSITY OF TANZANIA

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CERTIFICATION

The undersigned certifies that he has read and hereby recommends for acceptance by the Open University a dissertation entitled: ***The Impact of Price Fluctuation on Production of Cashewnuts in Tanzania*** in partial fulfillment of the requirements for the degree of Master of Science in Economics (MSc) at Open University of Tanzania.

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DEDICATION

I dedicate this work to my parents for their authoritative parenting and for laying the cornerstone of my intellectual abilities

ACKNOWLEDGEMENT

ABSTRACT

This study examines the impact of price fluctuation on production of cashew nuts in Tanzania. Specifically the study aims to identify causes of price fluctuation of cashew nuts in Tanzania cashew nut's market, to examine the extent to which price of cashew nuts has been fluctuated in Tanzania cashew nut's market, to identify the relationship between cashew nut's price fluctuation and amount of cashew nuts harvested, to assess if the government of Tanzania help out in solving the problem of cashew nut's price fluctuation. The methodology used to conduct study was exploratory and descriptive research designs and involved the use of various data collection methods and tools such as questionnaires and interviews. The study also used secondary data collection methods such as reference to previous works. The study finds that cashew nut's price fluctuation in Tanzanian are caused by quality of the cashew nuts, the government interventionism in the production of cashew nuts, cost of inputs in production, improvement of technology, among others. However, it was revealed that from 1990 to2014 the price of cashew nuts has increased by 65.69%. Within this period minimum price was 137TSH/KG (in 1990) while maximum price was 1701TSH/KG (in 2011). The study established that price of the cashew nuts influence production of cashew nuts in Tanzania. The study also shows that government has been regularly adjusting taxation structure as regards agricultural equipments and products to help both farmers and traders from the burden of price fluctuations. The study has a number of recommendation to government, farmers and traders-aimed at improving cashew nuts productivity through price control. These are strongly leaders farmers who responsible their union and quality control ,Cashew nut board equipped with officers with enough knowledge in marketing and transparency on prices changes and lastly farmers skills in modern farming rather than traditional ways.

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LIST OF ABBREVIATIONS

ADF	Augmented Dickey-Fuller
AGP	Agricultural Productivity
CP	Cashewnuts Production
CV	Critical values
EU	European Union
GDP	Gross Domestic Product
IR	Inflation Rare
PC	Price of Cashewnuts
TCB	Tanzania Cashewnut Board
WTO	World Trade Organization
USA	United States of America

CHAPHTER ONE

1.0 OVERVIEW OF THE STUDY

1.1 Introduction and Background of the Study

The cashew plant, Anarcadium Occidentale, belongs to the Anacardiaceae family. It was originated from Brazil and spread to some part of Tropical South and Central America, Mexico and West Indies. Is a native of central and South America with its main center of variation in Eastern Brazil. These crop was introduced in Tanzania during 15th and 16th century and since then it has flourished in wild areas. Cashew is a tree crop of economic importance to Tanzania and other tropical countries, major cashew growing areas in Tanzania is Mtwara, Lindi, Pwani and Tanga. Ripe cashew apple is sweet and rich in vitamin c and sugar. The cashew nut is about 2-4cm long and kidney shaped grayish in color. It is attached to the fleshy peduncle (cashew apple) and thin skin between epicarp and endocarp wall of the shell. Inside the shell is wrapped in a thin brown skin know as the testa (outer skin of kernel).

Cashew nuts trees are grown in the first instance for their kernels, which when roasted have a pleasant taste and flavor. The cashew trees are perennial and grow up 15 meters. It can grow on poor or stony soils likely due to its excessive roots development. the best soil for cashew are deep, friable well drained, sandy loam soils without a hardpan (Ohler 1997).Cashew nut is normally sown or planted in the rain season. Sowing of cashew in situ with or without planting holes has been the main method of establishing smallholdings and large plantation recently use of planting pots in the nursery, especially for grafted materials has been a common practice before planting in the field at 12 X 12 meters spacing (Anonymous, 1994).

Cashew nut harvesting consists of reaping the nuts that have dropped to the ground after maturity. The apple are detached from the nuts and kept in case of use in the secondary processing. To trace the nuts easily the surface under the tree has to be free from weeds the nut are collected in gunny bags or baskets, in the beginning of harvesting season nuts fall is scantly. The peaks are reached gradually and after that the production decreases slowly. Harvesting is therefore a time consuming.

Drying the nut immediately after harvesting is essential to preserve their quality. Such drying of cashew nut can be done on special prepared drying floors. But where no such floors are available mats made of bamboo or other similar materials can be used (Ohler 2001).Grading of cashew nut and inspection service was available with effect from (1999) with an intention of offering fair average quality certificates to exporters based on cutting tests(Mutter and Bigger,1999).Farmers were required to grade their nuts at the farm level and a two-tier price system was introduced which recognized two grades of nut at the buying posts.

The issue of price fluctuation in agricultural products prices has become a matter of great public interest worldwide. The major price swings taking place and their macroeconomic impact are now witnessed to appear throughout the world including the developing countries as the result of the linkage which became amplified because of the increase in the harmonization of the economic policies in the major developed countries (Raquet and Emback, 2011).

Fundamental changes are seen to appear in the structure of international economy which necessitates a new analysis of the role played by the agriculture sector. This sector is also seen as responsible for the booms and slumps that are affecting the growth process of developing countries. Over the past decades there have been additional areas of global economic instability. They include fluctuations in the exchange rates among the major currencies, changes in the interest rates and financial flows of resources. The instability in these areas have interacted and reinforced fluctuations in the primary agricultural commodity markets (Ahmed et al, 2012).

Moreover there are other factors which can directly impact the price of agricultural products such as cashewnuts that are referred to as the cost drivers which includes products or resources that are used in the production process of cashewnuts (Raquet and Emback, 2011). In the production processes of cashew nuts the factor which is considered to impact the price of cashew nuts in the great extent is oil where it tends to influences prices in two ways that includes energy related inputs which rises and fall as the resulted of crude oil prices such as fuel used in farming machines, fertilizers and pesticides, (Naylor and Falcon, 2010). This was also evidenced by the evidence of the 11.5% increase of the cost of production of various commodities between 2002 and 2007 as the result of the energy intensive inputs (Mitchell, 2008).

Another way is in the instability of the oil prices which directly affect the processing and transportation cost of the agricultural commodities which influence the price as well (Raquet and Emback, 2011). Thus there is unsteadiness of operations in the commodity sector which are not only the mechanisms for the transition of the recession from

developed or industrial countries to peripheral economies where it has also become a major source of instability in the world economy as a whole.

In Africa the situation of the price fluctuation in the agricultural commodity is evidenced in many countries where there have been a series of price changes in the agricultural products which in turn affects the economic situation of the farmers where they mostly earn less from agriculture when they present their products in the market for selling (Kilima, 2006). Currently the exports of cashewnuts in raw form from Africa are estimated to be at 95% which is expected to change following the efforts to boost processing in the continent which could raise the profitability (Mbendi, 2014). The notable African producers for cashewnuts are Mozambique, Tanzania, Ghana, Guinea Bissau, Kenya, Benin, Madagascar, Togo and Nigeria where they mainly export almost all of their production to India for processing. The industry is faced with poor prices for raw nuts, lack of national export brands, lack of credible quality certification, lack of finances for raw material purchases, lack of buyers of kernels, which are the major problems that are affecting them which generally lead to the depressed prices and dwindling production of cashewnut (Mbendi, 2014).

In Tanzania cashew nuts production is an important agricultural commercial product for export and an important source of income for small farmers in Southern coastal region where the regions of Mtwara, Lindi and Ruvuma accounts for 80 to 90 percent of Tanzania's marketed cashew crops (Mitchell, 2004). The sector has made remarkable recovery since 1980s where it was accredited to the economic reforms which began in 1986 especially in trade liberalization and exchange rate adjustments as well as the

sector reforms which began in the mid of 1990s which eliminated the monopoly of cashew nut marketing board (Mitchell, 2004).

Tanzanian farmers also for a number of years, have been faced with the problem of price fluctuation where the price of their cashew nut products tend to change from time to time while affecting the farmers where they gain less from the market after selling their cashew nut products. These have been after selling of raw cashew nut crops that are exported to India for processing as well as the existence of high levels of taxation (Mbendi, 2014). Due to this it lead to low farmer profitability, leading to lack of investment in cashew nuts, limited processing experience and lack of international reputation for Tanzanian processed kernels. This being the fact it came to the attention of the researcher to conduct a study for the purpose of investigating the impact of price fluctuation in cashew nut production in the Tanzania .

1.2 Statement of the Problem

Recently there have been the highest incidences of price fluctuation of agricultural products when they reach to the market from the farms in Tanzania cashew nuts being one of the agricultural products facing the rapid changes in its prices from time to time. Prices are evidenced to fluctuate from time to time with the fall in the cashew nut prices being the major impact facing cashew nuts' farmers at village, regional, country, international and all world wide level when taking their products to the market as they tend to gain less from selling their products (Korir, 2011). The problem started during the period of post colonial era where the African continent was made as the areas of producing raw materials which are mainly agricultural products and less investment in

the processing industries thus the African farmers failed to add value to their agricultural products by processing them. Moreover, after the reform of the sector in the mid of 1990s the recovery was aided by the decision to export raw nuts rather than processing them. As the result they ended up getting low prices which does not cover their cost of production when they take their agricultural commodities to the market where they spend a lot of time and money such as in purchasing pesticides and in the process of locally processing of cashew nuts (Parrish *et al*, 2005). This situation have discouraged cashew nuts' farmers in producing more commercial products and others tend to switch from producing cashew nuts to produce other food products such as maize and beans.

Therefore, due to the above reasons, it came to the attention of the researcher to conduct a study for the purpose of investigating the impacts of price fluctuation in the production of cashew nut in the Tanzanian cashew nut's market with the main focus in the examining the impact and causes of price fluctuation of the cashew nut's market.

1.3 Objectives of the Study

In this study the objectives are categorized into two types which are the general and specific objectives.

1.3.1 General Research 0bjective

General objective of this study is to determine the causes of price fluctuation and its influence on production of cashew nut in Tanzania.

1.3.2 Specific 0bjectives of the Study

i) To find out relationship between price fluctuation and production of cashew nut in Tanzania.

ii) To assess and explore the feedback mechanism between the production and price changes to farmers, traders and government awareness about the cashew price changes at village, regional, national and global level.

iii) To identify causes of price fluctuation of cashew nuts in Tanzania market in relation with other cashew nut grower's world wide.

1.3.3 Research Hypotheses

Econometric theories reveal causality between the two variables which have influence from each other and these variables are impact of price fluctuation and production , these causality can be clearly explain as the responsiveness one variable to change another variable as a granger cause. On the bases of theoretical background the hypotheses to be tested are;

i) H_0 : Price fluctuation does not influence level of production of cashew nut in Tanzania

ii) H_1: Price fluctuation does influence level of production of cashew nut in Tanzania.

1.4 Research Questions

Is the logical statement which extends from what is understood and require validation. In this study there are main research question and specific research questions.

1.4.1 Main Research Questions

The main research question for the study is: what are the impacts of price fluctuation on production of cashewnuts in Tanzania?

1.4.2 Specific Research Questions

The specific research questions for the study are:

i) What are the causes of cashewnut's price fluctuation in Tanzanian cashewnut's market?

ii) To what extent have the price of cashewnuts have been fluctuating in the Tanzania cashewnut's market?

iii) What is the relationship between cashewnut's price fluctuation and amount of cashewnuts produced?

iv) How has the government of Tanzania has helped to solve the problem of cashewnut price fluctuation?

1.5 Significance of the Study

As cashew has tremendous business potential that creates different opportunities to may people. This crop has a capacity to influence the life of people to large extent; therefore it needs to utilize this potential to uplift the life people. In this direction present study was explore the seasonal issues that can be helpful to farmers, traders, government and policy makers to formulate the desired policies later.

The findings and the suggestions from this study are of beneficial to a diverse number of groups that are directly or indirect in the cashewnut production administrators, farmers and cashewnuts traders; where they are able to have an insight on the situation of cashewnut producers in Tanzania the effect of price fluctuation of cashewnut in the development of the sectors. From the study findings will have an insight on the efforts which were made by the government in solving the problem and how they could improve their efforts to bring more changes in the issue of price fluctuation in the cashewnuts' market.

The traders especially those who are in the cashewnut market will benefit from the study by being informed on the causes of price fluctuation of cashew nut in the market and how it affects the cashewnut producers and the economy in general as well as the efforts which have been made to solve the problem.

The study will increase awareness to policy makers on the issue of price fluctuation and the effects of trade, tax policies and enable them to regulate and reform the policies to reduce the impact of price fluctuation in the cashew nut market.

Lastly, the cashew nut producers will also benefit from the study by being able to get knowledge on the causes of price fluctuation in the cashew nut market, its extent as well as being aware of the efforts which have been made by the government to solve the problem.

1.6 Organization of the Study

The study consists of five main chapters as follows:

Chapter One: This part carries the introduction and background of the study as well as statement of problem, the main objective of the study, significance of the study and the organization of the study.

Chapter Two: In this chapter literature review from previous studies on the topic related to the impacts of price fluctuation in the production of cashew nuts is presented including the theoretical definition, theoretical reflection, empirical studies and conceptual framework.

Chapter Three: This chapter presents the main research methodologies that are going to be used in the study for the purpose of achieving the required objectives.

Chapter Four: this chapter analysis the results of the study, description and discussion of study results are also presented in this chapter.

Chapter Five: This is the last chapter of the study which shows the conclusion and recommendation of the study.

CHAPTER TWO

2.0   THEORETICAL REVIEW

2.1 Introduction

In this chapter we give an overview of various factors and issues related to the impact of price fluctuation on the production of cashewnuts by reviewing different research works of other researchers done within and outside Tanzania

2.2   Theoretical Aspect

Traditionally, the focus of the production growth theory was on capital accumulation and labour usage as the causes for long run production improvement, thus growth is exogenously determined. However, this approach excluded any specific role for cashew nut sector. During the past twenty years, new theories have been developed that moved away from the view that growth is exogenously determined and therefore cannot influence it. New theories states that growth is endogenously determined, thus institutions and policies matters for production growth.

The exogenous growth model was an extension to the Cobb-Douglas production model which included the new term, productivity function in 1928 developed a relative simple production model which fit available data on economic production for success. The key assumption of capital is subjected to diminishing returns, given a fixed stock of labour and land, the impact on production of last unit of capital accumulated will always be less than the one before. Assuming for simplicity no technological progress or labour force growth, diminishing returns implies that at some point amount of new capital produced

is only just enough to make up for existing capital lost due to price appreciation or depreciation.

According to the accelerator Theory of investment most of farmers face problem of initial capital for establishing a farm and all costs for running agricultural activity especially application of pesticide and fungicide on their cashew trees due to unavailability and if available cost of buying is to high.

Based on (Fraser *et al.,* 2002) using the number of cashew nut growers and concentration ratio of market power found a positive relationship between production and prices. Berger (1999) and Samad (2007) suggested that an increase in the efficiency and size of farmers enable them to exercise market power in pricing well differentiated product hence increasing their concentration and profitability.

The relationship between production and price for simple theory of price, we need to know how quantity supplied varies with a products own price, all things being held constant (Lipsey and Chrystal, 2001; 43). In principle, the quantity of a commodity a person and firm is willing to offer for sale can be well explained through the law of supply. The law states that, as price rises, the corresponding quantity supplied rises, as the price falls, the quantity supplied falls (Colander, 2001). According to Leedy and Ormrod (2005) theoretical definitions are common in scientific contexts, where theories tend to be defined exactly, and the results are usually accepted as correct. The words that appeared more frequently in the study are price, market and production.

The cashew nut production in Tanzania is characterized by fluctuation in the price level. From 1945/46 there was almost persistent increase in the level of cashew nut up to 1973/74 growing season where the maximum level of production (145000 tones) was reached (Ghasia, 2003). From 1974/75 growing season, the production experienced a continuous decline and in 1986/87 growing season only 16548 tones were produced (CBT,2002 in PAP,2004;154).From 1987/88-1992/93 growing seasons the trend of cashew nut prices was experienced.

Price is the amount of money that is paid for the purpose of acquiring something. According to encyclopedia Britannica (2014) price is amount of money that has to be paid to acquire a given product. Moreover, Vianelo (1989) defined price as the compensation or amount of payment which is given by one party to another party in return for goods or services. The study will use price as the amount of money that a buyer pays for the purpose of purchasing cashew nuts. However, according to the study price fluctuation is defined as the increase and decrease of the price of cashew nuts in the market

In principle, the quantity of a commodity a person and firm is willing to offer for sale can be well explained through the law of supply. The law states that, as price rises, the corresponding quantity supplied rises, as the price falls, the quantity supplied falls (Colander, 2001).

The theory enabled the researcher to understand how the interaction between buyers and sellers and how their relationship can influence the price of the commodities in the

market. Through this the researcher was able to get an insight in the point where price is set which is at the point where the quantity being supply is equally to the quantity being demanded. Based on this theory the price of agricultural commodities is expected to fluctuate from time to time due to the changes in the quantity of the commodities being Produced.

2.2.1 Production

This is the process and methods that are used to transform tangible inputs and intangible inputs into goods or services. According to Shephard (1970) production is defined as the process of combining together various material inputs and immaterial inputs such as plant, know how, for the purpose of making something for consumption. The study uses the definition of production as all processes and methods involved from the seeding to the harvesting of the cashew nuts.

2.3 Theoretical Analysis

A theory is an explanation which helps to understand and make predictions about a given situation. A theory is constructed by a set of sentences consisting entirely of the true statement about a situation under consideration; however the truth of any one of these statements is always relative to the whole theory (Carnwell and Daly 2001). This section address theoretical issues related to the analysis and interpretation of data.

2.3.1 Price Theory

This is the theory which was developed by Milton Friedman where it based on economic theory. It is the theory which asserts that normally in a free market economy the market

price of goods and services is always reflected by the interaction between supply and demand where the price is set at the point where it equates the quantity being demanded and the quantity which is supplied. Furthermore these quantities are normally determined by the marginal utility of the asset that is to different buyers and different sellers. In a more realistic way these prices may be affected by other factors such as tax and government regulations (Milton, 1957).

Although there are different ways to measure household welfare (see Mc Culloch et al.2002;Nicita 2004;Seshan 2005;Porto 2006;Barraund 2008),we use a method that focuses on price transmission (Deaton 1989,1997; Minot and Goletti 2000;Friedman and Levinsohn 2002;Niimi 2005).A consumers own monetary valuation is a suitable measure of the welfare effect of price changes. Since the measure is in terms of money, individual valuations are commensurable and could in principle be added to form a measure of the aggregate benefit to all consumers. This monetary valuation of utility is captured by the compensating variation, the amount of money which must be taken from or given to the consumer after the price change to make them as well off (the same utility) as before the price change.

 The compensating variation can be expressed in term of the indirect utility function

Initially a consumer faces price for n good $p^0 = (p^0,......p^0_n)$ with income M and maximized utility is $u^* (p^0 ,m^0) = u^0$ .With the new prices $p^1 = (p^1,.......,p^1_n)$ and the same income, maximized utility becomes $u (p^1 ,m^0) = u^1$

The superscripts refer to before (0) and after (1) the price change; Compensating variation is the change in money income necessary to make utility under p^1 equal to the initial utility with p^0 and income of M^0 .Hence the CV is expressed as;

$$u^* (p^0 m^0) = u^* (p^1 ,m^0 -cv) =u^0$$

For the purpose of estimation, we define CV using the expenditure function. The minimum level of expenditure necessary to achieve the consumer's initial utility level u^0 with the initial price vector p^0

Is c (p^0 u^0)= M^0. The minimum level necessary to achieve this initial utility level when prices alter to p^0 is c (p^0, u^0) so that the difference between c (p^1 ,u^0) and c (p1 ,u^0) is the change in income necessary to ensure the consumer is indifferent between facing prices p^0 with income m^0 and price p with a different income. This change in income is the compensating variation (VC) (Deaton and Muellbauer 1980).

If welfare after the price change is lower than the initial period, the compensating variation would be positive at the new price level. The partial derivative of the minimum expenditure function with respect to price yields quantities consumed.

When a commodity is for sale to multiple locations, the law of one price is generally believed to hold. The law of one price is an economic concept which posits that a good must sell for the same price in all locations; it constitutes the basis of the theory of purchasing power parity which is derived from the no arbitrage assumption. In general this essentially states that the cost difference between the locations cannot be greater than that representing shipping, tax, other distribution costs and more.

The theory enabled the researcher to understand how the interaction between buyers and sellers and how their relationship can influence the price of the commodities in the market. Through this the researcher was able to get an insight in the point where price is set which is at the point where the quantity being supply is equally to the quantity being demanded. Based on this theory the price of agricultural commodities is expected to fluctuate from time to time due to the changes in the quantity of the commodities being supply and the quantity being demanded in the market. Thus in the situation where there is some changes in the quantity of cashewnuts being supply with the quantity being demanded in the market, the price of the cashewnuts is expected to fluctuate depending on the changes of demand and supply that are prevailing in the market.

Moreover, the theory will enable the researcher to get knowledge on how the concept of marginal utility can affect the price of commodities in the market where it determine the quantity which is different from the buyer and the seller perspective despite other factors which can affect the prices such as tax and the regulations that are set by the government.

2.3.2 Bi-directional Causality

The most interesting scenarios suggest two ways causal relationship between impact of cashew nut price fluctuation and production growth. Lewis (1955), one of the pioneers of development economic, postulates a two ways relationship between price fluctuation and production system.

The relationship enabled the researcher to get knowledge about the concept of price from the buyers and sellers perspective where both consider price to be as the value which is used to express their information about the quantity of money in which they choose to compensate for their exchange process in the market. Furthermore the researcher was able to understand the concept of supply price which is the price that depends on the decisions in which the seller has made earlier in which they tend to estimate the value of their products in the market whereas the demand price is considered as the price in which the buyers are willing to pay for a certain commodity which is compared to the value of all the alternative goods in which the buyer could buy in the market. Therefore by understanding these concepts the researcher was able to address the topic in the right direction and come up with the impacts of price fluctuation of cashew nut production in the Tanzanian cashew nut's market.

Theory which was developed by Carl Menger (1892) as the solution offered to the paradox of value through the theory of marginal utility. It states that price is the quantity of money which individuals choose as expression of their plans and which therefore transmit information about their plans. It was developed under the assumption of price differential which is defined as the positive difference between the demand price and supply price. The defining features of such disequilibrium are considered to be the new price differentials continuous emerge and incapability of market participants in discovering the existing price differentials (Carl Menger, 1892).

Supply price is defined as the lowest price at which a seller is willing to sell a unit of goods. Normally the supply price depends on the decision in which the seller has made

earlier. When the factor needed in the production process have already been irrevocably acquired, the seller has to estimate the value of the product in the market, or in his own use and the value of the products that he could alternatively produce by means of the factors. Therefore supply price is equal to the cost of selling the product which is the value of the best foregone alternative. The information in which the evaluation of the cost is based is normally possessed by the seller himself and others do not have access to it in its entirety.

Demand price is defined as the highest price in which the buyer is willing to pay for a unit of a good. Normally a buyer choose his demand price by comparing the value of the proposed good with the combined value of all goods that he could alternatively buy with the quantity of money equals to the demand price. Therefore it can be concluded that the value of goods is measured in terms of money where prices only facilitate the comparison of such values. In order to perform such comparison and to make good buying decisions the buyer need only to know the supply price of the sellers and nothing more of their plans. If any of the demand prices is higher than the supply price, a price differential is said to exist in the market. Traders can either be the creators of the new price differentials or discover the existing but previously unnoticed price differentials. In the economical view, unutilized price differentials should not be primarily conceived as socially harmful phenomena but rather as indispensable signals which alert traders to disco ordination and waste.

Theory which was developed by Daniel Kahneman and Amos Tversky in 1992 as the psychological description of decision making. Based on original formulation the term

prospect refers to a lottery. Prospect theory is the behavioral economic theory which describes the way in which people choose between probabilistic alternatives which involves risks where the probabilities of outcome are known. The theory states that people tend to make decisions based on potential values of losses and gains rather than the actual final outcome where people tend to evaluate these losses and gains using certain heuristics.

The theory describes decision processes in two stages which are editing and evaluation. During editing phase the outcomes of decision making are ordered according to a certain heuristic. Therefore people decide which outcome they consider equivalent that are set at reference point and then consider lesser outcomes as losses and greater ones as gains. In the editing phase the aim is to alleviate any framing effect. It is also aimed at resolving isolation effects stemming from individuals propensity that often isolate consecutive probabilities instead of treating them together. In evaluation phase, people behaves as if they would compute a value or utility based on potential outcomes and their respective probabilities and they proceed by choosing an alternative with higher utility.

An important application of the prospect theory is that the way economic agents subjectively frame an outcome or transaction in their mind affects the utility they expect or receive. This aspect has been widely used in behavioral economics. The theory helped the researcher to understand the behavioral of people that make them to make certain decisions based on probabilistic alternatives that involves risks which are known. Therefore through this theory the researcher was able to understand why people choose to make decision based on potential values of looses or gains that they expect to gain

from their decisions that lead to the speculation of the future and results to changes in the prices of commodities in the market. Thus through this the researcher was able to build up the conceptual framework on the causes of the price fluctuation in the cashew nut market.

2.4 Empirical Review

This section provides what has been done concerning impact of price fluctuation on production of agricultural products from different views of other researchers. It reviews previous studies which has relation with specific objectives of this work. Here below are some of them:

2.4.1 Causes of Price Fluctuation

Abbot et al. (2009) conducted a study in USA for the purpose of examining what's driving food prices in 2011. The study revealed five key issues which causes price fluctuation of agricultural commodities which includes persistence demand shocks, market inelasticity, weather and stocks, country policies and macroeconomic issues. The study concluded on the short periods of production shortfalls or demand surge where they tend to have a sharp price fluctuation on agricultural commodities when there is low stock of agricultural products. The study suggested on the strengthening of the country's trade policies, domestic stabilization, adhering to the World Trade Organization (WTO) commitments, export restrictions and international stabilization for the purpose of controlling the prices of agricultural products.

Raquet and Emback, (2011) conducted a study for the purpose of investigation the story behind commodity price changes with the focus on the causes and implications. The

study found out that the crops inventories, US dollar, oil prices and speculation were the major causes of the price fluctuation of commodities in the market. The study concluded on the implications from the findings where there was the need for policy makers to direct less attention on the at speculators and focus more on stabilizing exchange rates and initiating a process to reduce the dependence the production of agricultural commodities has on oil. The study recommended on more accurate political debates and research directed towards the ways in which the impacts of commodity price changes can be addressed from the society.

Naylor and Falcon, (2010) conducted a study for the purpose of analyzing international commodity price movements, assesses food policies in response to price fluctuations and explore food security implications of price volatility on low income groups. The study found out that the exchange rates, macro policies and petroleum prices were the important determinants of price variability over 2005-2010 in the agricultural commodities market which affected the world food economy. The study concluded on the long lasting effects of price spikes on food policies worldwide which often result in the self-sufficiency policies which created even more volatility in the international market. The study suggested that the efforts by the governments to stabilize prices frequently can contribute to even greater food insecurity among poor households and recommended for the need of the refocused policy approaches to prevent and mitigate increase of the prices.

Mitchell (2008) conducted a study in USA for the purpose of investigating the causes of the increases in the prices of food products in the world. The researcher found out that

the major factors which have contributed to the rapid rise in food prices from time to time are the large increase in biofuel production in the USA and EU from food grains, the weak dollar and the increase in food production costs due to higher energy prices. The study concluded on export bans and speculative activities which have occurred because they were formulated as the effective response to rising prices of commodities. The study recommended on reconsidering of the government policies that provides incentives to biofuel production and biofuel policies which have impact on food prices.

2.4.2 Price Fluctuation and Economic Development

Wang undated conducted a study in China for the purpose of examining the urban wholesale price change and economic growth in china. The researcher used a wholesale price index from three cities of Tianjin, Shanghai and Guangzhou as well as the national wholesale price index to collect data for the study. The study found out that the economic development of modern China was consistence as the result of the slowly rise in the wholesale price with fluctuation where the production commodities fluctuate more than consumption commodities.

The study concluded on the development of transportation industry sector such as railways and highway which facilitated price transmission and lowered transaction cost which provided conditions for the formation of national uniform market. The study suggested that the problems such as inconvenient transportation, market dispersion, regional price differentials and seasonal price differentials in rural areas should not be neglected especially in remote areas in a uniform market.

Ahmed et al (2012) conducted a study in Pakistan for the purpose of investigating the casual relationship between stock prices and real sector of economy in Pakistan. The researcher used annual data from December 1980 to June 2007 and the application of the simple correlation analysis to investigate the relationship. The study revealed that there was the much higher expansion in the stock prices relative to the real variables which are GDP and real investment although the stock prices also experienced much higher volatility during the sample period where the real variables were seems to be stable. The study concluded on the very high correlation between stock prices and GDP which increased significantly in the post liberalization period.

Rweyemamu (2002) conducted a study in Tanzania for the purpose of examining the contextual analysis of cashewnut industry in southern Tanzania after market liberalization. The researcher used secondary sources of information by reviewing various documents and reports as his basis for making assessment. The study findings revealed that liberalization measures have currently led to strong private sector activities in cashewnut purchase and export as well as the economic development of the country. The study concluded on the weakness of the partially liberalized industry which still suffers from the weakness that impairs the production and marketing system resulting from both market failure and government intervention. Moreover, the study recommended on the government interventions in terms of the structure of levies and activities of input trust funds as the reasons responsible for reinforcing some of the difficulties in the sector. The nature of demand for agricultural products need not be neglected if one intends to assess the extent to what agricultural products in the export market respond to the change in price. Brue and McConnell (1999) indicate that both

income and price elasticity of demand for agricultural products are inelastic. This means that an increase of agricultural production in the international market will reduce the price, but the additional demand generated by decline in price of agricultural exports will bring less revenue than before due to price inelastic nature for agricultural products (Ghatak and Ingersent,2000;284).

Colander(2001;105) indicate that the 1999 freeze in Florida USA led to great damage to the crops which led to the prices of some vegetable to rise by 25% just one week after the freeze. Emphasizing on the importance of climatic conditions in influencing agricultural production.

According to Rweyemamu (2002) indicates that there is a core group of not more than a dozen companies dominating cashew nut exports in Tanzania.

Frank and Bernanke,(2001), and Hardwick *et al.,(*1999) indicate that, income elasticity of demand for agricultural products is said to be inelastic because an increase in the income of consumers lead to less than proportionate increases in spending on farm products. In connection to what has been said we need to know how time affect responsiveness of agricultural products when the price of a commodity under consideration change. Beardshaw (1992;156) indicates that agricultural products are associated with one period time lag, where the supply in one year period is dependent upon what the price was in the previous period. What is important to note is that, the periods need not be a year, for tree crops like cashew nut might take a number of years of growing more trees. This implies that an increase in price of agricultural products

does not result to immediate response to the level of output. This is because it takes time for producer to switch from one activity to another and to build new capital goods and train or acquire new workers (Frank and Bernanke, 2001; 155). However, in short-run a rise in price is possible to increase output considerably if there is a pool of unemployed resource and unusual machinery in the industry or there is an accumulation of unsold stocks (Hardwick *et al.,*1999;98).

2.4.3 The Extent of Price Fluctuation

Kilima (2006) conducted study for the purpose of investigation the extent in which world market price changes are transmitted through changes in border prices into local producers' prices for agricultural product market in Tanzania. The study revealed that Tanzania border and world market prices for these products do not move closely together although border prices are influenced by world market price levels. The study concluded on implication for potential impacts of trade policy changes on Tanzanian producers and consumers where the extent of price transmission is likely to be imperfect. The study recommended on the need for concerted efforts by policy makers to reduce the extent of monopoly power in marketing chains and to improve the degree of price transmission.

Piesse and Thirtle (2009) conducted a study for the purpose of doing an explanatory review of the extent of the food commodity price events in London. The researcher used literature review and the summary of the behavior of food commodity prices in 2007-2008 from the report to the chief scientific adviser to her majestic government to collect data for the study. The study found out that the broad consensus causes of price spikes of

food commodities are depreciation of US dollar, macro policies and speculations on the future. The study concluded on the conventional wisdom on the prices of the main food commodities prices which were falling prior to 2006. The study recommended on more studies in the field of commodity prices with the focus on the ways to reduce the impacts of food commodity price changes.

Parrish et al (2005) conducted a study to investigate what Tanzanian cashewnut farmers can teach the world with the analysis on the performance based look at the fair trade-free trade debate. The researchers conducted a field research with the qualitative and secondary quantitative data collected from the field. The study found out that the financial flows provides an incomplete picture of the impact of the market interventions on smallholder well-being. The study concluded on the intervention strategies which yield potentially valuable results for smallholders in multiple domains where each is distinctly suited to specific market conditions. The study recommended on the business development organization as the best way to utilize elements of fair trade strategies that are beneficial in developing market.

2.4.4 Government Efforts in Solving the Problem of Price Fluctuation

Mitchell (2004) conducted a study in Tanzania for the purpose of investigating the Tanzania's cashewnut sector by examining constrains and challenges in the global environment. The study found out that indicative price changes, deterioration of export quality, inability of farmers to finance their production costs, lack of domestic processing and high overall taxes and rapidly increasing local taxes to be the major constrains and challenges in the cashew nut sector. The study concluded on the efforts

by the government in helping cashew nut producers by exploiting the opportunities for expansion of the industry by developing domestic processing activities, reform of the overall taxes and the local taxes and reversing the decline in export crop quality. The study recommended on defining a more constructive role for the cashew board where it should not announce indicative prices or regulations that relate to private sector activities as well as making statement about the fairness of private sector prices.

Korir (2011) conducted a study in Kenya for the purpose of examining risk management among agricultural households and the role of off-farm investment in Kenya. The researcher used 100 random selected farm households to collect data for the study. The study found out that the major risk facing farmers was market price among others which included institutional risks, pests and draught. The study concluded on the use for insurance products that are developed for the aim of fulfilling the needs of the farmers while by addressing the potential problem of transaction cost and moral hazard. The study suggested the government to use policies that encourage commercialization of the smallholder farms which are crucial to encourage farmers to get the surplus for sale and be able to manage their risks.

2.5 Conceptual Model

The conceptual model is the blueprints of information management used to describe the intention or purpose of something in abstract and generalized manner (Thurna, 2011). Based on the purpose of this study four investigative questions were stated in chapter one to guide the research. Researcher recalled these questions here:

i) What are the causes of cashewnut's price fluctuation in Tanzanian cashewnut's market?

ii) To what extent does the price of cashewnuts have been fluctuated in the Tanzania cashewnut's market?

iii) What is the relationship between cashewnut's price fluctuation and amount of cashewnuts harvested?

iv) How the government of Tanzania has helped out to solve the problem of cashewnut's price fluctuation?

In the previous sections, different kinds of theories and empirical studies have been exposed and discussed concerning the impact of price fluctuation in the production of cashew nuts. From what have been narrated on these sections, the following theories has been developed.

Lack of market information to cashew nut farmers particularly those, which are related to the determinant of the actual farmer's price affect farmers in bargaining or negotiation price with traders who go to their areas. The lack of appropriate and efficient farmers organization leaves farmer without a body that causes bargain for them and protect their interests (Tasaf,2001 in Ghasia,2003).In turn the price is not determined by the market forces (i.e. demand and supply forces),but by big cashew nut buyers in Tanzania, who had the agents in the field since the commencement of the liberalization process (Ghasia,2003 & Banda,1994 in Kasidi,2001).Private cashew nut buyers are blamed for colluding to fix the price paid to farmers and a survey conducted for 1999/2000 season

showed evidence of trader dividing themselves and operating in different villages to avoid competition among themselves (Rweyemamu,2002).
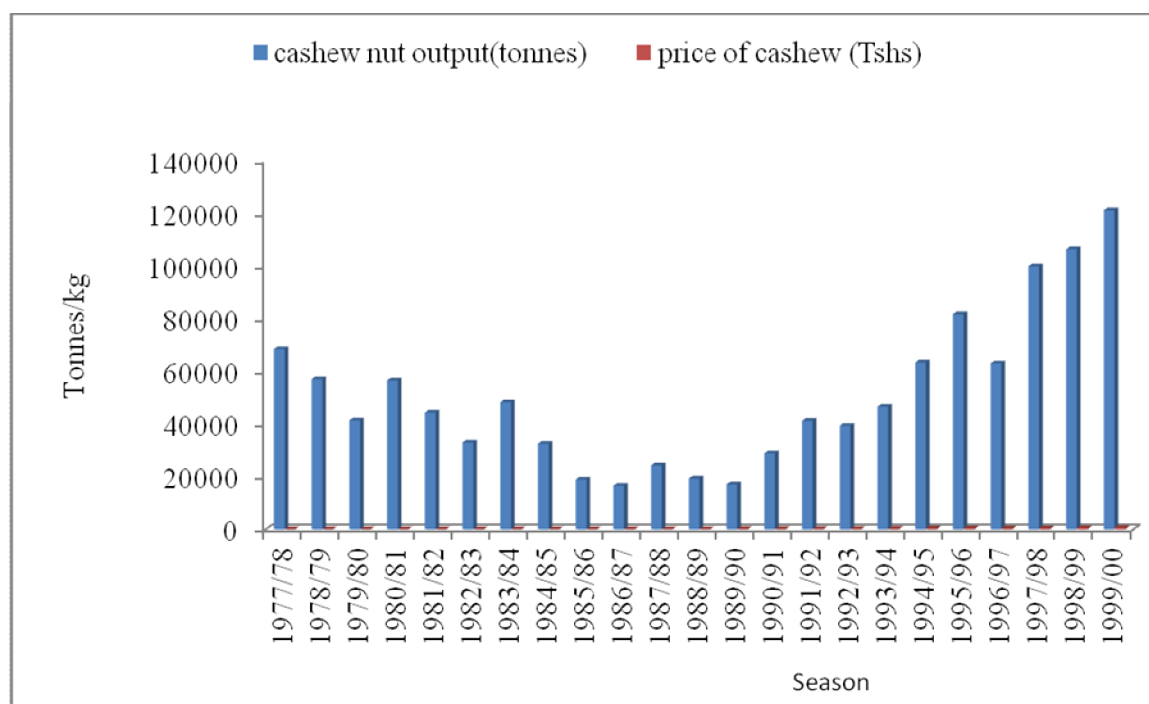
Figure 2.1 : The cashew nut output level and cashew nut domestic price in Tanzania (1997/78-2003/04).
Source; Cashew nut association of Tanzania (2003)

Based on the figure above the production of cashew nut in season 1986/87 and 1989/90 was decreased due to unavailability of input i.e pesticide and fungal side what resulted to decrease in production. In season 1998/99 and 1999/00 the production of cashew nut was increased because of favorable condition and high price promised last season per kg to farmers and availability of spraying race on credit to cashew nut growers.
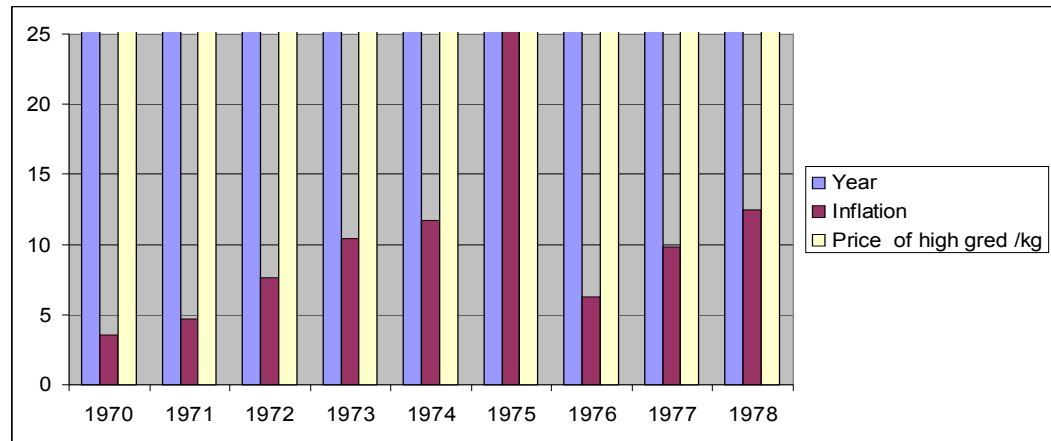
Figure 2.2 : Production against Price of High Grades/kg

 Source; Cashew nut Board of Tanzania 1970/72

As indicated above the cashew nut price high grade have been affected by frequency changes of price because of world market and inflation rate within our country which show that in year 1975/76 the price was increased more because of low production of cashew nut in worlds.

From the figure above it observed that production of the cashew nuts depends on its price or the amount of money to which buyer (demand price) and seller such as farmer or trading agent (supply price) have agreed after negotiation and bargaining. There is threshed of the price fluctuation (either increase or decrease), fluctuation this limit will affect production of cashew nuts. When the price is too higher than the actual market price, traders and consumers will stop demand for the cashewnuts and find for the substitute of product. Likewise, when the price is too low than the actual market price the farmers and agents will stop supply cashewnut which will also affect production.

On the other hand inflation rate and economic growth of the country also have an impact on the production of cashewnuts. Persistence increase of the price of other products such as price of oil, pest sides, fertilizers and so on can also discourage farmers for their production activities. Also, better economic condition in term of the agricultural productivity (AGP) can encourage agricultural activities while bad AGP discourage agricultural activities. The study shows that government effort play a big part in production of the cashewnuts. Therefore, government through its regulatory agents such as tax police, restrictions and permits act as the mediating factors between production of the cashewnuts.

Four factors of production ie land, labour, capital and organization. All these brought together in the process of production to form a final product.

A) Land represents natural resources like land plot, minerals, water and oil

B) Labour is considered to be an integral part of the process of production. Both skilled and unskilled labour is required by the firm.

C) Capital represents physical capital inform of machinery, equipment plants, factory and other physical assets

D) Finally organization/entrepreneur brings all these factors of production together to transform them into finished product.

CHAPTER THREE

3.0 METHODOLOGY OF THE STUDY

3.1 Introduction

This chapter presents the methodology that was used for this study. It describes the research approach, research strategy, study population and area, sample selection and data collection. It also discussed data analysis and criteria for measuring validity and reliability of the study.

3.2 Study Strategy

The study is aiming at establishing the impact of price fluctuation on the production of cashewnuts in Tanzania. Quantitative data was mostly used in the study to answer the research questions posed in chapter one. Quantitative strategy or approach is about prediction, generalizing a sample to a larger group of subjects and using numbers to prove or disprove a hypothesis while providing answers to research questions on what and when (Polit and Beck 2003). According to Strauss and Corbin (1998), quantitative approach deals with quantities and relationships between attributes; it involves the collection and analysis of highly structured data in the positivist tradition. Since the study wanted to find relationship between price fluctuation and production of cashewnuts as well as generalize the findings which were obtained from the selected respondents, therefore, quantitative approaches were mostly used in the proposed study.

3.3 Research Design

Is the structural designed to answer the research question (Saunder et al, 2009). Research design is the research plans involving several procedures that span decisions

from assumptions to detailed methods of data collection and analysis. However, the plans should focus into strategies and specific methods of data collection, analysis and interpretation. Research design is selected based on the nature of the problem or issue being addressed, researcher's personal experience and the population of the study. For the purpose of this study descriptive design was used. This research design has been found basing on how much knowledge the researcher has about the problem before starting the investigation and the type of information that is needed in order to deal with the purpose of the study. In addition to that it had been chosen on grounds of minimizing bias and maximizing the reliability of the data collected.

Descriptive research used to describe characteristics of a population or phenomenon being studied; it does not answer questions about how/when/why the characteristics occurred. Rather, it addresses the "what" question (Babbie, 2001). The descriptive design provided deeper insight and better understanding on description of the relationship between price fluctuation and production of the cashewnuts. Under this research design, the researcher utilized quantitative data that was attained through questionnaires and review of the documents.

3.4 Hypotheses

The hypotheses to be tested are;

i) Impact of cashew nut price fluctuation in Tanzania not cause production system.

Rejections of this hypothesis means that impact of cashew nut price fluctuation not cause production of cashew nut.

ii) Production of cashew nut crops in Tanzania not causes price fluctuation

Rejection of this hypotheses means that causality runs from impact of price fluctuation to cashew nut crops. If none of the hypothesis is rejected, it means that cashew nut production in Tanzania does not cause price fluctuation and price fluctuation also does not causes production fluctuation. This indicates that two variables are independent of each other. If all hypotheses are rejected or accepted then there is bi-directional causality between impact of cashew nut production and price fluctuation.

3.4.1 Area of the study

The study was conducted in Dar es Salaam region and Pwan. Dar es Salaam is located at $6^0 48'$ south, $39^0 17'$ East in Tanzania and covers approximately 1,590.5 sq kilometers; it is surrounded by coastal region in North, Western and Southern parts, and bordered by the Indian Ocean in the East. The reasons for choosing Dar es Salaam region is that the headquarters for the Tanzania Cashewnut Board (TCB) is located in Dar es salaam were Pwan is about 1789.1 sq kilometers where there have been so many complaints from cashewnuts traders regarding price fluctuation of cashewnuts in the market. The reason to conduct this study at the headquarter of TCB is because the headquarter/head office is the administrative branch of all government and agents' cashewnuts offices in the country, therefore, the information obtained at this head office presents the rest of government and agents' cashewnuts offices in the country. Moreover, it was easy to obtain all cashewnuts related information at headquarter.

3.4.2 Research Population

According to Ruane (2005), research population refers to the individuals, events or objectives that have common observable characteristics and meet certain criteria for inclusion in a given universe. In this study there were both individual and object populations. Individual population comprised of key informantion from Tanzanian cashew nut farmers and cashew nuts' traders who were visited on different parts within the study area. Data was collected from these officials of the cashewnut board because they are directly involved with the overseeing the activities that involve the production and selling of the cashew nut in the market thus they are widely exposed in the incidence of price fluctuation of cashewnut in the Tanzania cashewnut production industry. While cashewnut traders were involved because they are playing a big put in setting price of cashewnuts in both international and local markets. On the other hand, the study involved information (object population) concern with cashewnuts prices and amount produced in the country.

4.0 Sampling Design and Procedure

4.4.1:Sample Design

Sample refers to parts or subjects that represent the whole population in which the researcher is interested in gaining information and drawing conclusion (Kothari, 2004). Is the process of selecting the right number of items or population to participate in a given study (Yin, 1994). A sample should be small enough to make data collection convenient and should be large enough to be true representative of the population which is selected.

Concern with individual population, in this study TCB's staffs were selected, base on the reasons given above on study population section. The staffs selected were those who have worked with TCB for not less than three years. It was researcher belief that working experience of three years and above is enough for a staff to understand all weakness and strength of an organization/institution/industry. The study involved only TCB's staffs who were working on the days that researcher was going to collect data at the mentioned TCB headquarter. Object population involved amount of cashewnuts produced in the country as well as the price of cashewnuts per kilogram from the year 1990 to 2014. The researcher believed that twenty four years period (1990-2014) could be enough to give reliable and valid data which can be able to show the real impact of price fluctuation on the production of cashewnuts in the country.

4.4.2 Sample Procedure

According to Kothari (2006), Is the process of selecting some part of the aggregate of the totality based on which a judgment or inference about the aggregate or totality is made. Being a process of selecting a group of people, objects, events, behavior, or other elements with which to conduct a study it is also involved in selection of technique to be used in the selection process. The choice of a sampling technique depend in a situation whether a sampling frame is available or not, that is, a list of the units comprising the study population. There are two types of sampling procedures namely probability sampling and non-probability sampling. Oppenheim (2002) defined probability sampling as that type of sampling which includes all types of elements of the population. In probability sampling each element has an equal and independent chance of being selected in a sample while in non-probability sampling is the one which does not based

on the theory of probability. If sample frame is available the researcher is advices to use probability sampling techniques such as simple, stratified and cluster random sampling techniques. And if it is not available the researcher has to use non-probability sampling techniques such as purposive, convenience and snow ball sampling techniques.

For the case of this study, since it is hard for the researcher to obtain sample frame/total population of cashewnut traders and staff of TCB at the said location, non-probability sampling specifically purposive and convenience sampling techniques were used to obtain the representative of cashewnut traders and staff of TCB. The selection of these techniques also based on the merits that these types of sampling techniques are simple and cheap to use them.

4.4.3 Sample Size

Sample size is the number of respondents selected to participate in the study from targeted population. It depends on the accuracy needed, population size, population heterogeneity whether the sample is subdivided or not and resources available (Bailey, 1994). Kothari (2006) is the number of items to be selected from the universe to constitute the sample. The sample size of this study included 70 farmers (peasant) 20 cashewnuts traders and 10 staffs of TCB at the TCB headquarter. Therefore, total number of respondents was 100 respondents.

4.5 Method of Data Collection

Is the process of gathering and measuring information on variables of interest, in an established systematic fashion that enables one to answer stated research questions, test hypotheses and evaluate the outcomes the study used both primary and secondary data.

4.5.1 Primary Data

Primary Data are those which are collected as fresh and for the first time and thus happened to be original in character (Brink, 1996). Therefore, primary data are original works of research or raw data without interpretation or pronouncements that present an official opinion or position. Kothari (2006) explained four major significant of primary data as follows: According to the nature of the present study questionnaire was the mainly tool of collecting primary data from respondents.

4.5.2 Questionnaire

A questionnaire is a collection of questions based on the subject of interest to the researcher and completed by respondent. However, there was two sets of questionnaires and the rationale for using two forms of questionnaires were to cater for the peculiarities, differences and view points between different respondents (cashew nuts famers,traders and TCB's staffs) in terms of availability, accessibility and their economic gains from the cashew nuts in the study area. A questionnaire consisted of both open and close ended questions.

The open-endedness of some questions in the questionnaires provided ample opportunity and leverage for respondents who wished to elaborate or write length on some issues

relating to the causes of price fluctuation of cashewnuts and efforts of the government in dealing with this problem. This further served as a means of validating some earlier answered questions and the respondent's consistency. Also questionnaire was used because much data from many people could be collected in a short period of time and lastly it was easy for the researcher to quantify them by using the software package. The questionnaires were developed in English and then later interpreted in Kiswahili.

4.5.3 Secondary Data

Secondary information was obtained through review of various documents. The study used published data on cashew nut production and pricing for the period 1990 to 2014. Hand in hand with collection of statistical information regarding inflation rates and economic development (GDP) of the country. This is because they also have an influence in the production process in the country. The data was derived from Tanzania economic surveys, statistical abstracts, Central Bank of Tanzania's quarterly economic reviews and annual reports of TCB. Substantial amount of information was also obtained through visits Ministry of Finance among other credible sources. However, the researcher visited some libraries in order to read up some materials concerning the impact of price fluctuation on agricultural products particularly cashew nuts.

4.5.4 Model Specification

Running a Regression; before carry out preliminary tests in line with time series data. The researcher ran the initial regression analysis testing the statutory top prices of cashewnuts, inflation rates, AGP and amount of cashewnuts produced in the aforementioned period of fourteen years. This was performed as follows: Where 'a'

constant term and 'β' is the coefficient of the regressed variable, 'AGP' is the agricultural productivity, 'CP' is the amount cashewnuts produced, 'PC' is the price of cashewnuts and 'IR' is the inflation rate.

$$CP = a + \beta_1 PC + \beta_2 IR + \beta_2 AGP + e$$

In this study, Granger causality is used to examine the direction of causality between impact of price fluctuation and production of cashew nut. This approach has been used in production function and test alternative techniques because of its favorable response to both large and small samples. The conventional Granger causality test method involves testing of hypothesis that impact of price fluctuation of cashew nut does not cause production of cashew nut (Y) and vice versa by running two regressions.

4.6 Data Analysis

Data will be processed and analyzed using STATA which is one of the statistical packages for data analysis. Since much of the data in question are time series data; preliminary tests were carried out to establish normality, multicollinearity, stationarity and co-integration of the series. Jarque-Bera test was employed to test for normality, Augmented Dickey-Fully tests for stationarity and Johansen Co- integration procedure for testing co- integration on variables.

Descriptive Statistics: the descriptive statistics were established to get the means, medians, standard deviations and the normality test for each of the variables. Multicollinearity Test: the correlation matrix for the variables were drawn and analyzed. When the correlation value is very close to zero it is concluded that the variables have

no close relationship. When the R^2 of the run regression is high and the partial coefficients of the regression are statistically different from zero then it can be conclude that there is no multicollinearity.

Unit Root Tests: using the Augmented Dickey-Fuller (ADF) test for stationarity, unit root tests were carried out for each variable. The ADF-Test was used on series in level and in the 1st difference. Conclusions about stationarity was made by comparing the ADF-Statistic and the Critical values (CV) at 1, 5 and 10 percent. When the ADF-Statistic is greater in absolute terms than the CV, the series is said to be stationary and the reverse implies non-stationarity. Series that are stationary in levels are integrated of order zero {1(0)}. While those stationary after the first difference are integrated of order one {1(1)} and if stationary after the second difference, then the series are integrated of order two {1(2)} and so on.

Cointegration test was carried out to verify whether the variables that were non-stationary have a long run relationship or whether they are cointegrated. When variables are cointegrated, it means the model containing such variables can be relied on for policy recommendations. To test for cointegration the study found out whether the residuals for a given regression are integrated of order zero {1(0)} or stationary. If they are stationary {1(0)}, although the variables are individually 1(1) or have stochastic trends, their linear combination can cancel out the stochastic trends in these variables (Gujarati, 2005) and as a result, such a regression will be meaningful and not spurious.

4.7   Reliability and Validity of the Research Instrument

4.7.1 Reliability of the Research Instrument

An instrument is considered reliable if the results of a study can be reproduced under a similar methodology (Joppe, 2000). Reliability is therefore the extent to which measures yield consistent results (Zikmund, 2000). To be considered reliable, the measuring instrument must be free of errors and the results or observations must be replicable or repeatable (Joppe, *ibid*). The consistency or reliability implied in the research instrument relates to three issues namely (1) the degree to which a measurement, given repeatedly, remains the same (2) stability of a measurement over time and (3) the similarity of measurements within a given time period (Kirk and Miller, 1986).

Reliability of a measuring instrument is established by determining the association between the scores obtained from different administrations of the instrument (Joppe, *ibid*). An instrument is considered reliable if the degree of association is high. The methods frequently used to test reliability are test-retest, split-half, equivalent-form and the Cronbach alpha (Cant, et. al 2003). The test-retest method estimates reliability as the Pearson product-moment correlation coefficient between two administrations of the same measure (Bland and Altman 1997). In the proposed study, the Cronbach alpha coefficient was used to calculate the internal consistency (reliability) of the measuring scales.

The Cronbach alpha indicates the extent to which a set of test items can be treated as measuring a single latent variable (Malhotra 1999) and is more accurate and careful method of establishing the reliability of a measuring instrument than the Spearman-

Brown and Kuder-Richardson reliability measures (Parasuraman, 1991). The Cronbach alpha can also produce a reliability estimate with a single administration. The Cronbach alpha coefficient is interpreted as the mean of all possible split-half coefficients (Bland and Altman 1997).

The Cronbach alpha reliability coefficient ranges from 0 to 1 (George and Mallery 2003), hence the closer the alpha coefficient is to 1.0, the greater the internal consistency of the items in the scale. According to George and Mallery (*ibid*), a Cronbach alpha coefficient of 0.70 or more is considered ideal. Other studies, however, regard a Cronbach alpha coefficient of 0.50 as acceptable for basic research (Tharenou, 1993). A Cronbach alpha of 0.70 means that 70 percent of the variance in observed scores (the actual scores obtained on the measure) is due to the variance in the true scores (the true amount of the trait possessed by the respondent). In other words, the score obtained from the measuring instrument is a 70 percent true reflection of the underlying trait measured. Therefore, the measures of the variables were conducted as follow:

Cause of Cashewnuts Price Fluctuations: the variables for finding out the causes of cashewnuts price fluctuations were quality of the cashewnuts, demand and supply of cashewnuts in the world market, the government interventionism, cost of inputs including packaging, improvement of technology, socio-economic status of producers/farmers, seasonality, storage facilities and price of crude oil. The instruments (variables) had a 5-point Likert-scale. A reliability check of these instruments revealed a Cronbach alpha of 0.767 which shows that the measure was reliable, according to (Tharenou, 1993).

Efforts of Government in solving Cashewnuts Price Fluctuation: the responses had 4-Likert scale and the variable to meet this objective of determining efforts of the government in solving cashewnuts price fluctuation were regulating policies and laws concern with availability and usability of agricultural equipments, control the price of the end product paid by the consumers, reimbursement controls-to establish different levels of reimbursement/payment of the workers in agricultural sector, though adjusting taxation structures, and conduct cashewnuts price comparison between Tanzania and other countries together with monitoring performance of cashewnuts industries. A reliability check of these instruments revealed of 0.785 which shows that the measure was reliable.

Table 3.1 : Reliability of the Study

Variables	Number of Items	Cronbach's Alpha Coefficient
Cause of Cashewnuts Price Fluctuations	9	
Efforts of Government in solving Cashewnuts Price Fluctuation	6	0.785
Reliability of Questionnaires	15	0.761

Source: Researcher Coputation (2015)

4.7.2 Validity of the Research Instrument

Polit and Hungler (1995) explained that validity is the extent to which the research data and methods used obtain considered precise, correct and accurate findings. The definition also reflects on questions of how well the findings reflect on the truth, reality

of the main questions. There are three kinds of validity as noted by Yin (1994) that is constructing, internal and external validity. Construct validity refers to the process of establishing the correct operational measures for the studied concepts. The researcher ensured construct validity in this study by re-examining data entered in the analytical software (STATA) before perform any analysis this was hand in hand with repetition of analysis procedures to ensure that the answer(s) is correct.

Internal validity refers to the extent to which a researcher can prove that only the independent variable caused the dependent variable; it looks at the approximate truth about inferences regarding cause-effect or causal relationships. Internal validity was not applicable in this study since the study did not test any hypothesis. External validity is aimed at determining if a study's findings are possible to generalize beyond the immediate case study. Since the study was conducted at TCB headquarter which is the administrator of other cashewnuts' administrative offices in Tanzania, therefore, the information obtained at this office presents the rest of cashewnuts offices in the country In order to attain validity data, multiple sources of evidence were used during the data collection. Secondly establishment of a chain of evidence was done and this was based on the principle to allow an external observer to follow the derivation of any evidence from initial research questions to the conclusions of the study. The third and last tactic was to have the draft case study report reviewed by key informants so as to ensure that no mistakes are made.

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CHAPTER FOUR

4.0 DATA ANALYSIS AND DISCUSSION

4.1 Introduction

This chapter aimed at presenting and discussing findings obtained from both primary and secondary sources concerning the impact of price fluctuation on production of cashew nuts in Tanzania. In order to deal with this objective the study has three specific objectives which are to: identify causes of price fluctuation of cashewnuts in Tanzania cashewnut's market, examine the extent to which price of cashewnuts has been fluctuated in Tanzania cashewnut's market, identify the relationship between cashewnut's price fluctuation and amount of cashewnuts harvested and to assess if the government of Tanzania help out in solving the problem of cashew nut's price fluctuation. These have been also narrated on chapter one of this study. Now, in this chapter data have been presented in to two groups which are descriptive results and study results.

4.2 Descriptive Results

The background of respondents was analyzed through demography characteristics which include gender, age, and highest level of education as well as employment status of responded staff of TCB. However descriptive analysis of Cashew nuts Production (CP) and the Price of Cashew nuts (PC) as well as inflation rates (IR), and Agricultural Productivity (AGP) were conducted.

4.3 Demographic Data of Respondents

In this subsection, respondents' characteristics were analyzed. Respondents were asked to indicate their gender, age and their highest level of education. Frequency table 4.1

below shows that in the study respondents were employees of Tanzania Cashewnuts Board (TCB) and Cashewnuts Traders (CT) whereby respondents from farmers were (70) mean that 50 male and 20 female,TCB were ten (10) and CT were twenty (20). Total respondents were hundred (100). The results of this table 4.1 continue to show that more than two third of respondents (70%) were made this can implies that there many male individual engaging in cashewnuts industry than female individuals. If you can observe you can see that in both categories of respondent farmers, TCBs' staff and cashewnuts traders, number of male was outnumbered that of female at a big difference.

Almost half of the respondents (47%) were people aged between 40-49 years old followed by those who were between 30-39 years old who presented 30% of all respondents. This implies that respondents in this study were people who have seen so very many things regarding agricultural investment and economic growth of the country in present and past regimes. However the result of the some table show that 60%, 35% and 5% of responded cashewnuts traders were holding diploma, bachelor degree and master degree education qualifications respectively; while 60% and 40% of the responded TCBs' staff were people who were holding bachelor and master degree qualification respectively. Therefore, it can be said that the results were from knowledgeable people. Lastly the table shows that more than three quarters (57%+30%) of respondents had dealt with cashewnuts business for the period of the 6 years and above. For that reason it can be said that the results were from experienced people who know well issues concern with cashewnuts production and market prices.

Table 4.1 : Demographic of Respondents

Farmers		Category of respondent		Total
		TCB's Officer	Cashewnut Traders (CT)	
Gender of respondent	Male 50(85%)	6 (60%)	15 (75%)	71(70%)
	Female 20(15%)	4 (40%)	5 (25%)	29(30%)
	Total 70(100%)	10 (100%)	20 (100%)	99 (100%)
Age of respondent	20-29 years	-	2 (10%)	2(7%)
	30-39 years	3 (30%)	6 (30%)	9(30%)
	40-49 years	6 (60%)	8 (40%)	14(47%)
	50 years and above	1 (10%)	4 (20%)	5(16%)
	Total	10 (100%)	20 (100%)	30 (100%)
Education qualification of respondent	Diploma	-	12 (60%)	12(40%)
	Bachelor	6 (60%)	7 (35%)	13 (44%)
	Master	4 (40%)	1 (5%)	5(16%)
	Total	10 (100%)	20 (100%)	30 (100%)
Working experience in cashewnut industry	2-5 years	2 (20%)	2 (10%)	4(13%)
	6-10 years	5 (50%)	12 (60%)	17(57%)
	11 years and above	3 (30%)	6 (30%)	9(30%)
	Total	10 (100%)	20 (100%)	30 (100%)

Source: Field Data (2015)

4.3.1 Descriptive Analysis of Study Variables

The study went ahead and collects data concern with Cashewnuts Production (CP), the Price of Cashewnuts (PC), inflation rates (IR), and Agricultural Productivity (AGP) for the period of 24 years start from 1991 to 2014. Inflation rate was important to be considered in analysis because inflation affects agricultural investment because of the uncertainties associated with it and the fear of lower returns from future investments.

The result of such descriptive analysis have been given in the table 4.2 where the table shows that the minimum cashewnuts produced within the period under review was tones 6431 in the year 2001 while maximum production was tones 122283 in the year 2000 with the mean of 64382.29 tones. The minimum price was 137 TSH/KG in the year 1991 and maximum price was 1701 TSH/KG in the year 2011 while mean price within this period was 677TSH/KG. Inflation rate has been increasing constantly throughout the period from 10.95 in 1991 to 144.62 in 2014. Other results are as shown in the table 4.2 below.

4.3.2 Study Result

After presenting descriptive data in upper section, in this section analysis of main findings were presented as per objectives of the study. The collected quantitative data were presented in tables while qualitative data were presented in summary of propositions. However, much of data for this research were quantitative. As mentioned above (section 3.6) STATA software package was used to analyse these data.

Table 4.2 : Descriptive Statistics of Study Variables

YEARS	CP (Tones)	PC (TSH/KG)	IR (%)	AGP
1991	41238	137	10.95	225.46
1992	39323	160	13.34	221.18
1993	46603	200	16.72	221.08
1994	63403	330	22.41	219.23
1995	81729	380	28.56	225.98
1996	63033	300	34.55	229.27
1997	99915	330	40.11	229.93
1998	106442	460	45.25	229.78
1999	121207	600	48.82	234.70
2000	122283	250	51.71	240.78
2001	6431	300	55.02	248.23
2002	81220	300	59.65	255.61
2003	28710	360	60.10	258.60
2004	83192	460	63.15	268.33
2005	62000	750	66.33	274.33
2006	59180	600	71.14	278.76
2007	14841	600	76.14	283.18
2008	60468	610	83.97	289.18
2009	51910	700	94.16	291.18
2010	65898	1700	100.00	295.34
2011	65899	1701	112.69	297.52
2012	65487	1650	130.72	301.79
2013	54892	1680	141.01	305.87
2014	59871	1700	144.62	306.76
Mean	64382.29	677	65.46333	259.6696

Source: Tanzania Bureau of Statistic (2015)

4.3.3 Cause of Cashewnuts Price Fluctuations

The first objective of the study was to identify causes of price fluctuations (volatility) of cashewnuts in Tanzania cashewnut's market. The variables used were quality of the cashewnuts, demand and supply of cashewnuts in the world market, the government interventionism, cost of inputs including packaging, improvement of technology, socio-economic status of producers/farmers, seasonality, storage facilities and price of crude oil. The variables were presented to the respondents in form of short questions and they were asked to rate their views on how they could regard the given variables as the causes of price fluctuation in Tanzania cashewnut's markets. The response mode was in the Likert scales ranging from (1) strongly disagree to (5) strongly agree with the neutral point at the middle.

During analysis stage researcher used mean scores, standard deviation and ranks to explain the results of this first specific objectives of the study. It must be noted that the mean is the average value of response for each item on the Likert scale. This is simply the sum of the values divided by the number of values. The implication is that the item with the highest mean is the one which most respondents chose or rated highly and vice versa.

Standard deviation is, however, a measure of variation. This uses all the observations, and is defined in terms of the deviation (xi-μ) of the observations from the mean, since the variation is small if the observations are bunched closely about their mean, and large if they are scattered over considerable distances. This means an item on the Likert scale

with the smallest standard deviation implies that respondents gave a similar answer to that item compared with the others.

While rank was used to arrange analyzed results according to the order of important, starting from the most factor for the price fluctuation to the least factor. The results have been clearly given in the Table 4.3 below.

Table 4.3 : Cause of Cashewnut Price Fluctuations

S/N	Cause of Price Fluctuation	Scores					N	Mean Score	STD	Rank
		1	2	3	4	5				
1	Quality of the cashewnuts	1	1	7	12	9	30	3.94	1.21	1
2	Demand and supply of cashewnuts in the world market	1	3	10	5	11	30	3.7	1.18	2
3	The government interventionism	2	1	8	17	2	30	3.51	1.13	3
4	Cost of inputs including packaging	1	6	16	2	5	30	3.17	1.26	4
5	Improvement of technology	5	1	13	7	4	30	3.13	1.22	5
6	Socio-economic status of producers/farmers	5	6	4	13	2	30	3.09	1.22	6
7	Seasonality	4	12	7	4	3	30	2.62	1.12	7
8	Storage facilities	9	10	1	5	5	30	2.56	1.15	8
9	Price of crude oil	6	15	7	1	-	30	2.01	1.16	9
	1= Strongly Disagree, 2= Disagree, 3= Neutral, 4= Agree, 5=Strongly Agree									

Source: Field Data (2015)

From the Table 4.3 above it can be revealed that cause of cashewnuts price fluctuations, according to the order of priorities are quality of the cashewnuts marketed (mean score

3.94), demand and supply of cashewnuts in the world market (mean score 3.70), the government interventionism (mean score 3.51), cost of inputs including packaging (mean score 3.17), improvement of technology (mean score 3.13), socio-economic status of producers/farmers (mean score 3.09), seasonality (mean score 2.62), storage facilities (mean score 2.56) and price of crude oil (mean score 2.01).

i)   Quality of the cashewnuts marketed

The quality of cashewnut was voted to be number one cause of the price fluctuations. It was highlighted that what matter most in the market is superiority of the seeds. The price shoots up when the seeds are of high quality and drop down when as the seeds are getting poor. It should be known that the quality of the nuts/seeds depend on the weather condition as well as pests and diseases attacked the crops and technology used in the preparation of the final products before taken to the market. However, quality given competitive advantages when supply is very high; apart from Tanzania it should be known that cashewnuts are produced in many different countries such as India, Brazil, Mozambique, Kenya, Vietnam, Indonesia, Costa Rica, Guatemala and so on. In the competitive market like this, what matters is the quality of the product as reported by Spaulding (2014) that the major tool of competition is product differentiation, which results from differences in product quality among other factors. It was also mentioned by one of the discussion members in this study that the high quality brand has high reputation since customers will continue to buy the products of such brand even if the price will increase.

Therefore, when the quality of the Tanzanian cashewnuts is high compare to those from other countries, their competitive advantages in an international market increase and so the price. Likewise, poor quality decreases competitive advantages together with the price.

ii) Demand and supply of cashewnuts

The demand and supply of cashewnuts in the world market was the mentioned to be a number two cause of cashewnuts price volatility in Tanzania. As already mentioned above that cashewnut products are grown in some several countries in the world, therefore, they are highly subjected to the concept of demand and supply. For sure, oversupply of cashewnuts in the market with a limited demand tends to bring down the prices. Increased supply of substitute nuts such as walnuts or hazelnuts or almonds also leads to a lower price for the cashewnuts in the market. The demand and supply theory acknowledged that when the supply of a commodity increases the price of that commodity drops and vise verse.

It was mentioned that decline of the price of cashewnuts in both Tanzania local market and in an international market in terms of oversupply arises when the cashews are in the pick season. After its pick season the demand becomes high and supply becomes low which in tuner increase the price of cashewnuts and it's when traders who had stocked their cashewnuts get chance to sell at the price they want as long as the market is still demanding.

iii) **Government interventionism**

Government can intervene with the marketing of the cashewnuts and cause drop of rise of the price. Government intervention can be through policies which directly affecting plantation of the cashewnuts or packaging or shipping to the international markets. This can be done through increase or decrease of the exportation duties and bureaucracy attached on the whole process or by directly stopping free trade of cashewnuts that facilitate cashewnuts exportation to the neighboring countries. According to Mbendi (2014) there is the relationship between commodities prices and government fiscal and monetary policies. Another important factor apply is the assistance producers/farmers receive from the government such as fertilizers, seeds, pesticide and related agro-equipments. All these assistances, in their presence, can simplify production costs and bring price of the end products down.

iv) **Cost of inputs including packaging**

Cost of inputs especially fertilizer and processing costs such as peeling and packaging of cashewnuts all together determine the price of the cashewnuts. The increase of these costs lead to the increase of the price as legged by Raquet and Emback, (2011) who noted that reduction in cost of agricultural inputs can also lead to low agricultural prices. That is why some governments provide input subsidies to enable their farmers produce at competitive prices. This is the same conclusion reached by Mitchell (2004) who argued that due to favorable weather conditions for the paddy growth in Pakistan the inputs price become cheap and so the price of paddy. According to Marx's theory a price of an object or condition is determined by the sum of the cost of the resources that went into making it. The cost associate with production of cashewnuts including factors

of production such as price of pesticides and fertilizers, labor or employment price, land and other agro-equipments such as tractors, hoes, storage and taxation go along with transportation and selling. The price of cashewnuts in the market depends highly on the amount used in production processes.

v) **Improvement of technology**

Productivity improving technologies are those technologies that lowered the traditional factors of production of land, labor capital, materials and energy that go into the production of economic output. In these days of high economic development on the ground of technological development, different new equipments and improved procedures have been introduced and/or adopted in the agricultural activities. Cashewnuts growing is at the forefront of the technology where there are improved seeds which grow up faster and start producing just at the age of three years which is shorter compare to the traditional seeds which start producing at the age of ten years. There are also improved precision in fertilizer application and harvesting technique as well as modified irrigation systems to assure supply of water to the farms through pipes in the context of simplifies local farmers' workload as opposed to doing it by hand.

It was argued that technological changes influence the price of the commodities includes cashewnuts. Advanced and improved technology reduces the cost of production, which raises the profit margin. But in the competitive market it also induces the seller to reduce the price following cheap input-price. On other hand, technological degradation or complex and out-dated technology will increase the cost of production and it will lead to increase of the output-price. However, as we know that price volatility is a

multidimensional concept. The study consulted one of the experts in marketing field, Mr. S. Mwelele, who model that in recent time with the high development of technology in every sector; technology may not be the main factor for the reduction or hiking of price in agricultural commodities. He continued that in Tanzania we have sufficient agricultural production technology but the distribution or supply of agricultural products to market is not well maintained. Therefore, the major issue is how we distribute our products within internal and external markets. His argument was also supported by that fact that less and less market intermediaries lead to more market efficiency and also affect the price. In this case price spread become less so price also decrease and vice versa.

vi) **Socio-economic status of producers/farmers**

The increase of nodes (individuals) and ties (connections) in farmers' social networks create strong farmers' unions that work to secure the interests and benefits of the farmers. Examples of the Tanzanian farmers' co-operations (Trade unions) which work to ensure the rights of farmers are met are Tandahimba Cashewnut Farmers Association, Mtwara Farmers Group, and Newala Native Cooperative Union are among farmers associations in Southern Tanzania with a strongest objective of guarantee farmers are getting satisfactory returns from their crops. Trade unions have been according to Mitchell (2004) established with the view of shading light in realizing and fighting for the rights of their member-workers. ILO (2014) highlighted that both international organization and other related local organizations formed for the supervision of agricultural activities have the common aim of establishing price standards of both

agricultural equipments and products at the main tool of addressing many sorts of problems facing farmers in their productions.

In this study it was said that price of cashewnuts can go high or low depend on the management ability of cashewnuts farmers associations. With good managements that protected the income of farmers through proper strategic plans such as securing agricultural loans from financial institutions to the association members together with preparing enough storage places for the harvests during high season of production the price tend to be high. But in the presence of week managements where every individual farmer is free to set his/her retail price to reflect the cost he/she incurred in production the price always goes done since farmers start to compete for the customers with the price. Therefore, it can be understood that price of cashewnuts depend on the socio-economic condition existing between farmers at that time.

vii) **Storage Facilities**

Availability of safe storage facilities at the time of high supply enables farmers to keep their crops till the demand increase. By doing so farmers are secured from the fallen price where the price (value) of the crops becomes distributed equally throughout the year. Lack of enough and safe storage facilities may cause farmers to sale their crops under give away price.

Aspired by the government policy of poverty reduction, in the year 2004/2005, Ministry of Industry, Trade and Marketing together with Ministry of Agriculture introduced warehouse receipt systems in the trading and marketing of cotton, cashewnuts and coffee

under the aim of adding value in productivities of these crops. The ultimate reason for the establishment of the warehouse system in the country was to stabilize the price of agricultural crops to the farmers. Regarding cashewnuts warehouses were introduced in Tanndahimba, Newala, Masasi, Nachingweya, and Lindi areas that are renowned for the cashewnuts production in the Tanzania. These warehouses are used by both farmers and traders to store their crops. The warehouse operators hold the stored commodity by way of safe custody; implying they are legally liable to pay for the good any value lost through theft or damage by fire and other catastrophes but have no legal or beneficial interest in it. The receipts may be transferable, allowing transfer to a new holder a lender (where the stored commodity is pledged as security for a loan) or trade counter-party which entitles the holder to take delivery of the commodity upon presentation of the Warehouse receipt at the warehouse (Onumah, 2003).

In the discussion with some of the staff of TCB it was noted that apart from facilitating price stability the aim of warehouse receipt system is to guarantee farmers with the loans from the bank and using the stored crop as collateral until it is sold. The farmers under this system are paid 70% of the farm gate price at the start and 30% is paid when the crop is sold in the designated auction. Then if the crop is sold over its breakeven point the excess amount is also paid back to the farmers through their co-corporative societies. This being the fact the price of cashewnuts move up when farmers take almost all of their crops in warehouse receipt systems and fall down when decides to sale large part of their crops by themselves following their desire of faster money.

4.3.4 Fluctuation of the Price of Cashewnuts

The second specific objective of this study was to examine the extent to which price of cashewnuts has been fluctuated in Tanzania cashewnut's market. Data regarding price of cashewnuts, from 1990 to 2014, as indicated in Table 4.2 above were used to get to the conclusion of this second specific objective. Descriptive analysis and graph plot for the cashewnuts price under question was obtained using SPSS as well as scatter plot to determine the increase of the cashewnuts price in the given time frame.

In view of that normality test was used to test distribution of cashewnuts from 1990 to 2014. The common test for normality is the Jarque-Bera statistics test (Jarque, 1980). This test utilizes the mean based coefficient of skewness and kurtosis to check the normality of all the variables used. Skewness measures the direction and degree of asymmetry. A value of zero indicates a symmetrical distribution. A positive value indicates skewness (longtailedness) to the right while a negative value indicates skewness to the left. Values between -3 and +3 indicate are typical values of samples from a normal distribution. While Kurtosis measures the heaviness of the tails of a distribution.

The usual reference point in kurtosis is the normal distribution. If this kurtosis statistic equals three and the skewness is zero, the distribution is normal. Unimodal distributions that have kurtosis greater than three have heavier or thicker tails than the normal. These same distributions also tend to have higher peaks in the center of the distribution (leptokurtic). Unimodal distributions whose tails are lighter than the normal distribution tend to have a kurtosis that is less than three. In this case, the peak of the distribution

tends to be broader than the normal . Negative kurtosis indicates too many cases in the tails of distribution while positive kurtosis indicates too few cases. Table 4.4 and graph 4.1 together with graph 4.2 below show the result of the aforementioned analyses.

Table 4.4 : Descriptive Statistics of Cashewnuts prices from 1990-2014

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Price of Cashewnuts (TSH/KG)	24	137	1701	677.42	553.304	1.212	.472	-.095	.918

Source: Secondary Data (2015)

Graph 4.1 : Graph Plot of Cashewnuts Prices from 1990-2014
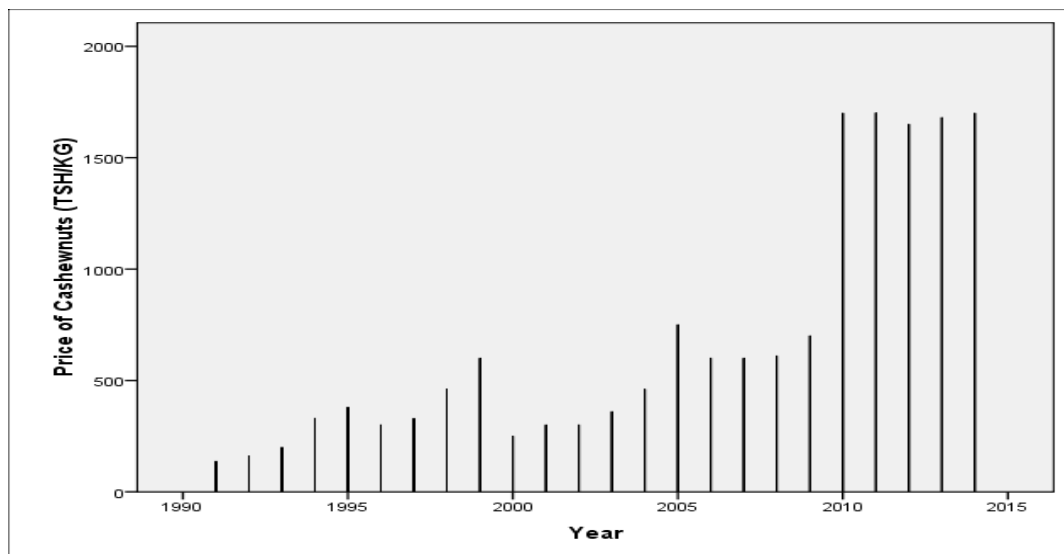
Source: Secondary Data (2015)

Graph 4.2 : Scatter Plot of Cashewnuts Prices from 1990-2014
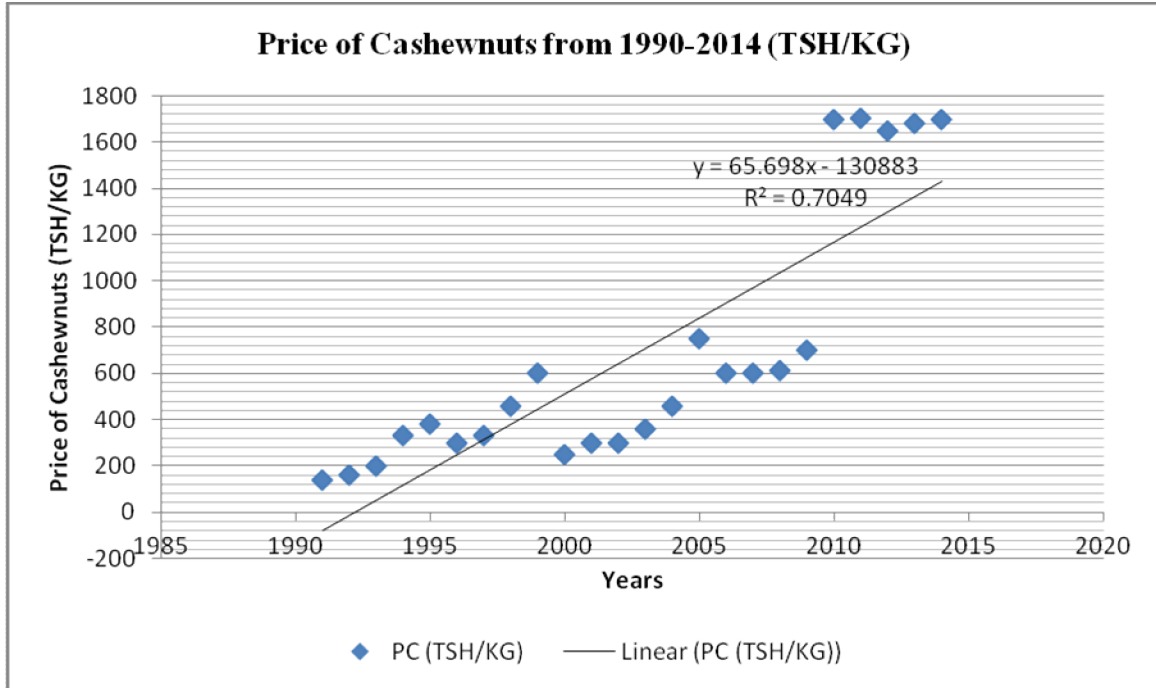
Source: Secondary Data (2015)

From the analytical results above (graph 4.1), it shown that cashewnuts farmers had enjoyed an increase of the cashewnuts in term of TSH per KG at the beginning of the period under review where the price increased from TSH 137 per KG in the year 1990 to TSH 380 per KG in the year 1995. This can be due to the increase of the agricultural equipments during this time whereby the second government of Tanzania under the leadership of president Ally Hassan Mwinyi allowed free entry of many commodities especially agricultural equipments following his RUKSA Policy with the aim of empowering entrepreneurship in the country. But there was slightly decrease of the price in the year 1996 to TSH 300 per KG of cashewnuts. It should be known that at this time third government took over in the country and the country was under the leadership of Benjamin Willium Mkapa (third president of Tanzania). But the price begun to increase from the year 1997 were it was TSH 330 per KG of cashewnuts to the year 1999 were it

reaches TSH 600 per KG. Again in the year 2000 the price was highly dropped to 250 TSH/KG and slightly increases to 300TSH/KG in both 2001 and 2002. It should also be known that in the year 2000 there was general election in Tanzania where Hn. Mr. Willium Mkapa entered for his second term in the government.

In line with that the price increased simultaneously from 300TSH/KG in the year 2002 to 750 TSH/KG in the year 2005 and once more dropped to 600TSH/KG. This was also a time when there was a general election where Hn. Mr. Jakaya Mrisho Kikwete became a president of the fourth government of Tanzania. With these results, in simple term, it can be thought that there is the great relationship between politics and economic development especially agricultural sector in particular cashewnuts production. Since this study was only to show the trend of price fluctuation and relationship with the production of agricultural products with the case study of cashewnuts, therefore, it is the researcher suggestion that other studies to be carried out to examine relationship between politics and agricultural development in the country.

The price again gradually increased from 600 TSH/KG in the year 2006 and 2007 to 610TSH/KG in the year 700TSH/KG in 2009 and greatly increased to 1700TSH/KG and 1701TSH/KG in the year 2010 and 2011 respectively. The increased was said to be helped with the increase of the demand of cashewnuts in the world market following political unrest that destroyed agricultural productivities in India, Indonesia and other east and central east countries that produce cashewnuts in large quantities. It again slightly dropped to 1650TSH/KG in the year 2012 and increased simultaneously to 1700 TSH/KG in the year 2014.

However, the results of table 4.4 show that the mean of cashewnuts price within the 24 years period under review was 677.42 TSH/KG while the minimum price was 137 TSH/KG (in 1990) and maximum price was 1701 TSH/KG (in 2011). The value of Skewness was positive 1.212 indicating that the price distribution of cashewnuts within the period under review is normal and skewed in the positive direction. For that reason, it can be said that the price of cashewnuts in Tanzania market is becoming more normal as you move from previous years to recently years or as the years going on. However, Kurtosis value was found to be negative 0.095 (or -0.095) which envisage that there many things should be done to continue keeping the cashewnuts price normal in the future. This can be either through innovated marketing strategies hand in hand with the use of modern methods of cultivation, harvesting and packaging. These can go a long way in improving cashewnuts production and farmers life standard following attractive farmers' gateway prices.

Graph 4.2 above shows scatter plot with the line of fit, the dots are randomly scattered from the diagonal line and this is why a very large standard deviation of 553.304 TSH/KG was observed in descriptive statistic of table 4.4. Now the reason for drawing the scatter plot with the line of fit was to determine the rate to which price of cashewnuts is growing as well as coefficient of determinant (R-Square). From the graph 4.2 it can be observed that cashewnuts price (Y) grown at the rate of 65.69 within a period of 24 years. However, the best equation to determine the price of cashewnuts in Tanzania has been given as Y= 65.69 X − 13088 whereby Y is the price of cashewnuts and X is the number of the years. Additionally, it was also indicated that 70.4% (since $R^2 = 0.704$) of the price of cashewnuts in Tanzania is determined by the number of the years and the

remaining percentage which is 29.6% can be determined by other things like inflation rate, labour productivity, marketing and so on.

4.3.5 Long run Causality

Long run causality is performed by testing whether the coefficient of the Error collection term in each equation is statistically different from zero by a t-test and it has a positive sign, the coefficient of high grade and low grade of cashew nut price equation has positive and statistically significant. In equation labour also positive coefficient and statistically significant while capital accumulation has negative and statistically insignificant what implies unidirectional causality run from impact of price fluctuation and cashew nut production in the long run.

4.3.6 Short-run Causality

The short run Granger causality test based on likelihood ratio test, which follows the chi-square distribution; test jointly the significance of the coefficients of the explanatory variables in their first differences, where cross equation restriction are imposed on the lag differences in each of the equations. This study fails to reject null hypothesis.

4.3.7 Difference between Price Fluctuation and Cashewnuts Produced

The third specific objective of the study Relationship was to identify the relationship between cashewnuts price fluctuation and amount of cashewnuts harvested. Time series analysis was used to establish the mentioned relationship. And the variables used were amount of cashewnuts produced (CP) as the dependent variable together with price of

cashewnuts (PC), inflation rate (IR) and agriculture productivity (AGP). In the process of performing this, the researcher had to perform three types of the test which included multicollinearity test, unit root test and cointegration test. However, before conducting these testes the researcher wanted first to find out how independent variables were affecting dependent variables. Therefore, there are many different approaches that could be taken to estimate the effect of independent variables (price of cashewnuts, inflation rate and agriculture productivity) on the dependent variable (cashewnuts production) but the empirical aim for this study was to set up a regression equation as such

$$CP = \beta PC + \beta IR + \beta AGP + e \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\text{i}$$

Whereby, CP is the amount of cashewnuts produced from 1990 to 2014, PC is the price of cashewnuts within this period, IR is the inflation rate and AGP is the agricultural productivity in the period under question while e is the estimated residuals from the regression results. In view of that data from the table 4.2 were used to establish regression equation as well as testing for the Multicollinearity in the data; but first data were converted to natural logarithm.

Table 4.5 : Regression Analysis of the Variables

```
. regress CP PC IR AGP

      Source |       SS       df       MS              Number of obs =      24
-------------+------------------------------           F(  3,    20) =    1.74
       Model |  4.0198e+09     3  1.3399e+09           Prob > F      =  0.1915
    Residual |  1.5419e+10    20   770956480           R-squared     =  0.2068
-------------+------------------------------           Adj R-squared =  0.0878
       Total |  1.9439e+10    23   845170501           Root MSE      =   27766


          CP |     Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          PC |   3.58811   25.00858     0.14   0.887    -48.57887    55.75509
          IR |  883.8225   625.2366     1.41   0.173    -420.3983    2188.043
         AGP | -1286.439   592.5359    -2.17   0.042    -2522.447    -50.4308
       _cons |  338142.8   123965.4     2.73   0.013     79555.51      596730


. vif

    Variable |       VIF       1/VIF
-------------+----------------------
          IR |     17.70    0.056513
         AGP |     10.31    0.096972
          PC |      5.71    0.175064
-------------+----------------------
    Mean VIF |     11.24
```

Source: Researcher Computations (2015)

From the table 4.5 it can be said that the IR and AGP variables have huge multicolinearity data problems since they have a variance inflation factor (VIF) greater than ten. Therefore, these variables if used in regression model tend to measure the same relationship or quantity as what can be measured by another variable or group of variables in the model. To remove multicolinearity problem the variables will be converted to first difference.

Additionally, the table shows the slope for predicting cashewnuts production is positive at 338142.8 which indicates a positive relationship between the expected level of the cashewnuts production and the predictors (price, inflation rate and agricultural productivity) in the regression equation. Specifically, price of cashewnuts (PC) has positive slope of 3.588 with cashewnuts production (CP) which indicate that production

of cashewnuts increase with the increase of price. The same applied to IR were the slope between inflation rate (IR) and cashewnut production is positive 883.822. But agricultural productivity has got negative slopes of -1286.439 with cashewnuts production (CP). This can suggest that cashewnuts production increase with the decrease of agricultural productivities in the country.

However, the regression result continued to show that the correlation coefficient (R Squire) is 0.2068 which suggests a weak correlation between the cashewnuts production and the predictors. The coefficient of determination (Adj R Squire) is also observed to be 0.0878, which indicates that 8.78% of the variation in the cashewnuts production is determined by the regression model or question. The regression equation at "level" for predicting cashewnuts production can be given as

CP = 33814.8 + 3.588PC + 883.822IR – 1286.43AGP…………………………ii

On the other hand, the model is either statistically significant or not statistically significant. This is because the level of significant is negligible (has not been given) at the 5% level of significance which signifies that the model many not be useful for prediction of cashewnuts production. This effect might be brought by the existence of unit roots in the data. According to Maddala (1992), the majority of raw data in economic time series are non-stationary because they normally exhibit some trends over time which can be removed by using first difference.

i) **Unit Root Test**

The regression result in table 4.5 may be misleading because the time series data may be suffering from non-stationarity problem. For instance, in table 4.5 a percentage change

in price of cashewnuts increases cashewnuts production by 100% which may be misleading because there are very many things to which production of cashewnuts and other agricultural products depend on apart from the price of the products in the market. Likewise the negative relationship between cashewnuts production and agricultural productivity of the country is also problematic and needs to be investigated.

Non-stationarity problem may occur when the mean or expected value of a given data varies. The problem of non-stationary series of the variables (both the dependent and the independent) may lead to spurious regression problem. Similarly, the least square estimators will be inconsistent and diagnostic statistics such as T and F statistic will not have their standard limiting distributions. This may lead to having regression coefficient of the explanatory variables which are significantly different from the actual coefficient (Dougherty, 2002). Researcher, therefore, conduct a unit root (Dickey-Fuller and Augmented Dickey fuller) test to investigate whether the time series data are stationary or not. According to Gujarati (2003) Dickey-Fuller (DF) test can be estimated in three different ways as follows.

Y_t is a random walk with no drift no trend $\Delta Y_t = \delta Y_{t-1} + u_t$...........................iii

Y_t is a random walk with a drift $\Delta Y_t = \beta_1 + \delta Y_{t-1} + u_t$......................iv

Y_t is a random walk with a drift and trend $\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + u_t$.............v

The DF test is employed under the null hypothesis that there is a unit root problem (the variable is non stationery) while the alternative hypothesis states that the series is stationary (stationary). This test takes into account the serial correlation of the stochastic

error term and it also assumes that the error term has a constant variance and it is statistically independent. The hypotheses are that

Null (H_O) = Variable is not stationary or got unit root

Alternative (H_1) = Variable is stationary or no unit root

Table 4.6 : Results of Unit Root Test (at Level)

Number of observations = 24					
	DF Models	Test Statistics	5% Critical Value	Lag 1	Stationarity and Validity
CP	With no drift no trend	1.468	-1.950	0.016	Not Stationary
	With drift	-1.171	-3.00	-0.108	Not Stationary
	With drift and trend	-2.551	-3.60	-0.483	Not Stationary
PC	With no drift no trend	1.468	-1.950	0.0160	Not Stationary
	With drift	-1.171	-3.00	-0.108	Not Stationary
	With drift and trend	-2.551	-3.600	-0.483	Not Stationary
IR	With no drift no trend	-3.633	-3.600	-0.190	Stationary
	With drift	-5.023	-3.000	-0.078	Stationary
	With drift and trend	5.475	-1.950	0.0254	Stationary
AGP	With no drift no trend	4.741	-1.950	0.0024	Stationary
	With drift	0.486	-3.000	0.0122	Not Stationary
	With drift and trend	-2.981	-3600	-0.3371	Not Stationary

Source: Researcher Computation (2015)

From the result of the table 4.6 above where DF test was used, there is enough evidence to suggest that all the series, except inflation rate, are suffering from non-stationary problems. Therefore, there is evidence that the null hypothesis of non-stationarity is accepted hence the residual is non-stationary. This means that, the regression results generated above (in table 4.5) must be treated cautiously. Moreover, conceding inflation

rate (IR) although it has been found to be stationary at level but there some distrust because its third equation for unit root test (with drift and trend) shows that IR can make a model to be invalid for the reason that its lag value is not negative, instead it is positive 0.0254. It should be known that for the series data to be stationary should produce absolute value of DF test statistic greater that absolute critical value at 5% together with negative lag value. With this condition it can be argued that IR has got weakly stationary data which should be also subjected to second DF test after first difference together with other variables under question. After taking the first difference the results of unit root test are given in the table 4.7 below.

Table 4.7 : Results of Unit Root Test (at First Difference)

Number of observations = 24					
	DF Models	Test Statistics	5% Critical Value	Lag 1	Stationarity and Validity
CP	With no drift no trend	-4.466	-1.950	-0.969	Stationary
	With drift	-4.853	-3.000	-1.083	Stationary
	With drift and trend	-4.731	-3.600	-1.083	Stationary
PC	With no drift no trend	-4.466	-1.950	-0.969	Stationary
	With drift	-4.853	-3.000	-1.083	Stationary
	With drift and trend	-4.731	-3.600	-1.083	Stationary
IR	With no drift no trend	-1.490	-1.950	-0.095	No Stationary
	With drift	-1.384	-3.000	-0.170	No Stationary
	With drift and trend	-1.685	-0.259	-3.600	No Stationary
AGP	With no drift no trend	-2.072	-1.950	-0.313	Stationary
	With drift	-3.978	-3.000	-0.732	Stationary
	With drift and trend	-3.6000	-3.588	-0.712	Stationary

Source: Researcher Computation (2015)

The findings show that, with exception to inflation rate, all variables were non-stationary at level (table 4.6). However, after taking the first difference they become stationary while inflation rate become non-stationary at first difference (table 4.7). Since CP, PC and AGP was non stationary at level and become stationary at first difference, meanwhile IR was stationary at level and non stationary at first difference, therefore, in establishing relationship between these variables researcher will use second difference data of these variables. The second difference series of these variables were tested (the results are not included in this study) and found to be stationary and promising valid model. Hence the issue of non stationary series will not be a problem in the series. Thus both variables are integrated of order two i.e. I (2). This gives a researcher chance to apply cointegration test to see if these variables have a long run relationship.

ii) Cointegration Test

When the individual variables are non-stationary and they are integrated of the same order, there is a chance that their linear combination to be stationary. If the variables have this relationship, it can be said that the variables are cointegrated that is they tend to move together in the long run as reported by Engle and Granger (1987). In this study, researcher employed Johansen cointegration test to capture the existence of long run relationship between Cashewnuts Production (CP) and Price of Cashewnuts (PC). In this technique, we need to identify the number of cointegrating equations available. Normally, the null hypothesis states that there is no cointegrations between the variables while the alternative hypothesis states there is cointegration between the variables. The lag length used as per Johansen Information Criterion was one. However, Johansen test

for cointegration was used and the hypotheses are Null: there is no cointegration between variables, ALT: the is contegration between variables.

Table 4.8 : Results of Cointegration Test

```
. vecrank D2.CP D2.IR D2.AGP, trend(constant) max

                         Johansen tests for cointegration
Trend: constant                                      Number of obs =      20
Sample:  1995 - 2014                                         Lags =       2
───────────────────────────────────────────────────────────────────────────
                                                        5%
maximum                                     trace    critical
   rank     parms        LL      eigenvalue statistic  value
    0         12      66.240424       .       47.9236   29.68
    1         17      79.499839    0.73445    21.4048   15.41
    2         20      85.65501     0.45964     9.0944    3.76
    3         21      90.202219    0.36537
───────────────────────────────────────────────────────────────────────────

                                                        5%
maximum                                      max     critical
   rank     parms        LL      eigenvalue statistic  value
    0         12      66.240424       .       26.5188   20.97
    1         17      79.499839    0.73445    12.3103   14.07
    2         20      85.65501     0.45964     9.0944    3.76
    3         21      90.202219    0.36537
───────────────────────────────────────────────────────────────────────────
```

Source: Researcher Computation (2015)

Table 4.8 above provided the results from the Johansen cointegration test. It can be seen that at zero rank, the test rejected null hypothesis as it can be seen the trace statistic value (47.9236) is greater than the 5% critical value (29.68). However, at rank zero, the max statistic value (26.5188) is also greater than the 5% critical value (20.97). Therefore, the test has double confirmed existence of cointegration equation between the variables. Hence it can be said that the variables under test have long run relationship so they are moving together. Since cashews nuts production and price of cashewnuts are cointegated it is quite possible that one variable can cause another and the vice versa.

This instance paves the study a way to examine the causal link between cashews nuts production and price of cashewnuts together with other two variables in question.

iii) Granger Causality Test

The granger causality test was developed by Granger (1969). Granger causality analysis seeks to determine if one variable granger cause another variable or they are just independent to one another. Whenever the lags of one variable enter into the equation of the other variable and first variable can predict the second variable, then we say that the first variable granger cause the second variable. This study applied a pair-wise granger causality analysis. In granger causality analysis there are three possibilities of causality between the variables. There are no causal relationship, bi-directional causal relationship and unidirectional causal relationship. It is more likely that at least in one direction of causality will exist since the study has identified that the variables are cointegrated. Specifically, the granger causality test was conducted to test if price of cashewnuts causes production of cashewnuts and vice versa.

Table 4.9 : Grager Causality Test

```
. vargranger

   Granger causality Wald tests
```

Equation	Excluded	chi2	df	Prob > chi2
D2_CP	D2.PC	6.7242	1	0.010
D2_CP	D2.IR	1.5757	1	0.209
D2_CP	D2.AGP	.23942	1	0.625
D2_CP	ALL	6.7379	3	0.081
D2_PC	D2.CP	.00023	1	0.988
D2_PC	D2.IR	.6333	1	0.426
D2_PC	D2.AGP	1.1513	1	0.283
D2_PC	ALL	1.759	3	0.624
D2_IR	D2.CP	.82823	1	0.363
D2_IR	D2.PC	.16105	1	0.688
D2_IR	D2.AGP	.10823	1	0.742
D2_IR	ALL	1.0066	3	0.800
D2_AGP	D2.CP	5.3991	1	0.020
D2_AGP	D2.PC	.02415	1	0.877
D2_AGP	D2.IR	.45694	1	0.499
D2_AGP	ALL	5.5429	3	0.136

Source: Researcher Computation (2015)

From the granger causality test (table 4.9) above it can be observed that price of cashewnuts (PC) causes cashewnuts production (CP) since the probability value is 0.010 which is less than 0.05. But cashewnuts production cannot cause price of the cashewnuts since probability value is 0.9888 which is higher than recommended probability value of 0.05. For that reason, price of the cashewnuts is the one that determine cashewnuts production in the country and because the study had found that there is the cointegration between price of cashewnuts and cashewnuts production (that means they are moving together) hence it can be said that high price lead to the high production and low price lead to low production. Because there is no granger causal relationship running from production to price it can be said that whether the production is high or low does not affect/cause the price. It is the price which causes production.

After that vector auto-regression was applied to modify regression equation obtained from the regression analysis at the beginning of this section (page 60). This is because the early equation was established when variables had unit root (not stationary). Table 4.10 below shows the results of vector Auto-regression.

The different between this new equation and the first question (in page 60) above is that the first question use time series data at the level (which was not stationary) while this new equation use data at the second difference (stationary data). This new equation is more accurate in predicting CP in Tanzania because it has used stationary data/data used has no unit root.

Table 4.10 : Vector Auto-Regression

```
. var D2.CP D2.PC D2.IR D2.AGP, lags(1/1)

Vector autoregression

Sample:  1994 - 2014                              No. of obs    =        21
Log likelihood = -502.3602                        AIC           = 49.74859
FPE        =  4.92e+16                             HQIC          = 49.96448
Det(Sigma_ml)  =  7.05e+15                         SBIC          = 50.74337

Equation          Parms      RMSE      R-sq      chi2     P>chi2

D2_CP                5      41357.5    0.7350   58.24032   0.0000
D2_PC                5      342.976    0.2635    7.513802  0.1111
D2_IR                5      3.86224    0.0460    1.013528  0.9077
D2_AGP               5      3.1482     0.3611   11.86723   0.0184
```

	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
D2_CP						
CP LD2.	-.7954714	.1241028	-6.41	0.000	-1.038708	-.5522345
PC LD2.	69.28304	26.71822	2.59	0.010	16.91629	121.6498
IR LD2.	3806.259	3032.226	1.26	0.209	-2136.795	9749.314
AGP LD2.	-1211.234	2475.401	-0.49	0.625	-6062.93	3640.463
_cons	-1411.151	8017.522	-0.18	0.860	-17125.21	14302.9

The new regression equation for predicting cashewnut productivity in the country is given as:

$$CP = 69.28304PC + 3806.259\,IR - 1211.234\,AGP - 1411.151 \quad \ldots\ldots\ldots\ldots\text{vi}$$

4.3.8 Efforts of Government in solving Cashewnuts Price Fluctuation

The last objective of this study was to assess how the government of Tanzania helps out in solving the problem of cashewnut's price fluctuation. Therefore, potential respondents were asked to indicate in which ways government of Tanzania has been helping cashewnuts industry and the whole agricultural sector in general from fluctuation of price of crops. Variable were prepared inform of short sentences with the aim of assessing thereof. The variables were as follow: regulating policies and laws concern

with availability and usability of agricultural equipments, control the price of the end product paid by the consumers, reimbursement controls-to establish different levels of reimbursement/payment of the workers in agricultural sector, though adjusting taxation structures, and conduct cashewnuts price comparison between Tanzania and other countries together with monitoring performance of cashewnuts industries. The response mode was four Likert scale points ranging from strongly disagree to strongly agree. Analysis of the results of this objective used mean and standard deviation. Explanation of mean and standard deviation has been given in the previous section.

The results of this objective are given in the table 4.11 below whereby mean and standard deviations have been used to rank the responses of the respondents according to the order of priorities. The response with the highest mean is the one which was rated highly by respondents accepting to be one of the factors performed highly by Tanzanian government in trying to stabilize price of cashewnuts. The variable with the lowest mean is the least factor utilized by government in solving problem of price fluctuation in agricultural commodities, particularly cashewnuts. Also the variable/item with the smallest standard deviation implies that respondents gave a similar answer to that variable compared with the others. On the other hand a variable with the biggest standard deviation is one that respondents gave varying (different) answers.

From the results of the table 4.9 above it can be understood that in helping cashewnuts industry from the burden of abruptly price changes in the cashewnuts markets both locally and internationally, government of Tanzania have been regularly adjust taxation structure (Mean=2.75) as regards agricultural equipments and products. On the other

hands, as the strategies of helping cashewnuts industry from the fluctuation of cashewnuts price the government have been rarely control the price of the cashewnuts as well as other crops in general (Mean 2.42), monitoring performance of cashewnuts industry (Mean=2.33) as well as financing farmers when price is too low (Mean 1.92). But it was discovered that government does not regulate policies and laws concern with availability and usability of agricultural equipments (Mean 1.75) neither conduct price comparison with prices in other countries (Mean=1.42). The observed average mean of 2.10 depicts that government have been rarely helping agricultural sector in particular cashewnuts to guarantee secured price of products in both internal and external market, the so called institutional inefficiency.

Table 4.11 : Efforts of Government in solving Cashewnuts Price Fluctuation

Variables	N	Min	Max	Mean	Std.
Though adjusting taxation structures	30	1	4	2.75	.866
Control the price of the agricultural products paid by the consumers	30	2	3	2.42	.515
Monitoring performance of cashewnuts industry	30	2	3	2.33	.492
Financing farmers when price is too low	30	1	3	1.92	.793
Regulating policies and laws concern with availability and usability of agricultural equipments.	30	1	2	1.75	.452
Conduct price comparison with prices in other countries	30	1	2	1.42	.515
AVERAGE MEAN			2.10		
Interpretation of the Means: 1.00-1.75 = Not at all 1.76-2.50 = Rarely 2.51-3.25 = Regularly 3.26-4.00 = Very Regularly					

Source: Field Data (2015)

According to Kunze (2012) failures by governments to stabilize price of raw material can result in a set of immediate circumstances of agricultural productivities in the country. Although contribution of government was valued to have very low contribution in guaranteeing stability of price in agricultural products, but the good thing is that the cashewnuts farmers have never face total lack of market for their crops in both inside and outside the country. The cashewnut farmers' associations hand in hand with cashewnuts traders have been making efforts to furtherance selling of cashewnuts in the world market.

i)   Adjustment taxation structure

It was revealed that the number one strategy used regularly by the government to help farmers from price fluctuation of the crops was the adjustment of the taxation structure both agricultural equipment and crops. This can take place through different taxation plans-when the price of crops is to low with high production of crops in the country the government try to lower export tax to allow many international traders to buy crops (in this case "cashewnuts") from the Tanzania. Tax is also lowed when the demand in international market has drop. But is the situation is reversed meaning that the demand is too high in international market government also increases tax in order to recover the revenue lose when tax was reduced.

However, in helping farmers who are the cornerstones of the national back-born government has removed taxes in all agricultural equipments imported in the country. This being the fact government has also tried to reduce some other port fees on imported agricultural equipments at the time when this sector has faced bad circumstances. All

these are to give farmers relief on the burdens associated with agricultural production include price volatility.

ii)   Control the price of the agricultural products

Government of Tanzania had and has tried to allow the free market to promote higher producer prices and to increase efficiency. However, for specific development programs the concept of free market has been omitted to allow development for the benefits of the whole nation. Following the low level of education and skills to Tanzania farmers, government has been intervening the sales of agricultural products start from measurement of the products to the price setting. This has helped farmers to get adequate income from their labor since they are protected from the activities of unfaithful traders who look only on their benefiters. Cashewnuts, coffee and cotton are the agricultural products sold at the fixed price established by the government although sometime traders take advantage of farmers' problems to buy these crops at below government fixed prices. Most of farmers (more than 90%) in Tanzania are peasants-a group which is living at the margin of life where there is lack of adequate food, shelter and clothes due to these government has to protect them from the hands of malicious traders.

iii)   Monitoring performance of cashewnuts industry

Government has established cashewnuts board with the main objective of improving cashewnuts industry in the country. Within this board there is the department of Planning and Monitoring and Evaluation which deal with performance measure of the whole cashewnut production with emphasize on the wealth of the farmers where cashewnuts farmers' standard of living is the one of the performance indicators. As a

matter of fact, the department has been responsible of ensuring farmers are getting enough storage for their crops at a time of high production hand in hand with searching for the markets outside the country and promoting farmers through securing loan for them from financial institutions as they are waiting to sale their produce when the price is attractive.

CHAPTER FIVE

5.0 SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Introduction

This chapter presented conclusion of the study based on the objectives, recommendation and area for further research were also given in this chapter.

5.2 Summary and Conclusion of the Study

The present study was dealing with examination of the impact of price fluctuation on production of cashewnuts in Tanzania. The study used both primary data and secondary data-primary data was obtained from officers of cashewnuts board of Tanzania and cashewnuts traders specifically those who are dealing with exportation of cashewnuts. The study imposed four questions which are to what are the causes of cashewnut's price fluctuation in Tanzanian cashewnut's market? To what extent does the price of cashewnuts have been fluctuated in the Tanzania cashewnut's market? What is the relationship between cashewnut's price fluctuation and amount of cashewnuts harvested? And how the government of Tanzania has helped out to solve the problem of cashewnut's price fluctuation?

According to the order of priority, the study found that the causes of cashewnut's price fluctuation in Tanzanian cashewnut's market are quality of the cashewnuts marketed followed by demand and supply of cashewnuts in the world market, the government interventionism in the production of cashewnuts, cost of inputs including packaging, improvement of technology in agricultural sector, socio-economic status of

producers/farmers, seasonality of cashewnuts production,availability of storage facilities and last was price of crude oil.

Concern with the extent to which price of cashewnuts has fluctuated from the economic period under review in this study, which is from 1990 to 2014; the study found that price of cashewnuts has grown at the rate of 65.69 within this period of 24 years. The minimum price was 137 TSH/KG (which was observed in the year 1990) and maximum price was 1701 TSH/KG (in 2011) while the mean price was 677.42 TSH/KG. Additionally, it was also indicated that 70.4% (since $R^2 = 0.704$) of the price of cashewnuts in Tanzania is determined by the number of the years and the remaining percentage which is 29.6% can be determined by other things like inflation rate, labour productivity, marketing and so on. With the help of scattered plot the study determined that the best equation to determine the price of cashewnuts in Tanzania Y= 65.69X - 3088 whereby Y is the price of cashewnuts and X is the number of the years.

The study was also to determine the relationship between cashewnut's price fluctuation and amount of cashewnuts harvested in the country. It was found that price of cashewnuts is the one causing production of cashewnuts. The high the price the higher the production and vice versa.

Lastly, the study found that government of Tanzanian is regularly help in stabilize price of cashewnuts in the country. According to the order of importance the study found that government of Tanzania has been regularly help farmers from the burden of price fluctuation through adjusting taxation structure as regards agricultural equipments and

products. Apart from regular adjustment of tax the government has been rarely control the price of the cashewnuts by putting a fixed minimum price, monitoring performance of cashewnuts industry as well as financing farmers when price is too low. However, it was discovered that government does not regulate policies and laws concern with availability and usability of agricultural equipments neither conduct price comparison between Tanzania and other countries producing cashewnuts. In general, the study found that government has been rarely helping agricultural sector in particular cashewnuts industry to guarantee secured price of products in both internal and external market.

5.3 Recommendation

From the findings of the study a number of recommendations were provided so as to improve the productivity of the cashewnuts by helping farmers to realize the benefits of their labour through smart price of cashewnuts. This will also help government to obtain high revenue from the improved cashewnuts market in the country. The recommendation has been directed to government, cashewnut traders and farmers with respect to the cashewnuts price fluctuation.

- Farmers are advised to have a strong tie within them through strongly established farmers' unions with responsible leaders. This will help them to set a reasonable price for their products which reflect their labour. Having strong collaboration will help protect them from malicious traders who want to benefit from the sweet of others. It will also help in getting group loans from the bank and other financial institution, at the time when productivity decease, since they don't have enough collateral to pledge for the individual loans.

- However, farmers should pay more attention to the quality of their produce since the study found that the number one cause of the price fluctuation is the quality of the cashewnuts produced.

- Cashewnuts board of Tanzania should be equipped with officers with enough knowledge in marketing, not only agricultural and food preservation, who will be responsible of searching for the market in and outside the country through the use of modern advertisement and promotion ways such as social media and cloud computing applications.

- On other hand, the board and importantly cashewnuts warehouse licensing managements should consider further training to farmers on the benefits expected from the introduced warehouse receipt system. Also, the study suggested construction of more and modern warehouse very close to farmers. This will reduce disturbance and cost incurred by cashew nut farmers who are normally small earners in chasing for warehouse facilities in far distance.

- Cashew Board to steer further transparency in cashew auctioning process (move away from closed/secret bidding to more open and participatory auction process), market and price updates to farmers

- Lastly, government through cashewnuts board and other public and private organization dealing in agriculture sectors should continue in one way or another helping cashewnuts' farmers to acquire required skills in modern farming activities which are so productive than traditional ways. This should also involve marketing skills together with giving them some possible socio-economic supports that will improve their living standards.

5.4 Limitations, Delimitations and Ethical Issues

5.4.1 Limitation

The major limitation of the study was mainly related to the limited coverage of the study area. In the country, the major cashewnut traders are located in Dar es Salaam, Lind, Ruvuma and coastal regions. However, the study focused only on those who are located in Dar es Salaam-if should be known that different location have different challenges from both political and economical factors. Moreover, the study did not include opinions of the farmers who are also affected with the price fluctuation. This is due to the lack of enough budget and time constraint since this is academic study therefore it was supposed to be completed within academic time frame.

Form of bias: the following types of bias needed to be considered:

i.   The attitude of the respondent could influence the responses

ii.   Bias in the way that response were interpreted

iii. Where credibility was lacking

5.4.2 Delimitations

The following suggestions used to improve the standard of the questionnaire and thus the quality of the data:

i.   Questionnaires were identical in order to improve reliability

ii. The questionnaires were proper prepared in order to ask the correct questions

iii.   A detailed explanation were supplied to make clear the fact that the questionnaires was not intended to collect trade secrets and the purpose of the research was explained.

iv.   All respondents were given the opportunity to complete the questionnaire at their own convenient time.

5.4.3 Ethical Issues

Research ethics relates to the way one formulates and clarifies one's research topic, design one's research and gains access, collects data, processes and stores the data, analyse data and disclose the research findings in a moral and responsible way (Sauders et al. 2007). Different codes and considerations were applied to different stages of the research, for example: Negotiating access: participants' rights to privacy were respected and credibility was established. Respondents were informed of the option to stay anonymous, to ensure that the information were confidential and for the purpose of the study alone.

Ethical consideration during data collection, storing, analysis and reporting: the researcher had prepared to sign any confidentiality agreement with the entities that prefer to be anonymous. Privacy of the participants was respected and they were under no obligation to provide sensitive data or trade secrets. Personal data were kept securely only used for the intended purposes.

5.5 Area for further Study

Researcher suggested another studies on the impact of the price fluctuation on the living standard of the cashewnuts' farmers and country economic development in general. However, there is the need of assessing the impact of cashewnuts warehousing receipting system on the price fluctuation.

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APPENDIXES

Further Analyses

1.   Descriptive Data in Natural logarithm

YEARS	CP	PC	IR	AGP
1991	10.62	4.91	2.39	5.41
1992	10.57	5.07	2.59	5.39
1993	10.74	5.29	2.81	5.39
1994	11.05	5.79	3.10	5.39
1995	11.31	5.94	3.35	5.42
1996	11.05	5.70	3.54	5.43
1997	11.51	5.79	3.69	5.43
1998	11.57	6.13	3.81	5.43
1999	11.70	6.39	3.88	5.45
2000	11.71	5.52	3.94	5.48
2001	8.76	5.70	4.00	5.51
2002	11.30	5.70	4.08	5.54
2003	10.26	5.88	4.09	5.55
2004	11.32	6.13	4.14	5.59
2005	11.03	6.62	4.19	5.61
2006	10.98	6.39	4.26	5.63
2007	9.60	6.39	4.33	5.64
2008	11.00	6.41	4.43	5.66
2009	10.85	6.55	4.54	5.67
2010	11.09	7.43	4.60	5.68
2011	11.09	7.43	4.72	5.69
2012	11.08	7.40	4.87	5.70
2013	10.91	7.42	4.94	5.72
2014	10.99	7.43	4.97	5.72

2.   Unit Root Test for the Cashewnuts Production (at level with drift)

```
. dfuller CP, regress lags(0)
```

Dickey-Fuller test for unit root   Number of obs   =   23

| | Test Statistic | Interpolated Dickey-Fuller | | |
		1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-1.171	-3.750	-3.000	-2.630

MacKinnon approximate p-value for Z(t) = 0.6861

D.CP	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
CP						
L1.	-.1086857	.0928489	-1.17	0.255	-.3017757	.0844043
_cons	.7804868	.5770341	1.35	0.191	-.4195212	1.980495

.

3.   Unit Root Test for the Cashewnuts Production (at level with drift and trend)

```
. dfuller CP, trend regress lags(0)
```

Dickey-Fuller test for unit root   Number of obs   =   23

| | Test Statistic | Interpolated Dickey-Fuller | | |
		1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-2.551	-4.380	-3.600	-3.240

MacKinnon approximate p-value for Z(t) = 0.3029

D.CP	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
CP						
L1.	-.4834635	.1895174	-2.55	0.019	-.8787899	-.0881371
_trend	.0454795	.0205391	2.21	0.039	.0026356	.0883234
_cons	2.548252	.9581953	2.66	0.015	.549492	4.547013

4.   **Unit Root Test for the Cashewnuts Production (at level with no drift no trend)**

. dfuller CP, noconstant regress lags(0)

Dickey-Fuller test for unit root   Number of obs   =   23

	Test Statistic	——— Interpolated Dickey-Fuller ———		
		1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	1.468	-2.660	-1.950	-1.600

D.CP	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
CP L1.	.0160572	.0109408	1.47	0.156	-.0066326	.038747

5.   **Unit Root Test for the Price of Cashewnuts (at level with drift)**

. dfuller PC, regress lags(0)

Dickey-Fuller test for unit root   Number of obs   =   23

	Test Statistic	——— Interpolated Dickey-Fuller ———		
		1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-1.171	-3.750	-3.000	-2.630

MacKinnon approximate p-value for Z(t) = 0.6861

D.PC	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
PC L1.	-.1086857	.0928489	-1.17	0.255	-.3017757	.0844043
_cons	.7804868	.5770341	1.35	0.191	-.4195212	1.980495

6.   Unit Root Test for the Price of Cashewnuts (at level with drift and trend)

```
. dfuller PC, trend regress lags(0)
```

```
Dickey-Fuller test for unit root                    Number of obs   =        23
```

	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
		———— Interpolated Dickey-Fuller ————		
Z(t)	-2.551	-4.380	-3.600	-3.240

```
MacKinnon approximate p-value for Z(t) = 0.3029
```

D.PC	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
PC						
L1.	-.4834635	.1895174	-2.55	0.019	-.8787899	-.0881371
_trend	.0454795	.0205391	2.21	0.039	.0026356	.0883234
_cons	2.548252	.9581953	2.66	0.015	.549492	4.547013

7.   Unit Root Test for the Price of Cashewnuts (at level with no drift no trend)

```
. dfuller PC, noconstant regress lags(0)
```

```
Dickey-Fuller test for unit root                    Number of obs   =        23
```

	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
		———— Interpolated Dickey-Fuller ————		
Z(t)	1.468	-2.660	-1.950	-1.600

D.PC	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
PC						
L1.	.0160572	.0109408	1.47	0.156	-.0066326	.038747

8.   Unit Root Test for the Inflation Rate (at level with drift)

```
. dfuller IR, regress lags(0)
```

```
Dickey-Fuller test for unit root                    Number of obs    =          23
```

	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
		——— Interpolated Dickey-Fuller ———		
Z(t)	-5.023	-3.750	-3.000	-2.630

```
MacKinnon approximate p-value for Z(t) = 0.0000
```

D.IR	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
IR L1.	-.0783408	.0155967	-5.02	0.000	-.1107759	-.0459057
_cons	.4197127	.0621449	6.75	0.000	.2904752	.5489501

9.   Unit Root Test for the Inflation Rate (at level with drift and trend)

```
. dfuller IR, trend regress lags(0)
```

```
Dickey-Fuller test for unit root                    Number of obs    =          23
```

	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
		——— Interpolated Dickey-Fuller ———		
Z(t)	-3.633	-4.380	-3.600	-3.240

```
MacKinnon approximate p-value for Z(t) = 0.0271
```

D.IR	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
IR L1.	-.1903981	.0524049	-3.63	0.002	-.2997129	-.0810833
_trend	.0119808	.00539	2.22	0.038	.0007375	.0232241
_cons	.715841	.1449149	4.94	0.000	.4135538	1.018128

10. **Unit Root Test for the Inflation Rate (at level with no drift no trend)**

. dfuller IR, noconstant regress lags(0)

Dickey-Fuller test for unit root   Number of obs =   23

	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
		──── Interpolated Dickey-Fuller ────		
Z(t)	5.475	-2.660	-1.950	-1.600

D.IR	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
IR L1.	.02544	.004647	5.47	0.000	.0158028	.0350773

11. **Unit Root Test for the Agricultural Productivity (at level with drift)**

. dfuller AGP, regress lags(0)

Dickey-Fuller test for unit root   Number of obs =   23

	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
		──── Interpolated Dickey-Fuller ────		
Z(t)	0.486	-3.750	-3.000	-2.630

MacKinnon approximate p-value for Z(t) = 0.9844

D.AGP	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
AGP L1.	.0122573	.025239	0.49	0.632	-.0402302	.0647447
_cons	-.0544216	.1398434	-0.39	0.701	-.345242	.2363987

12. **Unit Root Test for the Agricultural Productivity (at level with drift and trend)**

. dfuller AGP, trend regress lags(0)

Dickey-Fuller test for unit root   Number of obs   =   23

	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
		─────── Interpolated Dickey-Fuller ───────		
Z(t)	-2.981	-4.380	-3.600	-3.240

MacKinnon approximate p-value for Z(t) = 0.1373

D.AGP	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
AGP						
L1.	-.3371693	.1130881	-2.98	0.007	-.5730669	-.1012718
_trend	.0061721	.0019623	3.15	0.005	.0020789	.0102653
_cons	1.807185	.6033481	3.00	0.007	.5486225	3.065747

13. **Unit Root Test for the Agricultural Productivity (at level with no drift on trend)**

. dfuller AGP, noconstant regress lags(0)

Dickey-Fuller test for unit root   Number of obs   =   23

	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
		─────── Interpolated Dickey-Fuller ───────		
Z(t)	4.741	-2.660	-1.950	-1.600

D.AGP	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
AGP						
L1.	.0024373	.0005141	4.74	0.000	.0013712	.0035035

.

14. Unit Root Test for the Cashewnuts Prices (at first difference with drift)

```
. dfuller D.CP, regress lags(0)
```

```
Dickey-Fuller test for unit root                    Number of obs    =         22
```

	Test Statistic	─────── Interpolated Dickey-Fuller ───────		
		1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-4.853	-3.750	-3.000	-2.630

MacKinnon approximate p-value for Z(t) = 0.0000

D2.CP	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
CP						
LD.	-1.083286	.2232084	-4.85	0.000	-1.548891	-.6176819
_cons	.1167749	.0762644	1.53	0.141	-.0423099	.2758597

.

15. Unit Root Test for the Cashewnuts Prices (at first difference with drift and trend)

```
. dfuller D.CP, trend regress lags(0)
```

```
Dickey-Fuller test for unit root                    Number of obs    =         22
```

	Test Statistic	─────── Interpolated Dickey-Fuller ───────		
		1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-4.731	-4.380	-3.600	-3.240

MacKinnon approximate p-value for Z(t) = 0.0006

D2.CP	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
D.CP						
L1.	-1.083357	.2289756	-4.73	0.000	-1.562608	-.6041051
_trend	-.0008644	.0116237	-0.07	0.941	-.0251932	.0234644
_cons	.1267235	.1549769	0.82	0.424	-.197647	.4510939

16.   **Unit Root Test for the Cashewnuts Prices (at first difference with no drift no trend)**

. dfuller D.CP, noconstant regress lags(0)

Dickey-Fuller test for unit root   Number of obs   =   22

	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-4.466	-2.660	-1.950	-1.600

D2.CP	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]
CP LD.	-.9691622	.2170276	-4.47	0.000	-1.420496	-.5178287

17.   **Unit Root Test for the Price of Cashewnuts (at first difference with drift)**

. dfuller D.PC, regress lags(0)

Dickey-Fuller test for unit root   Number of obs   =   22

	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-4.853	-3.750	-3.000	-2.630

MacKinnon approximate p-value for Z(t) = 0.0000

D2.PC	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]
PC LD.	-1.083286	.2232084	-4.85	0.000	-1.548891	-.6176819
_cons	.1167749	.0762644	1.53	0.141	-.0423099	.2758597

18. **Unit Root Test for the Price of Cashewnuts (at first difference with drift and trend)**

```
. dfuller D.PC, trend regress lags(0)
Dickey-Fuller test for unit root                    Number of obs   =       22
```

	Test Statistic	1% Critical Value	Interpolated Dickey-Fuller 5% Critical Value	10% Critical Value
Z(t)	-4.731	-4.380	-3.600	-3.240

```
MacKinnon approximate p-value for Z(t) = 0.0006
```

D2.PC	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
D.PC						
L1.	-1.083357	.2289756	-4.73	0.000	-1.562608	-.6041051
_trend	-.0008644	.0116237	-0.07	0.941	-.0251932	.0234644
_cons	.1267235	.1549769	0.82	0.424	-.197647	.4510939

19. **Unit Root Test for the Price of Cashewnuts (at first difference with no drift no trend)**

```
. dfuller D.PC, noconstant regress lags(0)
Dickey-Fuller test for unit root                    Number of obs   =       22
```

	Test Statistic	1% Critical Value	Interpolated Dickey-Fuller 5% Critical Value	10% Critical Value
Z(t)	-4.466	-2.660	-1.950	-1.600

D2.PC	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
PC						
LD.	-.9691622	.2170276	-4.47	0.000	-1.420496	-.5178287

20.   Unit Root Test for the Inflation Rate (at first difference with drift)

. dfuller D.IR, regress lags(0)

Dickey-Fuller test for unit root   Number of obs   =   22

	Test Statistic	1% Critical Value	Interpolated Dickey-Fuller 5% Critical Value	10% Critical Value
Z(t)	-1.384	-3.750	-3.000	-2.630

MacKinnon approximate p-value for Z(t) = 0.5899

D2.IR	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
IR LD.	-.1702558	.1230166	-1.38	0.182	-.4268639	.0863522
_cons	.0120069	.0167711	0.72	0.482	-.0229769	.0469908

21.   Unit Root Test for the Inflation Rate (at first difference with drift and trend)

. dfuller D.IR, trend regress lags(0)

Dickey-Fuller test for unit root   Number of obs   =   22

	Test Statistic	1% Critical Value	Interpolated Dickey-Fuller 5% Critical Value	10% Critical Value
Z(t)	-1.685	-4.380	-3.600	-3.240

MacKinnon approximate p-value for Z(t) = 0.7573

D2.IR	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
D.IR L1.	-.2591997	.1538008	-1.69	0.108	-.5811086	.0627091
_trend	-.0016814	.00174	-0.97	0.346	-.0053232	.0019604
_cons	.0416528	.0349762	1.19	0.248	-.0315532	.1148588

22.   Unit Root Test for the Inflation Rate (at first difference with no drift no trend)

```
. dfuller D.IR, noconstant regress lags(0)
```

Dickey-Fuller test for unit root   Number of obs =   22

	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
		—————— Interpolated Dickey-Fuller ——————		
Z(t)	-1.490	-2.660	-1.950	-1.600

D2.IR	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]
IR LD.	-.0953777	.0640075	-1.49	0.151	-.2284887	.0377332

23.   Unit Root Test for the Agriculture Productivity (at first difference with drift)

```
. dfuller D.AGP, regress lags(0)
```

Dickey-Fuller test for unit root   Number of obs =   22

	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
		—————— Interpolated Dickey-Fuller ——————		
Z(t)	-3.978	-3.750	-3.000	-2.630

MacKinnon approximate p-value for Z(t) = 0.0015

D2.AGP	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]
AGP LD.	-.7329461	.1842515	-3.98	0.001	-1.117288	-.3486042
_cons	.011237	.0035788	3.14	0.005	.0037717	.0187022

24. **Unit Root Test for the Agriculture Productivity (at first difference with drift and trend)**

. dfuller D.AGP, trend regress lags(0)

Dickey-Fuller test for unit root   Number of obs   =   22

	Test Statistic	─── Interpolated Dickey-Fuller ───		
		1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-3.588	-4.380	-3.600	-3.240

MacKinnon approximate p-value for Z(t) = 0.0309

D2.AGP	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
D.AGP						
L1.	-.7122198	.1984964	-3.59	0.002	-1.127677	-.2967621
_trend	-.0001393	.0004183	-0.33	0.743	-.0010148	.0007361
_cons	.0125469	.0053734	2.33	0.031	.0013002	.0237936

25. **Unit Root Test for the Agriculture Productivity (at first difference with no drift and no trend)**

. dfuller D.AGP, noconstant regress lags(0)

Dickey-Fuller test for unit root   Number of obs   =   22

	Test Statistic	─── Interpolated Dickey-Fuller ───		
		1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-2.072	-2.660	-1.950	-1.600

D2.AGP	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
AGP						
LD.	-.3132527	.151215	-2.07	0.051	-.6277215	.0012161