ANALYSIS OF COMMON BEAN *(Phaseolus vulgaris* L) **CROSS-BORDER TRADE AND MARKET EFFICIENCY IN EAST AFRICA: A CASE STUDY OF KENYA**

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DECLARATION AND RECOMMENDATION

Declaration

I declare that this thesis is my original work and has not been submitted in any university for the award of a degree.

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Recommendation

This thesis has been submitted with our approval as University supervisors.

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DEDICATION

I dedicate this thesis to Dennis Ochieng for his unconditional love, support and for being an inspiring husband. My beloved sons Isaiah Paul Otieno, Jesse Otieno Otieno and my mum and siblings, thanks for your support.

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ABSTRACT

East Africa region has imbalances in the supply and demand of common bean. This can be offset by improving marketing infrastructure. The objectives of the study were to determine the characteristics of common bean traders, to determine the constraints to the observed trade in common bean varieties and finally to assess the extent to which markets have integrated in key selected markets. Multi-stage sampling technique was used to obtain a sample of 240 respondents (120 traders from the border points and 120 traders from key selected markets). The four border points (Busia, Malaba, Isebania, and Namanga) were purposively selected due to the extent of activities, nature of trade and the volumes of common beans that they handled. The three key markets (Nairobi, Mombasa, and Nakuru) were also purposively selected because of high potential demand and supply for common beans. Snow balling method was used to select the traders. Descriptive statistics were used to address characteristics of common bean traders in key selected border points and markets (objective 1) and constraints to the observed trade in the selected border points and markets (objective 2) and co-integration analysis was used to address the extent to which markets of common bean are integrated in key selected markets (objective 3). The findings revealed that a greater proportion of the traders were women, majority being retailers. The women traders also had more years of experience on average in the retail business compared to the men. Results also indicated that the major constraints to bean trade were high transportation costs, heavy rains, and irregularities in bean supply. Nyayo and Wairimu bean varieties were the most traded varieties in the markets whereas Saitoti variety was the least traded. The co-integration tests established that Nairobi- Mombasa and Nakuru- Mombasa Rosecoco markets and Nairobi- Nakuru and Nakuru- Mombasa Mwitemania markets were co-integrated. The study recommends that, in order to increase the degree of market integration, the government and private sector should improve marketing infrastructure especially the roads to enable easy flow of the product between the markets. There is also need to zero rate agricultural produce being imported in the country to tackle the issue of bribery at the border points, this in return will enable traders not take advantage of increased production to lower returns accruing to farmers thus enhancing degree of market integration.

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ACRONYMS AND ABBREVIATIONS

CIAT   International Center for Tropical Agriculture

CGIAR   Consultative Group on International Agricultural Research

COMESA   Common Market for Eastern and Southern Africa

EAC   East African Community

EABC   East Africa Business Council

FAO   Food and Agriculture Organization

FAOSTAT   Food and Agriculture Organization Statistics

FEWSNET   Famine Early Warning Systems Network

KEPHIS   Kenya Plant Health Inspectorate Service

Kg   Kilogram

Kshs   Kenya shillings

RATIN   Regional Agricultural Trade Intelligence Network

USD   United States dollars

CHAPTER ONE

INTRODUCTION

1.1 Background information

The global economy is integrating rapidly through trade such that exports from developing countries are becoming increasingly diversified. In turn, these countries have become less dependent on agricultural exports than they were in the past. Currently, developing countries are becoming their own best markets for agricultural products. This is as a result of countries trading with each other. In order to facilitate trade in Africa, it's important to remove bottlenecks that hinder cross border trade such as; bribery, long custom procedures, and complex import/export requirements. The Common Market for Southern and Eastern Africa (COMESA) and the East African Community (EAC) are some of the regional bodies that facilitate trade. These trading blocs harmonize and standardize trade procedures as well as the administration of border controls. For example, the major role of the EAC Customs Union is to deepen the integration process through liberalization and promotion of regional commercial integration through intra-regional trade (EABC, 2008).

Trade in East Africa involves all types of goods such as agricultural commodities and manufactured goods. Agricultural commodities flowing across the borders include staple food commodities such as maize, beans, rice, fish, groundnuts and banana. Manufactured consumer goods traded are shoes, textile, medicine, vehicles and bicycle parts (Uganda Bureau of Statistics, 2007). It is estimated that 26% of Kenya's exports to the EAC are evenly distributed in Uganda, Tanzania and Rwanda. On the other hand, Kenya is a significant destination for Tanzania's exports estimated at 44% while Uganda's exports to Tanzania are approximately 25% (EABC, 2008). Of the agricultural goods traded in East Africa, common bean is the major staple food that is traded across the borders (RATIN, 2011). In recent years, trade opportunities in common bean for both exports within the Eastern and Southern Africa region have increased. Kenya and Malawi show a huge potential for import market of common beans which can be tapped by their neighbors, particularly Tanzania, Uganda and the great lakes region (Katungi *et al*., 2009). Some of the bean corridors according to Pan-Africa Bean Research Alliance (PABRA) are around North West Tanzania, Burundi, Rwanda and Eastern DRC into Kenya ;

South west Uganda, Northern Rwanda and Eastern DRC into Kenya; Northern Tanzania into Kenya and Ethiopia including the rift valley destined to Kenya.

1.1.1 Common bean (*Phaseolus vulgaris* L) production in the world

Common bean is globally grown in nearly 28 million hectares with a production of 20 million tons. The average yield of common bean (*Phaseolus vulgaris* L) has been increasing over the past years with a range of 493kg/ha in 1961 to 729kg/ha in 2008 (FAOSTAT, 2008). Production of common bean is highest in Latin America with about 5.5 million metric tons being produced with the major producers being Brazil and Mexico. Africa is the second largest producer of common bean with a production of 2.5 million metric tons. In Africa, the leading producers are Uganda, Kenya, Tanzania, Rwanda, Burundi, Ethiopia, Malawi and Congo (CGIAR, 2012). Most of the common bean varieties grown for the market are the sugar type, red mottled, large red kidneys, small and medium reds, yellows, tan/khaki (pinto), cream, white, purples and blacks. Common bean is grown twice a year in Eastern Africa. The sowing seasons run from March to April and from September to October with the exception of Ethiopia in which the main growing season is June to August (Rukandema *et al*., 1981; Wortmann *et al*., 1998; Ferris and Kaganzi, 2008).

Table 1: Eastern Africa common bean production in tons

Country	2010	2011	2012	2013
Burundi	201,551	200,673	205,944	200,524
Ethiopia	362,890	340,280	463,009	463,500
Kenya	390,598	577,674	613,902	600,512
Malawi	153,815	288,414	185,578	200,234
Rwanda	327,497	331,166	432,857	430,564
Uganda	455,000	464,105	425,400	431,621
Tanzania	867,530	675,948	1,199,267	924,254

(Source: FAOSTAT, 2012)

Common bean production varies from country to country in East Africa due to varied soil type, climatic conditions and adoption of high yielding bean varieties by farmers. As shown in Table

1, the production of common bean in Kenya has been increasing over the past years. Uganda's common bean production has been steady with a slight drop in the year 2012 while in Tanzania there has been a fluctuation in the four years with the highest production being in 2012. This is due to increased acreage in Kenya, Uganda and Tanzania thus increase in productivity.

1.1.2 Common bean consumption in East Africa

Common bean provides dietary protein for over 100 million people in both the rural and poor urban areas. Studies have shown that there is a high *per capita* consumption of common bean in developing countries (13-40 kg per year) especially with low income families in urban and rural areas (Singh, 1999). The *per capita* consumption of common bean is high in poor countries such as Nicaragua (22.5 kg *per capita* per year) and in poorer regions of higher income countries such as Northeast Brazil (18.5 kilogram *per capita* per year) (CIAT, 2012). Eastern Africa has the highest *per capita* consumption in the world that ranges from 50 to 60kg (ISAR, 2011). The *per capita* consumption of common bean in Kenya is estimated at 14 kg per year (Spilsbury *et al*., 2004; Buruchara, 2007). Consumption of common bean in Karagwe district in Tanzania is higher than the national average and is estimated at 13 Kg per year (Xavery *et al*., 2005). In Uganda the *per capita* consumption of common bean is over 58 kg (Soniia, 1999).

Apart from the pulse being an important food source, common bean has the potential to generate incomes if key markets are harnessed through contracts from other countries for the overall development of the economies. In addition, production of common bean contributes to the inputs, transport, processing, retailing, packaging and the formal and informal trade sector. However, the importance of regional trade of bean appears underestimated with focus on consumption and export markets. The improved bean varieties are not well known among most smallholder farmers in Kenya thus the need to promote these varieties. This is because the varieties developed in the 1980s that are low yielding and susceptible to diseases have been passed from farmer to farmer and saved from season to season. According to the Ministry of Agriculture Kenya (2009), the consumption of beans between 2004 and 2008 was approximately 464, 000 metric tons while the production was 357, 000 metric tons which resulted in a deficit of 107, 000 metric tons.

Over the last few years in Kenya, the price per ton of common bean has considerably increased, from USD 760 in 2010, to USD 837.5 in 2011 then USD 866.1 in 2012 (FAOSTAT, 2013). This price change significantly affects the purchasing power of poor people in both rural and urban areas and also points to possible inefficiencies in grain distribution system between surplus and deficit areas. According to Kibiego *et al*. (2003), common bean deficit in Kenya suggests an apparent market failure to stimulate production. The deficit is caused by seasonal price fluctuation and lack of statistical data on bean marketing. To ensure production of different common bean varieties in the market at affordable prices, quantity and quality, an efficient marketing system is required.

1.2 Statement of the problem

East African region produces most of the common bean in Africa and Kenya is a major consumer of the bean. Despite increased regional trade and increased common bean production in Kenya over the past years, demand still outweighs supply and consequently prices have increased significantly. The constraints to common bean trade and effectiveness of the marketing systems are not yet clearly known. Past studies have looked into the issue of market information systems in the region with a view to strengthening it so as to correct supply and demand imbalances. However, integration of bean markets has received less attention therefore it is not known to which extent the border and major bean markets are integrated in the region to facilitate steady product flows across markets. This knowledge would help stabilize bean prices as well as increase its availability and consumption thereby contributing to food security and nutrition at household level.

1.3 Objectives of the study

1.3.1 General objective

The broad objective of the study was to contribute to improved livelihoods of actors in common bean trade through efficient marketing of beans across the borders.

1.3.2 Specific objectives

1. To determine the characteristics of common bean traders in key selected border points and markets.

2. To determine the constraints to the observed trade in the selected border points and markets.

3. To assess the extent to which markets of common bean are integrated in key selected markets.

1.4 Research questions

1. What are the characteristics of common bean traders at key border points and markets?
2. What are the constraints to the observed trade in common bean?
3. What is the extent of market integration in key selected bean markets?

1.5 Justification of the study

One of the major policy needs in East Africa is to curb food insecurity and promote regional trade. To attain this, the East African Community should aim at facilitating agricultural trade among its members by eliminating some of the bottlenecks to cross border trade. This will become increasingly important in linking food surplus areas to food deficit areas especially as development is driven by increased population and activities in towns and cities. Thus, this study sought to generate valuable information on most traded bean varieties and market integration which can be used to develop the efficiency of trade in East Africa. Information on market flow of common bean enables improvement of policies to increase marketing efficiencies and also to maintain quality of varieties being developed by monitoring their movement across the borders. Farmers will be able to produce bean varieties that are highly demanded in the market. Traders will also benefit from the knowledge of the most traded varieties to trade in and which are the best markets to trade in to increase their profit margin. The government will be able to formulate policies to assist in promoting new drought tolerant and disease resistant bean varieties.

1.6 Scope and limitation of the study

This study focused on traders, transporters, crop inspectorate officials and customs officials at the border points of which the sampling unit was from the key selected border points and markets in Kenya. Reliance on memory recall of those traders and transporters who did not keep records affected precision of the data collected but the study supplemented the information through records kept by the customs officials at the border points. The study also utilized secondary data on the monthly average prices for three bean varieties (Mwitemania, Rosecoco

and Mwezi moja) collected from the Ministry of Agriculture covering a period of three years (2011 to 2013) because prices for different varieties were incomplete in earlier years.

1.7 Definition of terms

Common bean: It is used in this study interchangeably with bean and scientifically known as *Phaseolus vulgaris* L.

Food security: The state in which the food demands of people are met at all times.

Cross border trade: The buying and selling of commodities with the seller being in one country and the buyer being in another country.

Market performance: This study adopted the definition of market performance from Harris (1993) as representation of economic results of the structure and conduct, in particular the relationship between distributive margins and the costs of production and marketing services.

Market efficiency: This study adopted the definition of market efficiency from Barrett and Li (2002) as the transfer of excess demand from one market to another, manifested in the physical flow of the commodity, the transmission of price shocks from one market to another or both.

Market: Refers to a place where willing buyers and sellers exchange money for commodities**.**

Market integration: This is the flow of commodities from surplus to deficit markets and transmission of price shocks from one market to another.

1.8 Outline of the thesis

This thesis is organized in five chapters. Chapter one gives the background of the research problem addressed in this study. Chapter two describes the literature reviewed, conceptual and theoretical frameworks. Chapter three describes the study area, sampling procedure and data collection strategies used.

The results from this thesis are presented in chapter four whereby descriptive statistics results are presented and discussed on the characteristic of traders and constraints to bean trade. Chapter four analyzed market integration of Rosecoco, Mwitemania and Mwezi moja in the key selected markets using co-integration model. Summary, conclusion and implications are represented in chapter five.

CHAPTER TWO

LITERATURE REVIEW

2.1 Common bean varieties produced in East Africa

Preferences for common bean varieties vary among farmers, traders and consumers. Furthermore, common bean varieties vary in their adaptation to diverse environments including the biotic and abiotic stress factors (Chirwa *et al.,* 2007). Bean varieties can be classified into nine major classes according to color and size as follows: pure large reds, medium and small reds and red mottled, purple, yellow and tans, cream, navy/white and black. The red and the red mottled are the most common types due to market preference (Wortmann *et al.,* 1998). Further, literature notes that, a wide range of seed colors and sizes is acceptable in many common bean production areas in Africa (Van Rheenen, 1979; Grisley and Mwesigwa, 1991a; Voysest and Dessert, 1991; Grisley and Munene, 1992). The large and the medium sized seeds are mostly preferred but also small seeds are acceptable.

Tanzania's production of common bean includes both local and improved varieties which differ by color, shape, size and properties such as cooking time and digestibility (Wortmann *et al.,* 1998 and Fulgence *et al.* 2009). The most common varieties grown in Tanzania are the *Lyamungu* 85 and the large red/brown Calima, or Rosecoco. This is because of their relatively high and stable productivity under moderately good growing conditions and the high market preference in Kenya (Wortmann *et al.,* 1998). Other studies done by Kweka *et al.* (1998) and; Nkonya *et al.* (1998) found the *Lyamungu* 85 was rapidly adopted than Canadian wonder in Northern Tanzania because it cooked fast and its palatability is better than Canadian wonder. Other varieties include Soya 4 and 5, Canadian wonder, *Tikyakuponza* and *Lyamungu* 90. Soya is preferred by urban consumers in towns of Northern zone and some of the coastal towns like Tanga, Dar es Salaam and Zanzibar and it also fetches high prices in the market (Katungi *et al.,* 2009). The purples locally known as *Mwezi moja* in Tanzania are preferred in Dar es Salaam because it cooks quickly, is tasty and produces a reddish broth (Wortmann *et al.,* 1998). According to Korir *et al.* (2005), majority of retailers in northern Tanzania preferred *Soya* (a local, medium sized, purple bean) to other varieties because it sells faster, has low flatulence, cooks faster and is very sweet.

In Kenya the common bean varieties grown are the large red kidney beans, medium and small reds, the creams, pinto sugars, browns and the purples. Some of the multiple bean varieties grown are AFR708, G2333, KATX56, KATB1, and RWR719 which are of good color, liked by many sellers and are of good taste (Buruchara, 2007). A different study found out that the most commonly grown and marketed varieties in Kenya are GLP-2 (Rosecoco), GLP-24 (Canadian wonder), GLP-x-92 (*Mwitemania*), GLP-585 (red haricot) and GLP-1004 (*Mwezi moja*) (Munene and Grisley, 1992; Mbugua and Munene, 1997). KATX56 is the most preferred variety for production because it has a stable yield even in stress conditions and also high yielding in favorable situations. In contrast to Tanzania retailers, the majority of Kenya retailers preferred *Nyayo* (Korir *et al.,* 2005). According to Grisley and Munene (1992), the Calima (or Rosecoco) has a high market preference in Kenya. According to Korir *et al.* (2005), Kenya residents in Githuria have a preference for the Red Harricot beans because of the strong red color that blended with maize when cooked together. On the other hand, *Mwitemania* was preferred by residents in Taita Taveta.

The major bean varieties in Uganda include: large seeded red-mottled, the purple, red type and the pale and white colors. The large red-mottled varieties comprise traditional types such as K20, a variety developed by the national research programme in the 1960's (Rubaihayo *et al.,* 1981) and the semi climbers NABE 4 (locally known as *Nambale*). Other local grain types available in the country are medium size types such as red-medium type (*Kayinja*) and the brown-red oval (*Kanyebwa*). In Northern Uganda, there is the small-seeded (locally known as *Lango*) and are usually black or creamed colored bush bean varieties. In addition, there are some new improved varieties by the national research organization (NARO) and other partners and these varieties have received high market reception especially K131, K132 and NABE 2 (Kalyebara, 2008). K132 and NABE 4 are preferred for their large seed size, desired market qualities, short cooking time and shorter maturity period.

2.2 Common bean trade in East Africa

Most recent studies have shown that there exist two types of trade in the East African region that is, the formal and informal trade. Informal cross border trade is more dominant in East Africa due to a number of factors including: traders' tendency to evade the previously high export taxes

and import duties, bureaucratic licensing, registration requirements and market failures as a result of poor policies adopted by countries and poor infrastructure (Tchale, 2002).

According to Mauyo *et al.* (2011), the participants involved in the common bean marketing business in Kenya and Uganda are farmers, middlemen, upcountry assemblers, long distance wholesalers, agents, wholesalers based in each country, exporters, retailers and consumers. In Tanzania, those involved in cross border common beans trade are traders, agents, transporters and consumers. The traders consist of wholesalers, retailers and informal hawkers/dealers (Ogutu and Echessah, 1998). The agents buy common beans at the farm gate where they can either sell in small quantities directly to consumers from their stores or sell them to large traders during peak periods. Travelling traders collect sufficient volumes from the agents and are always individual operators whereas the transporters simply transport common beans from large traders into the major urban centers. Wholesalers role in the commons beans trade is to provide large storage facilities to bulk commodities and send them to urban retailers, export houses or cross border traders. On the other hand, retailers directly sell to consumers in small amounts and they are the participants who add the highest margin to common beans. The exporters in common beans are specialized operators involved in large scale procurement, cleaning, grading and rebagging.

In Uganda most traders sell beans by weighing in kilograms with a few in 2kg tins while in Kenya most traders sell in 2kg tins. In addition, traders arrive at uniform prices of beans by agreeing among themselves on the prices to sell depending on the demand and the supply of beans. In farmsteads located in areas with limited access to commercial motor vehicles, people use bicycles to transport common beans from farms to rural markets or to the stores of the commission or market agents. When moderate quantities are involved, pick-ups are used with respect to transporting from rural to urban areas while lorries are used to transport large quantities of common beans to final destination especially outside the country. Traders of common beans experience problems of high cost of transportation during rainy seasons due to poor road condition as compared to dry seasons (Mauyo *et al.,* 2010).

Tchale (2002) analyzed the informal cross border trade of beans in Eastern and Southern Africa. He concluded that cross border markets provide a niche market that can ensure income and food security to millions of small scale bean producers in the region. In addition, informal movement of bean varieties has implication on the quality of the varieties released by the bean breeding and dissemination programs. Tchale (*ibid*) also suggests that, informal markets should be encouraged in order to improve the benefits to small scale farmers resulting from increased bean trade in the region. Furthermore, opportunities offered through cross border markets should be explored as these markets provide an important outlet for producers who may not have access to domestic markets due to poor infrastructure and internal marketing inefficiencies.

Mauyo *et al.* (2011) analyzed cross border trade between Kenya and Uganda using both primary and secondary data. Using the concentration model, they indicated that, at the wholesale level, the bean structure was moderately concentrated with competitive fringe in both Uganda and Kenya. At the retail level, the markets in both Kenya and Uganda were well dispersed with a number of traders controlling only small amount of beans in each market. They concluded that, high quality beans fetched higher prices in both Uganda and Kenyan markets. Furthermore, they found out that majority of traders in Uganda sorted their beans and on the contrary, majority of these traders in Kenya did not sort/grade their beans. In addition the study found that, pricing of common beans was determined by the market forces and that uniform prices were arrived at by traders who agreed among themselves on the prices that they were to sell depending on supply and demand of each day. Kenya has been importing beans from Ethiopia, Uganda and Tanzania despite being the seventh largest producer in the world. For the period 2004-2008, the country's total value of bean imports amounted to about US$ 5.3 million while total value of exports estimated at US$ 624, 000 over the same period. This shows that Kenya imported of beans 10 times what it exported (USAID, 2010).

The studies clearly show that Kenya is the major importer of common beans in East Africa. Katungi *et al.* (2009), states that some of the factors that contribute to high demand of common beans in Kenya are high population growth rate, weather turbulence and declining to stagnant yields. Therefore to offset this demand, Kenya has to import common beans from neighboring

countries. As shown in Table 2, a lot of common beans were destined to Kenya from Uganda and Tanzania through various border points.

Table 2: Cross border yearly volumes for common bean for the Year 2012 in metric tons

Border	Vol (MT)	Source	Destination
Busia	119,332.00	Uganda	Kenya
Gatuna	2,420.40	Rwanda	Uganda
Lwakhakha	1,311.92	Uganda	Kenya
Malaba	2,561.05	Uganda	Kenya
Mutukula	2,388.00	Tanzania	Uganda
Namanga	519.35	Tanzania	Kenya
Oloitoktok	226.00	Tanzania	Kenya

Source: Regional Agricultural Trade Intelligence Network (RATIN 2011)

The findings of EASSI (2012), on the paradox of women cross border traders indicated that, majority of cross border trade; especially the informal is conducted by women who run small businesses. The challenges the women faced included travel security risk, poor infrastructure that increases the cost of transporting goods across the borders, discrimination and harassment by border officials, complexities of cross border trade regulations and lack of market information.

2.3 Market integration analysis

Market integration is an important determinant of food flow, availability, accessibility and price stability. The extent to which markets make food available and accessible, and keeps prices stable depends on the degree of market integration across the region (Nyange, 1999). Barrett and Li (2002) consider market integration to be most usefully defined as the tradability or contestability between markets. This implies the transfer of excess demand from one market to another, manifest in the physical flow of the commodity, the transmission of price shocks from one market to another or both. A different study states that market integration is associated with price transmission, which measures the speed of traders' response in moving food to deficit zones (WFP, 2007).

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According to Mushtaq, Gafoor and Dad (2008), markets that are not integrated could result in the inefficient allocation of resources. Kose, Prasad and Terrones (2003), state that, markets that are integrated perform better in improving per capita income and standards of living. Market integration is a tool that ensures that regional balance is maintained between food deficit and food surplus regions and that food will always move to where there is high demand and where the prices are also high. Markets that are integrated need to share the same traded good and the same long run information. The information does not have to be processed simultaneously but the markets need to be connected by trade and long run information either directly or indirectly (Gonzalez-Rivera and Helfand, 2001).

Over the last few decades, market integration studies have had a wide application. In agriculture for instance, it has been used to determine the overall performance of the market. Various authors have applied different methods and techniques in studying market integration. Correlation and co-integration analysis are the most used but have failed to account for transaction costs and non-linearity (Moser *et al.,* 2009). The correlation analysis of market integration has been used widely. Price series correlation is regarded as convenient indicator of market integration (Basu, 2006). Two variables are correlated if a change in one variable brings about a change in another. The variables will be perfectly negatively correlated if they have a co-efficient of negative one. They will not be correlated if the correlation is close to zero (Boisseleau and Hewicker, 2002). This method has methodological flaws such as: failure to recognize common exogenous trend, seasonality or autocorrelated and heteroskedastic residuals in the regression with non-stationary price data (Basu, 2006). In addition, correlation cannot account for many real world complexities (Vollrath, 2003).

Meyers (2008) studied long run and short run integration of maize in six markets in Malawi using the co-integration approach within the vector autoregressive modeling framework. He used monthly maize retail prices for period January 2000 to May 2008 and found out that nine out of the fifteen market pairs were integrated in the long run and short run market integration was low implying slow price transmission. Mayaka (2013) assessed market integration of dry beans in four markets in Kenya using price data from the periods 1994 to 2011. The study found out that all the four markets were co integrated and the Granger causality test confirmed independent

causality with only one market link showing bi-directional causality leading to symmetric price adjustment between Kitale and Nairobi market. However this study only generalized dry beans and did not take into consideration the different varieties.

Barrett and Li (2002) incorporated the effect of transaction costs in the co-integration analysis which is considered as a major problem that affects continuous trade and the direction of trade flow. They introduced a mixture distribution model which takes into account transfer costs and trade flows. The model considers the correlation between trade flows; price spread and cost transfers to explain the four potential market conditions that exist: perfect integration, segmented equilibrium, imperfect integration and segmented disequilibrium. Wim *et al.* (2010) used co-integration analysis and vector error correction model to analyze market integration and utilized wholesale weekly rice prices over a period of between January 2004 to November 2006. They found out that there existed at least three co-integrating vectors implying that, rice markets in Bangladesh during the study period were moderately linked together and that the long run equilibrium was stable. They also found out that the speed of price transmission between the divisional markets were weak.

Mumbeya (2011) analyzed value chain and market integration of cassava in the Democratic Republic of Congo. He used co-integration techniques, an error correction mechanism and an index of market connection. The study established that among the eleven pairs of markets, six of them were segmented implying that price changes in the reference markets were fully transmitted to the regional market. Du Preez (2011) analyzed market integration within the potato industry in eight selected markets in South Africa and used weekly data ranging from January 1999 to June 2009. The study determined market integration by applying the threshold vector error correction model and based on the results, there existed long run relation between all the markets and the markets were not integrated in the short run.

Studies in East Africa and especially Kenya have concentrated on dry beans in general and have not taken into account the different varieties. This study therefore analyzed market integration of key major bean varieties.

2.4 Price analysis

To help judge the extent of efficiency of the marketing system, price movement analysis in varietal commodities in corresponding and linked markets is used. The observed trends in price changes over years in the long run are associated with developments in technology of production input, supply and infrastructure. Time series of prices and quantities can be analyzed using various methodologies ranging from simple graphs, regression or autoregressive integrated moving average (ARIMA) model. Time series has been decomposed by the classical model into different components such as trend (T), cyclic (C), seasonal (S) and random (E) indices (Goetz and Weber, 1986).

The variations in market prices can be classified as temporal variation and spatial variation. Temporal variation is as a result of mixtures associated with cyclical, seasonal and irregular components. The seasonal component is the most important. Spatial price variation is the variation in the prices observed in different markets and they occur due to the differences in the location of production and consumption centers. Inter relationship between prices movements in different markets mostly depends on nature and extent of competition, dissemination of market information and the attitude of market functionaries. The degree to which wholesale prices of a commodity in different markets are related to one another determines the efficiency of any marketing system.

Kohls and Uhls (1998) are of the opinion that, pricing signals guide and regulate production, consumption and marketing decisions over time, form and place. Price relationships between spatially separated competitive markets depend on the size of transaction cost. As price differences between different markets exceed transaction costs, arbitrage opportunities are created which make profit seeking participants to exploit this opportunity by purchasing commodities from low price surplus market and transferring them to higher price deficit areas. According to Tomek and Robinson (1990), arbitrage opportunities occur only when the deviation in price is substantial enough for potential profit to exceed the cost of trading. This then raises prices in the surplus region and reduces them in the deficit region.

Tomek and Robinson (1990) further state that, the principle underlying the differences between regions in a competitive market structure with homogenous commodities is that price differences between any two regional markets that trade with each other should equal transaction cost. In a situation of autarky price differences will be less than or equal to transaction costs. According to Negassa, Myers and Gabre-Madhin (2003), price relationships between spatially separated markets are generally analyzed within the framework of spatial price equilibrium theory developed by Enke (1951), Samuelson (1964) and Takayama and Judge (1964). The key assumption underpinning spatial price equilibrium theory is that price relationships between spatially separated competitive markets depend on the size of transaction costs. Prices are an important tool in the economic analyses of markets (Oladapo and Momoh, 2008). The overall functioning of the market can be better understood by analyzing the vertical or spatial price transmission between markets. The level of market competitiveness can be determined by studying the extent and speed with which shocks in prices are transmitted within the marketing chain (Serra and Goodwin, 2002a).

Vollrath (2003) extends the law of one product to international markets stating that, prices will equalize across freely trading areas. In addition homogenous goods will sell for the same prices in different countries taking the exchange rate into account. If two markets are integrated, a shock in any of the markets in either demand or supply and ultimately price should be transmitted to the other market (Barrett, 1996; McNew and Fackler, 1997; Boisseleau and Hewicker, 2002; Negessa *et al.,* 2003; Mushtaq *et al.,* 2008). Markets that are normally integrated exhibit long run relationship between their prices (Balke and Fomby, 1997; Vollrath, 2003; Negassa *et al.,* 2003). In the short run spatial prices can deviate from each other but still be integrated (Vollrath, 2003).

2.5 Theoretical framework

Market integration can be vertical, spatial or inter-temporal. Vertical integration involves different stages in marketing and processing channel. In spatial integration, spatially distinct markets have prices that move together and price signals and information are transmitted smoothly. Finally, inter-temporal market integration refers to arbitrage across a period of time. Spatial market integration is the long run relationship of prices. It is the smooth transmission of

price signals and information across spatially separated markets (Golletti, Ahmed and Farid, 1995; Ghosh, 2000).

The idea of spatial market integration is always expressed as the law of one price. Market integration depends on trade action and its operational environment, which is determined by transportation and communication infrastructure availability and the policies that affect price transmission (Gilletti *et al.*, 1995). Fackler and Godwin (2001), point out that, although majority of authors have focused on whether or not markets exhibit spatial integration, only a number of them have explicitly evaluated the determinants of market integration.

If geographically separated markets are integrated, then there exists an equilibrium relationship (Goodwin and Schroeder 1991 Sexton *et al.,* 1991). Co-integration model in market integration is usually performed to determine whether price of a commodity in a local market is related to change in the central market (Ghoshray, 2009; Ravaillion, 1986). The long run equilibrium relationship for analyzing market integration is as follows:

$$Y_t = \alpha + \beta X_t + U_t \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \ (1)$$

Where; Y_t and X_t = commodity prices of a homogenous good (common beans in this case), in two different markets at time t, and α and β are parameters to be estimated. If two markets are perfectly spatially integrated, then $\beta = 1$. If this holds, then price changes in one market are fully reflected in alternative market. When $\beta \neq 1$ (i.e. $\beta < 1$ or $\beta > 1$), then the degree of integration may be evaluated by investigating how far the deviation of α_1 is from unity.

2.6 Conceptual framework

Market integration is important in indicating transmission of price signals and shocks among commodities over time. The model underlying market integration assumes that if there are two markets *i* and *j* that are completely separated from each other, then the price of the same commodity should not be related. Implying that, if market *i* experiences poor harvest and market *j* receives good harvest and in the absence of information flow between the two markets, then prices will suddenly rise in market *i* and show no movement in market *j* (Ravallion, 1986). If markets *i* and *j* are integrated, then the price in market *j* would also show some movement. This is as aresult of some food flowing from the surplus market *j* to deficit market *i* therefore

decreasing the food supply in market j. The prices in market i would go down because of the increased supply from market j. The co-movement of prices gives a degree of market integration.

The conceptual framework below shows that an efficient market or integrated market depends on balance in trade which is brought about by improved market infrastructure, government policies and fair prices in the market. If the marketing costs are high then the volume, price, variety and quality of bean that is supplied in the market will be low to meet the rising demand in the market. Government policies which bring about the trading regimes and constraints or challenges such as bribery, long custom procedures and high fee charges at the market that are faced by both the transporters and the traders play a major role in influencing the adequacy of the volumes and quality of bean that is traded between the surplus and deficit market. Rigid trading regimes discourage traders and transporters from trading in large volumes of beans which also impacts on the prices received by consumers and the quality and variety of beans in the market. The characteristics of the bean trade in terms of traders characteristics such as age, gender, education level, distance to the market or border point, years in education and the nature of business all have an impact on the volumes, varieties and prices of common bean that is traded.

Surplus market 1

Deficit market 1

Improved market infrastructure (roads and market information demand) Government policy Fair prices

Balance in bean supply and demand
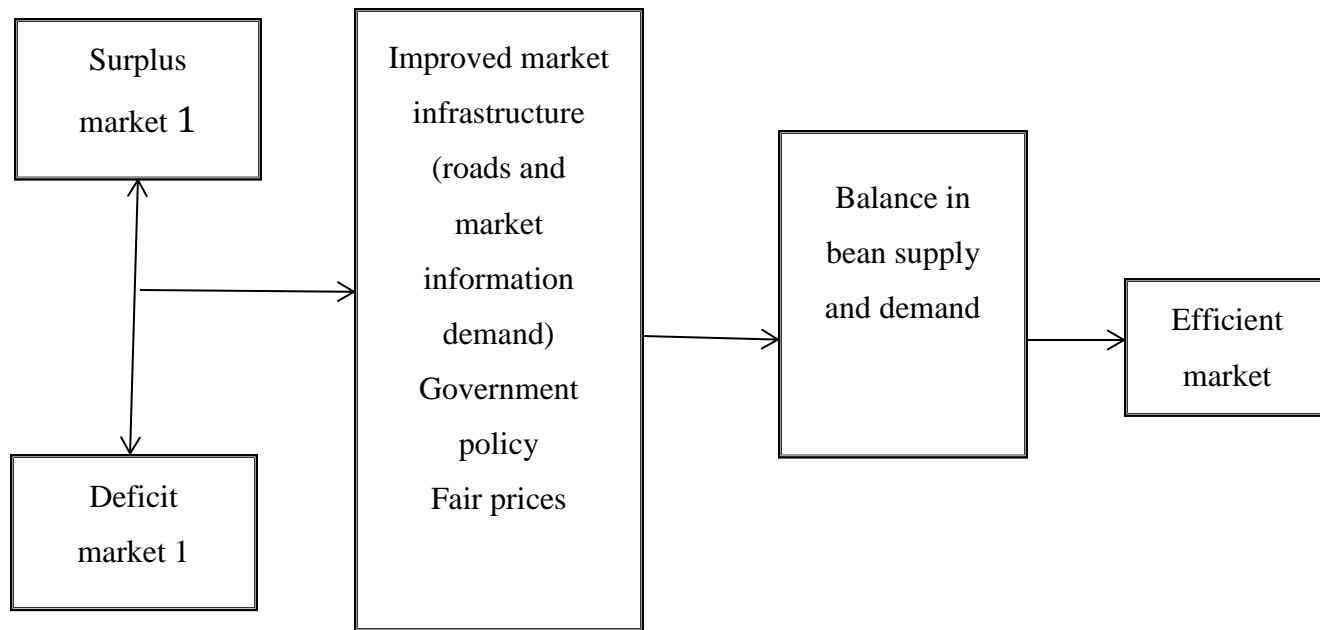
Efficient market

NB: Arrows show the flow of beans

Figure 1: Conceptual framework for factors influencing efficient market.

Source: Own conceptualization, 2014

CHAPTER THREE

METHODOLOGY

3.1 Study Areas

This study involved selection of key border points within East Africa. There are about ten border points in Kenya. The study covered four major border points namely Busia, Malaba, Isebania and Namanga: These border points were purposively selected due to the extent of bean activities, nature of trade and the volumes of common beans that they handled.

Busia border is mainly an exit point for goods destined for Uganda from Kenya and vice versa. There is substantial trade that goes on between Kenya and Uganda however; the trade in agricultural commodities is in favor of Uganda. Imports from Uganda are mainly maize, beans, bananas, tomatoes, dried cassava chips, water melon and pineapples. The exports to Uganda are mainly Irish potatoes and cabbages but in small quantities. Trade in common beans mainly takes place between the months of May to August.

Malaba border point is mainly for goods on transit, with small imports that pass for local consumption. The main imports through this border are cereals, beans, water melon, bananas and mangoes. Exports are mainly passion fruits and onions which are in small quantities.
Isebania border point is located in Kuria district bordering Tanzania. This point has a district agricultural officer stationed permanently here in collaboration with an officer from KEPHIS. Imports from Tanzania mainly include beans, cotton seed cake, rice bran, rice, oranges, tomatoes, green grams, water melons, sweet potato and maize. It handles relatively high amounts of common bean.

Namanga is one of the busiest borders between Kenya and Tanzania. It serves as an entry point for commodities destined to the Nairobi market and the transit goods to other countries through the Jomo Kenyatta International Airport (JKIA). It is also the entry point for commodities destined to other parts of the country. It handles commodities such as dry maize, oranges, watermelon, livestock, onions and beans. Common beans are traded throughout the year.

Table 3: Border points studied

Province/border name	Neighboring countries
Isebania	Tanzania
Busia	Uganda
Malaba	Uganda
Namanga	Tanzania

The study also involved three selected key markets in Kenya. The criteria for selecting the markets was generally based on their position from the selected border points i.e. whether they are surplus or deficit region and the potential demand for common bean. These markets were purposively selected due to the following reasons: Nakuru is a major cosmopolitan town and a production zone with relatively high demand for common bean. Nairobi is a consumption zone with a high real and potential demand for bean and most of the common bean from the border points is destined to Nairobi. Mombasa also a consumption zone and the largest town in the coastal region for both retail and wholesale market for common bean which is served by Namanga border point.

3.2 Respondents

Respondents interviewed included traders and transporters of common beans to get information on their characteristics and the constraints they face in the common bean trade. Customs officials at the border points or crop inspectorate officers were also interviewed on the quantity of both formal and informal trade of common bean and the varieties of common bean crossing the borders.

3.3 Sampling procedure and sample size

A multistage sampling technique was used in this study to arrive at a sample of 240 traders. The four border points and three key markets were purposively selected. The second step involved snowballing to determine the traders. At least two transporters were interviewed and one Kephis/customs official was interviewed from each border point.

In determining the sample size for traders, the formula as developed by Groebner and Shanon (2005) was used as follows:

$$n = (z^2\, pq)/e^2 \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (2)$$

Where:

n = sample size

p = proportion of the population of interest

q = 1-P (the weighting variable)

z = standard variate at confidence level (α = 0.05)

e = margin of error

The area under the normal curve corresponding to 95% confidence interval is 1.96 (z value in the statistical tables). Using a p value of 0.5 and acceptable error of 8.95%, a sample size of 120 was obtained. This was replicated for both the border points and key markets. The sample was then proportionately disaggregated as follows for the four the four border points and three key markets based on the proportion of bean traders in each market. Busia (68), Namanga (32), Malaba (5), Isebania (15), Nairobi (60), Nakuru (30) and Mombasa (30).

3.4 Data Types and Sources

This study utilized both primary and secondary data. The secondary data consisted of common bean monthly average prices for the years 2011 to 2013 collected from the Ministry of Agriculture Kilimo House Nairobi in the Agribusiness and Marketing department. Primary data was collected from the common bean traders and transporters using a structured interview schedule. Data collected included characteristics of traders, different types of common beans traded, prices of common beans, place where beans are bought and sold, frequency of trade per month, mode of transport, challenges traders and transporters face and market information.

3.5 Data analysis

Objective one: Characteristics of common bean traders at key border points and markets.

Descriptive statistics (mean, frequencies, standard deviation and graphic representation of the results in charts) was used to establish the following parameters; gender, age, level of education, number of years in business and category of trade (transportation, wholesale and retail).

Objective two: Determination of constraints to the observed trade.

Descriptive statistics were used in the comparisons of the quantity of different common bean varieties traded and the constraints traders faced. This included the use of frequencies, mean, cross tabulation and percentages.

Objective three: Assessing extent of market integration for common bean.

This analysis provided important information on the product movement mechanisms and technical information on spatial prices behavior. Relationship among prices in key markets was checked using co-integration analysis. A long run linear relationship exists if different price series are co-integrated. If geographically separated markets are integrated, then there exists an equilibrium relationship (Goodwin and Schroeder 1991 Sexton *et al.*, 1991). Co-integration model in market integration is usually performed to determine whether the price of a commodity in a local market is related to change in a central market (Ghoshray, 2009; Ravaillion, 1986). The long run equilibrium relationship for analyzing market integration is as follows:

$$Y_t = \alpha + \beta X_t + U_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (3)$$

Where; Y_t and X_t = commodity prices of a homogenous good (common beans in this case), in two different markets at time t, and α and β are parameters to be estimated. If two markets are perfectly spatially integrated, then $\beta = 1$. If this holds, then price changes in one market are fully reflected in alternative market. When $\beta \neq 1$ (i.e. $\beta < 1$ or $\beta > 1$), then the degree of integration may be evaluated by investigating how far the deviation of α_1 is from unity.

A two-step model by Engel and Granger (1987) was used since price time series are usually non-stationary and because standard statistical models do not allow explicit determination of α and β. The first step was to determine the order of integration of each price series by checking for stationarity. A time series (say Y_t) is stationary if the joint distribution of Y_t and Y_{t+t} is independent of time (t). Augmented Dickey-Fuller test was used to determine the order of integration. This was achieved by regressing ΔY_t on Y_{t-1} and several lags of ΔY_t (enough to avoid auto correlated disturbances).

The model was specified as:

$$\Delta Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \Sigma \alpha_{k+t} \Delta Y_{t+k} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(4)$$

Where: ΔY_t is the first difference of prices in market Y, Y_{t-1} is the lagged price of common beans in market Y, α_0 and α_1 are parameters to be estimated, ε_t is the error term.

The t-statistic on the estimated coefficient of Y_{t-1} was used to test the hypothesis that:

Ho: $Y_t \sim I(1)$ Vs H_1: $Y_t \sim I(0)$

If the null ($H_{o)}$ above cannot be rejected then Y_t cannot be stationary, it can be integrated of order one or even higher. To find out the order of integration the test was repeated with ΔY_t in place of Y_t thus regressing $\Delta\Delta Y_t$ on a constant ΔY_{t-1} and several lags of $\Delta\Delta Y_t$. ADF test was then used to test the hypothesis that:

Ho: $\Delta Y_t \sim I(1)$ Vs;   H1: $\Delta Y_t \sim I(0)$

i.e Ho: $Y_t \sim I(2)$ VS; H1: $Y_t \sim I(1)$

This process was continued until the order of integration was established. The second step involved testing for co-integration based on the idea that if two time series (eg. Y_t and X_t) are each $\sim I(1)$, then their residual (say U_t) was integrated of order zero (stationary). Where $U_t = Y_t - \alpha - \beta X_t$. The residual ($U_t$) was then tested for stationarity. The ADF tests applied to these residuals should yield statistics which are large and negative so as to reject the null hypothesis of I (1) in favor of stationarity.

If the first step shows that each time series is integrated of order one, and if the second step results to a stationary residual, then the two time series are said to be co-integrated. This implies that long run equilibrium relationship exists between the two sets of prices. To have a distinction between short-run and long-run integration, an Error Correction Model (ECM) was used. This allowed for derivation of the speed of price transmission from one border point/market to another.

The error term in the co-integration was treated as the equilibrium error. To tie the short run behavior of Y_t to its long run value, the ECM will be specified as:

$\Delta Y_t = \alpha_0 + \alpha_1 \Delta X_t + \alpha_2 U_{t-1} + \varepsilon_t$ …………………………………………………………… (5)

Where; Δ = first difference operator, ε_t = random error term and $U_{t-1} = (Y_{t-1} - \alpha - \beta X_{t-1})$

ECM states that ΔY_t depends on ΔX_t and also on equilibrium error term, while absolute values of α_2 decide how quickly equilibrium will be restored (speed of adjustment).

Table 4: Variables used in co-integration model

Variable	Description	Measurement	Expected sign
NrbPr	Price of common bean in Nairobi	Kenya shillings	+
NkrPr	Price of common bean in Nakuru	Kenya shillings	+
MsaPr	Price of common bean in Mombasa	Kenya shillings	+

CHAPTER FOUR

RESULTS AND DISCUSSIONS

This chapter presents the findings from the study of common bean cross border trade. The chapter is divided into two sections. The first section presents the descriptive results comprising types of traders, age, gender, experience, level of education of traders, varieties traded and constraints to bean trade. The second section of the chapter discusses empirical results of market integration of the three selected markets in Kenya.

4.1 Descriptive Analysis

4.1.1 Characteristics of common bean traders

The results in Table 5 show that the mean age of all sampled traders was 38.97 with the mean age for women and men traders being 40.79 and 36.34 respectively. This shows that female traders were older than the male traders. This could be due to the fact that women began trading in beans at an older age due to family obligations. Some of the women respondents mentioned that they had to take care of the young children until they reached a certain age before they could venture into trade. It was also found that, the mean trading experience for all sampled traders was 7.64 years. Women traders averaged more years in trading than their men counterparts (7.9 years versus 7.2 years for men). As shown in Table 5, majority of women traders had more experience in the bean trade with the maximum experience being 47 years in bean trade and minimum experience being 6 years. The highest number of years that men stayed in the trade was 25 years and the minimum being a year. The results show that all the variables tested had $p > 0.05$ indicating that there was no significant difference between the women and men traders in terms of age and experience.

Table 5: Age and Experience of common bean traders

		Aggregate	t-value	p- value	Women	Men
Age	Mean	38.97			40.79	36.34
	Std. deviation	0.71	-0.67	0.50	1.01	0.89
Experience	Mean	7.64	0.13	0.90	7.86	7.21
	Std. deviation	6.69			7.62	5.16
	Min				6.00	1.00
	Max				47.00	25.00
Women traders= 141; men= 99						

Education level of common bean traders

The findings showed that more than half (57.58%) of traders had secondary school education. Majority of them felt that it was valuable to be educated to secondary school level as it gave them an advantage on record keeping, credit access, getting information of sources of bean supply and knowing their customer needs over those who did not reach secondary school level (see figure 2 below). Masinjila (2009) also found similar results that majority of traders felt it was advantageous to be educated to secondary school level to engage in meaningful cross border trade. From the results, 28.13% of the traders had attained primary education while those without formal education constituted 7.36%. Those traders who attained post-secondary school education and secondary long cycle accounted for 3.03% each and they outnumbered those traders who had reached early childhood education (0.87%).
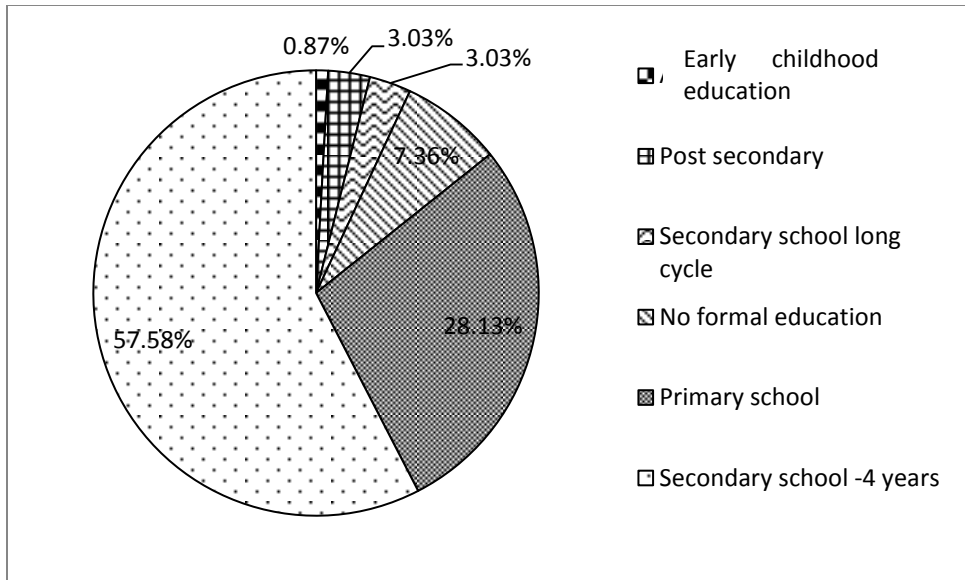
Figure 2: Overall education level of common bean traders

Figures 3 (a) and (b) show the level of education by gender. These findings reveal that male traders tend to be more educated than women traders. The results show that most traders had attained secondary education in which 64.21% were men while 52.94% were women traders. 30.15% of women traders and 25.26% of men traders had achieved primary level education. About 11.03% of the women traders had no formal education. In contrast, only 2.11% of men traders had no formal education. The relative high level of women traders with no education is an indication of poor human capital of women which increases their probability to participate in the informal sector as observed by Njikam and Tchouassi (2011). With regard to those traders who had attained post-secondary education, 2.21% were women while 4.21% were men. In addition, the results also show that, 2.21% of women traders and 4.21% of men traders completed secondary long cycle.

27
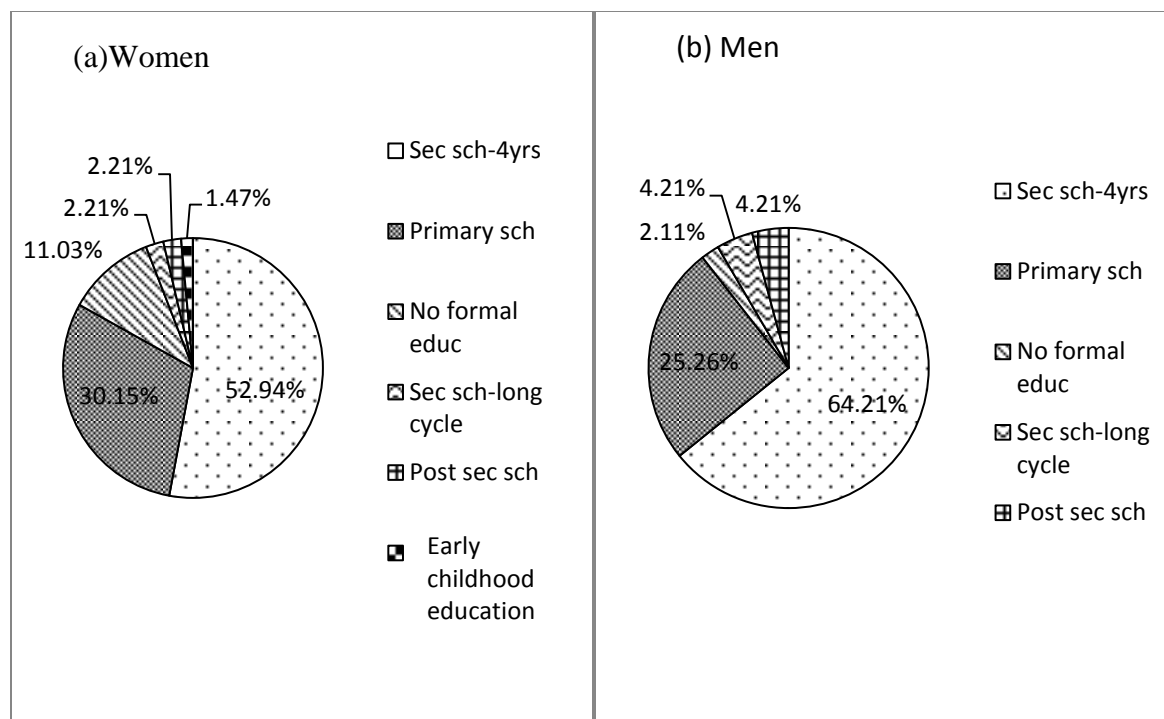
Figure 3: Level of education by gender of common bean traders

The sample consisted of 41.8% retailers, 39.2% wholesalers, 9.7% both wholesalers and retailers and only 9.3% transporters as shown in Table 6. The reason for most traders being in retail bean trade could be attributed to the fact that other categories of trade require more capital to start and maintain. Odhiambo *et al*. (2006) noted that lack of capital is a serious constraint for entry into bean trade in Nairobi.

Table 6: Types of common bean traders

Type	Frequency	Percentage
Transporters	23	9.3
Wholesaler	94	39.2
Retailer	99	41.8
Both wholesale and retail	24	9.7
Total	240	100.00

The results in Table 7 show that 59.1% of sampled traders were women while 40.9% were men. This indicates that women are more active in bean trade than men. The findings are consistent with Kibiego *et al.* (2003) who observed that, majority of common bean traders in Kenyan markets were women who constituted long distance wholesalers, wholesalers/retailers, agents and retailers operating in shops, market stalls and open air. This difference in gender can be

attributed to the fact that women traders have defied the belief that trade is a men dominated economic venture. This also goes against the belief that women in most African societies have been perceived as delicate and their duty is to stay at home and take care of the family since men are considered to be bread winners in the family. Currently, more women are participating in trade so as to minimize increasing family costs.

Table 7: Category of common bean traders by gender

Trade involved in		Women	Men	Total	Chi-square
Transporters	Count	6	16	22	
	%	27.3	72.7	100	
Wholesaler	Count	48	45	93	
	%	51.6	48.4	100	
Retailer	Count	74	25	99	
	%	74.8	25.3	100	
Both wholesale and retail	Count	12	11	23	
	%	52.2	47.8	100	
Total		141	99	240	
		59.1	40.9	100	21.8560***

*** indicates significance at 99 percent confidence level.

Of the sampled common bean transporters, 72.7% were men while 27.3% were women. This could be because truck driving or transportation is considered a masculinity venture. From the study, it was also observed that women wholesalers constituted 51.6% while men wholesalers constituted 48.4%. In addition, there were 74.8% women retailers and 25.3% men retailers. Among traders who participated both in retail and wholesale bean trade, women traders comprised 52.2% while men traders were 47.8%. The results in Table 7 also reveal that women dominated in the three trade categories. The Chi square results revealed that there were no differences among the women and men traders in relation to category of trade. This can be attributed to the fact that the common bean traders share same market customers and opportunities and are exposed to similar constraints in bean trade.

4.1.2 Common bean varieties traded in key selected markets and border points

Regarding the common bean varieties among the traders, Nyayo bean was popular and was sold by 35.0% of the traders while 23.5% of the traders sold Wairimu bean variety as shown in Table 8. This could be because these two varieties sell faster in the market due to consumers' preference and low prices. These findings are similar to that of Korir *et al.* (2005), who found that farmers preferred to grow the Nyayo variety since it was very marketable at retail level in Kenya. About 15.5% of traders sold Mwitemania variety with 10.2% of traders stocking mixed bean while 8.8% of the traders sold Rosecoco. The least traded bean varieties were Yellow bean and Saitoti which were sold by 4.8% and 2.0% of traders respectively.

Nyayo variety was highly traded in the key selected markets and sold by 40.8% of the traders followed by 35.9% of the traders in Busia. In Namanga, 15.5% of traders sold Nyayo bean variety while in Isebania 7.8% of the traders sold the same variety and no trader sold Nyayo in Malaba border point (see Table 8). This could be because Malaba border point is a transit point and minimal trade is carried out at this point. Other than Malaba, 35.7% traders in Namanga, 28.6% traders in Isebania, 21.4% traders in Busia and 14.3% traders in key markets sold yellow bean. Among the sampled traders, 66.7% in Busia sold Saitoti variety while another 33.3% in the key selected markets traded in Saitoti bean. This could probably be because Saitoti bean shares similar features with Nyayo. Saitoti is rather smaller in size than Nyayo making Nyayo the most preferred by traders to sell among the two varieties. Mwitemania variety was sold in the key selected markets, Busia and Namanga by 56.5%, 39.1% and 4.3% of the traders respectively. Of all the bean varieties traded, it was only Wairimu that was sold in all the markets. It was highly traded in the key selected markets (39.1%) and least traded in Malaba (7.3%). This could be attributed to the fact that Wairimu variety is relatively cheaper and preferred by most consumers. There are more than 10 varieties traded in the Kenyan market and the most popular among traders and with a big market share are Nyayo, Wairimu and Rosecoco (Spursby *et al.,* 2004; Katungi *et al.,* 2010).

Table 8: Common bean varieties traded at the border points and key markets

Common bean varieties	Busia	Malaba	Namanga	Isebania	Key selected mkts	Total
Nyayo	37 (35.9)		16 (15.5)	8 (7.8)	42 (40.8)	103 (35.0)
Wairimu	13 (18.8)	5 (7.3)	17 (24.6)	7 (10.1)	27 (39.1)	69 (23.5)
Mwitemania	18 (39.1)		2 (4.3)		26 (56.5)	46 (15.7)
Mixed	10 (33.3)		2 (6.7)	1 (3.3)	17 (56.7)	30 (10.2)
Rosecoco	13 (50)		2 (7.7)	3 (11.5)	8 (30.8)	26 (8.8)
Yellow bean	3 (21.4)		5 (35.7)	4 (28.6)	2 (14.3)	14 (4.8)
Saitoti	4 (66.67)				2 (33.3)	6 (2.04)

Numbers in Parenthesis are percentages

4.1.3 Constraints to common bean trade

From the interviews on constraints faced by the traders, 33.3% of the bean traders indicated that poor roads was a constraint, 32.5% gave high transport cost as a constraint while 21.9% gave the constraint of seasons (heavy rains). The high transport costs were common during the rainy season due to poor road conditions compared to the dry seasons (Mauyo *et al.,* 2010). Traders expressed that high transport costs which is majorly caused by poor road infrastructure constrained them from purchasing beans from source markets. Heavy rains also affected the supply of beans which later translated to low margins for the traders.

Table 9: Constraints faced by traders

Constraints	Transporters	Retailers	Wholesalers	Wholesalers/ retailers	Overall percentage
Poor roads	25	50	25	0	33.3%
High transport cost	9.30	34.9	32.6	23.3	32.5%
Seasons (heavy rains)	16.7	47.6	35.7	0.00	21.9%
Low profit margins	0.00	70.9	5.9	23.5	19.8%
Irregular quantity of supply	0.00	42.9	28.6	28.6	19.0%
Lack of access to credit	8.3	58.3	20.8	12.5	16.9%
Lack of storage	0.0	20.0	60.0	20.0	7.2%
Not convinced that the demand will last for too long	14.3	57.1	28.6	0.0	6.3%
Heavy formal taxes (tariffs)	0.0	75.0	25.0	0.0	5.5%
Insecurity	0.0	100.0	0.0	0.0	1.7%

Results in Table 9 also show that 19.8% of the traders expressed low profit margins while 19.0% of the traders gave irregular quantity of supply as constraints to bean trade. Some traders expressed that they would sell off their stock of beans at low prices to avoid it from being

attacked by pests because at times the demand for beans was low. The issue of irregular quantities of beans forced traders to source beans from alternate sources at very high prices compared to the original source.

Some traders mentioned that their source suppliers would hoard beans so as to sell them later at a high price during peak season; this forces most of them to source beans from neighbouring countries like Uganda and Tanzania. Korir *et al.* (2003) mentioned that long distance wholesalers especially women travelled to neighbouring Tanzania markets to purchase beans. 16.9% of bean traders expressed lack of access to credit as a constraint, 7.2% gave lack of storage, 6.3% gave uncertainty about demand as a constraint while 5.5% gave the constraint of tariffs. Only 1.7% of the traders gave the issue of insecurity as a constraint to bean trade. This finding is similar to Mauyo *et al*. (2010) who found out that, traders mentioned insecurity as one of their least worries in bean trade. Issues of theft were very rare in bean trade and were experienced by very few traders. This is because the traders had adequate and safe storage facilities for the beans.

Other than transporters, all the other traders gave low profit margin, irregular quantities of supply and lack of storage as a constraint. Only retailers were observed to have expressed insecurity as a constraint to bean trade. A greater number of retailers (75%) gave tariffs as a constraint while 25% of the wholesalers gave the same constraint. Other than those traders who were both wholesalers and retailers, all the other traders expressed poor roads, seasons and uncertainty about demand as constraints to bean trade.

4.2 Results of Integration Analysis

Secondary data from the years 2011-2013 for Rosecoco, Mwezi moja and Mwitemania were used. The three bean varieties were used because they were common in Nairobi, Nakuru and Mombasa markets that were to be tested for integration. Mbugua and Munene (1997) noted that, Mwitemania, Mwezi moja and Rosecoco are the most commonly grown and marketed varieties in Kenya.

4.2.1 Price trends

Figure 4 shows wholesale variation in market prices for Rosecoco in Nairobi, Nakuru and Mombasa between the years 2011 to 2013. It can be seen that there has been continuous price

fluctuation in the three markets since beans are normally harvested in August and December. Bean prices generally decline immediately after harvest and are at their lowest around August to September and December to February due to bounty supply. The prices then gradually increase and reach their peak around April to July (Katungi *et al.,* 2010). This is because during the months of April to July, beans are still in the field and the demand increases due to minimal supply hence increased prices in the market.
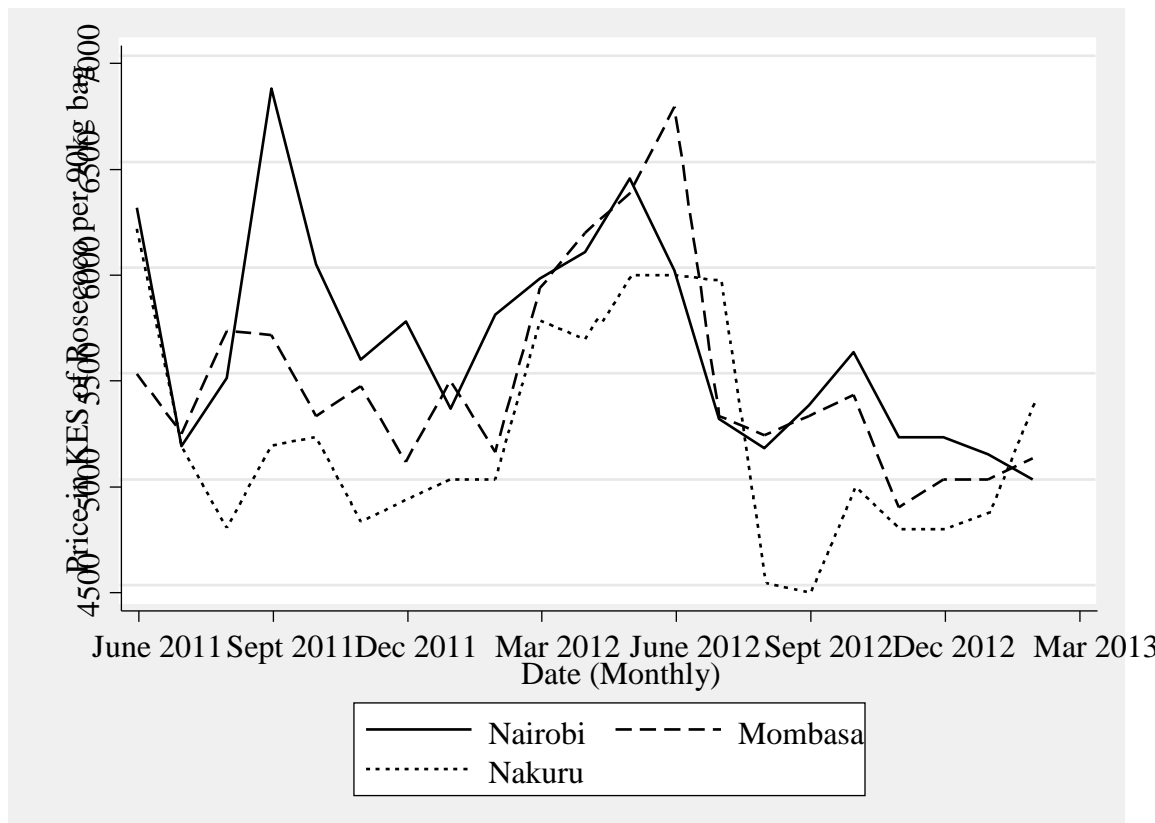
Figure 4: Seasonal variation of Rosecoco bean prices in Nairobi, Mombasa and Nakuru

It is evident that the wholesale prices have been fluctuating over the three years with the highest average price being in Nairobi especially in the months of June and September followed by Mombasa and then Nakuru with the lowest. This could be because both Nairobi and Mombasa are consumption zones for Rosecoco. Nakuru is a production zone for Rosecoco making the prices relatively cheaper as compared to the other two markets.

Figure 5 shows wholesale market price trends for Mwezi Moja bean in Nairobi and Nakuru between the years 2011 to 2013. The wholesale prices reached peak in April in both markets. This is because the planting season for beans is in April and so there is less beans in the market which causes supply shortage in the market thus increase in prices. In the month of October, the wholesale prices were low in Nakuru but very high in Nairobi. The difference of prices in these two markets may be explained by the fact that in October beans are probably still in the field and are yet to be harvested. Nairobi is not a production area for beans therefore has to be supplied by other markets thus high prices in the month of October.
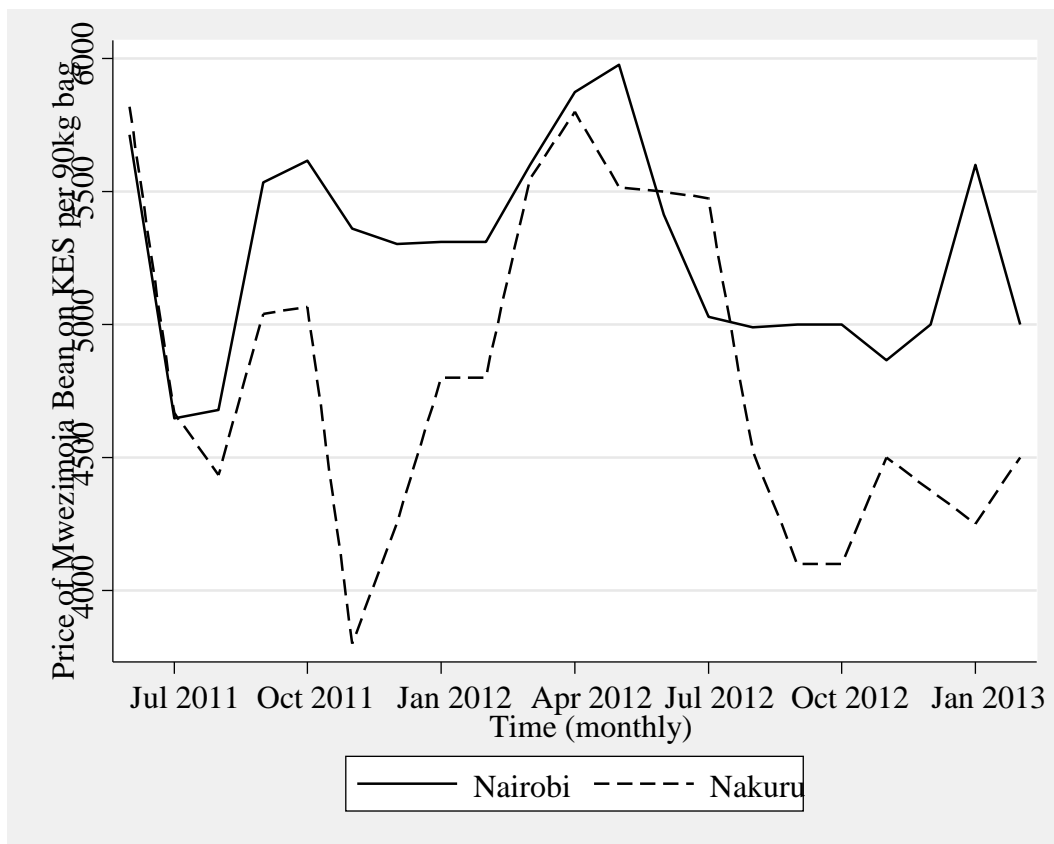
Figure 5: Seasonal variation of Mwezi moja bean prices in Nairobi and Nakuru

Figure 6 shows wholesale market price trends for Mwitemania in Nairobi, Nakuru and Mombasa between the years 2011 to 2013. The trends in the three markets have varied and fluctuated between the three years and this could be due to either bumper harvest or poor harvest caused by variation in weather conditions or resistance and susceptibility to pests and diseases. Mwitemania prices are highest in Mombasa followed by Nairobi and Nakuru. The monthly

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average prices reach their peak in the month of April and are slightly low in the month of January possibly because April is a planting season while January is a harvesting season.
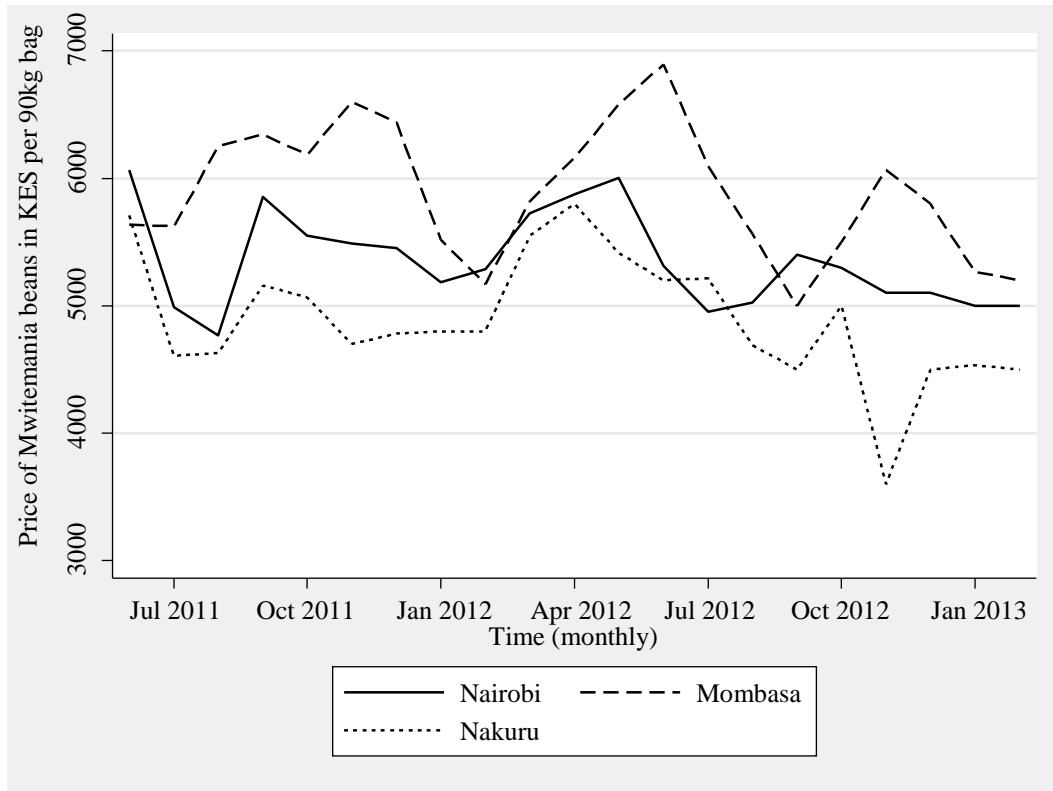
Figure 6: Seasonal variation of Mwitemania bean prices in Nairobi, Mombasa and Nakuru

4.2.2 Unit root test results

Table 10 shows unit root test for Rosecoco bean and the first difference of the selected markets. Prices were converted to logarithm and it was found that price series for Nairobi were not stationary as the test statistic (-2.792) is less than the 5 percent critical value. Differenced price series for Nairobi (D1. Nairobi) was stationary as the test statistic (5.317) is greater than the 1 percent critical value (3.75) in absolute terms meaning we reject the null hypothesis that the series are not stationary. Differenced price series for Nakuru and Mombasa were stationary as the test statistics were greater than the 1 percent critical value. This implies that prices of the previous period for Rosecoco in the three markets influenced the current prices. This means that the price series for Nairobi, Nakuru and Mombasa Rosecoco bean are integrated of order one I (1). When price series are integrated once, this makes it stationary and integrated of order one process, denoted as I (1) as observed by Odipo *et al.* (2014).

Table 10: Unit Roots Test for Rosecoco Bean

Market	Test Statistic	1% critical value	5% critical value	10% critical value	MacKinnon approximate pvalue for Z(t)
Nairobi	-2.792	-3.750	-3.000	-2.630	0.0595
D1. Nairobi	-5.317	-3.750	-3.000	-2.630	0.0000
Nakuru	-2.950	-3.750	-3.000	-2.630	0.0399
D1. Nakuru	-4.326	-3.750	-3.000	-2.630	0.0004
Mombasa	-2.232	-3.750	-3.000	-2.630	0.1950
D1.Mombasa	-5.423	-3.750	-3.000	-2.630	0.0000

Price series for both Nairobi and Nakuru were not stationary as the test statistics of -2.929 and -2.614 respectively were less than the 5 percent critical value meaning previous period prices influenced current prices. The differenced prices for both Nairobi and Nakuru were stationary as depicted in Table 11 meaning that the price series for Mwezi moja for the two markets were integrated of order one. However, contrary to a study by Mayaka (2013), price series for dry beans in Nakuru and Nairobi were integrated of order zero at 1 and 5 percent significance.

Table 11: Unit Roots Test for Mwezi moja Bean

Market	Test Statistic	1% critical value	5% critical value	10% critical value	MacKinnon approximate pvalue for Z(t)
Nairobi	-2.929	-3.750	-3.000	-2.630	0.0421
D1. Nairobi	-4.816	-3.750	-3.000	-2.630	0.0001
Nakuru	-2.614	-3.750	-3.000	-2.630	0.0902
D1. Nakuru	-3.901	-3.750	-3.000	-2.630	0.0020

Table 12 shows that Nairobi and Nakuru Mwitemania bean markets were stationary series. There was no need therefore to test the first differences of the price series to determine the order of integration. This means that previous prices for Mwitemania in both Nairobi and Nakuru did not influence current prices. Price series for Nairobi and Nakuru were integrated of order zero I (0) Mombasa Mwitemania bean market was not stationary as shown in Table 12, the test statistic of -2.015 was less than the 5 percent critical value. The differenced prices for Mombasa were stationary and therefore integrated of order 1 meaning previous prices influenced current prices.

Table 12: Unit Roots Test for Mwitemania Bean

Market	Test Statistic	1% critical value	5% critical value	10% critical value	MacKinnon approximate pvalue for Z(t)
Nairobi	-3.517	-3.750	-3.000	-2.630	0.0076
Nakuru	-3.218	-3.750	-3.000	-2.630	0.0190
Mombasa	-2.015	-3.750	-3.000	-2.630	0.2799
D1.Mombasa	-3.215	-3.750	-3.000	-2.630	0.0191

4.2.3 Co-integration test results

After testing for stationarity, the data was then tested for Co-integration. If two markets in spatially separated markets p_{1t} and p_{2t} contain stochastic trends and are integrated of the same order, then the prices are said to be integrated.

$$p_{1t} - b\, p_{2t} = u_t \quad \text{is I(0)} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots. (6)$$

b is referred to as the co-integrating vector. To confirm whether the selected markets are co-integrated, the above relationship was estimated using Ordinary Least Squares OLS (Engle and Granger, 1987). The null hypothesis of no co-integration was tested by applying unit root tests on the residuals (u_t) for each of the price series. The hypotheses H0: $U_t \sim I\ (1)$ was tested against H1: $U_t \sim I\ (0)$.

Results in Table 13 indicate that Nairobi- Mombasa and Nakuru- Mombasa markets for Rosecoco were co-integrated since the test statistics were greater than the critical value at 5 percent. The reason for Nairobi-Mombasa market for Rosecoco being co-integrated could be because of good infrastructure between the two markets. Nakuru-Mombasa markets being co-integrated could be partly because of good market information flow among the two markets. This means we reject the null hypothesis of markets not being co-integrated at α= 0.05. Nakuru-Nairobi market for Rosecoco was not co-integrated and this can be attributed to the fact that Nairobi market could be supplied with Rosecoco from a different production zone other than Nakuru. Beans are established to move from Arusha to Nairobi through Namanga border point and there appears to be a co-movement or trend of average wholesale prices of Rosecoco between Nairobi and Arusha as observed by Korir *et al.* (2003).

Table 13: Cointegration tests between Nairobi and Mombasa and Nakuru for Rosecoco

Market	Test Statistic	1% critical value	5% critical value	10% critical value	MacKinnon approximate pvalue for Z(t)
Nairobi vs Mombasa	-3.490	-3.750	-3.000	-2.630	0.0083
Nairobi vs Nakuru	-2.627	-3.750	-3.000	-2.630	0.0876
Nakuru vs Mombasa	-4.735	-3.750	-3.000	-2.630	0.0001

An Error Correction Model (ECM) was used to distinguish between short-run and long-run price relationships amongst Rosecoco markets in Nairobi, Mombasa and Nakuru. ECM was only carried out on the market pairs that were co-integrated. ECM accounts for both short and long run adjustment to disequilibrium in the markets and the time it takes to eliminate disequilibrium as noted by Mushtaq *et al.* (2008). Once a number of variables were found to be co-integrated, then there existed a corresponding error correction representation which indicated that changes in the dependent variable are a function of the level of disequilibrium in the co-integrating relationship as well as changes in other variables as noted by Engle and Granger (1987).

$$\Delta N_t = -0.087 + 0.659 \Delta M_{t-1} + 0.724 e_{t-1} \dots\dots\dots\dots\dots\dots\dots\dots (7)$$

Where; Δ = first difference operator, e_t = random error term

N_t is Rosecoco prices in Nairobi while M_t is Rosecoco prices in Mombasa.

Equation 7 indicates ECM for Nairobi and Mombasa. The error correction mechanism as indicated by the lagged residual is significant and positive meaning that short run prices diverge away from the long run equilibrium and are unstable. Mombasa prices for Rosecoco appear to have significant long term effect on Nairobi prices. A 1 percent increase in Mombasa prices causes a 0.65 percent rise in Nairobi prices. Besides, Acquah and Owusu (2012) also observed that wrong sign (positive) on the estimate of error correction coefficient of Accra plantain market showed that, short run price movement along the long run equilibrium path may be unstable.

$$\Delta M_t = 0.002 + 0.522 \Delta NK_{t-1} + 0.556 e_{t-1} \dots\dots\dots\dots\dots\dots\dots\dots (8)$$

Equation 8 indicates ECM for Mombasa and Nakuru which shows that short run prices diverge away from long run equilibrium since the coefficient on the error correction term is positive. The positive sign on the coefficient of the error correction term may be an indication of instability in

the short run price movements along the long run equilibrium. A 1 percent increase in Nakuru Rosecoco prices causes a 0.52 percent rise in Mombasa prices.

Table 14 shows that Nairobi- Nakuru markets for Mwezi Moja were not co-integrated since the test statistic was less than the critical value at 5 percent. This is partly attributed to the fact that Nairobi market could be supplied by other markets other than Nakuru hence the market is already supplied with Mwezi moja bean variety.

Table 14: Cointegration test between Nairobi and Nakuru markets for Mwezi Moja.

Market	Test Statistic	1% critical value	5% critical value	10% critical value	MacKinnon approximate pvalue for Z(t)
Nairobi vs Nakuru	-2.889	-3.750	-3.000	-2.630	0.0467

Nairobi- Nakuru and Nakuru- Mombasa markets for Mwitemania were co-integrated since the test statistics are greater than the critical value at 5 percent as shown in Table 14. This is probably because the marketing infrastructure in these three markets is good therefore low transaction cost. This means we reject the null hypothesis of markets not being integrated at α= 0.05. As also observed by Mayaka (2013), improving market infrastructure such as roads and communication facilities can greatly reduce transaction costs and improve price transmission and market efficiency hence increasing market integration across markets. Mombasa- Nairobi market for Mwitemania was not integrated.

Table 15: Cointegration tests between Nairobi, Mombasa and Nakuru markets for Mwitemania.

Market	Test Statistic	1% critical value	5% critical value	10% critical value	MacKinnon approximate pvalue for Z(t)
Nairobi vs Nakuru	-4.177	-3.750	-3.000	-2.630	0.0007
Nairobi vs Mombasa	-2.519	-3.750	-3.000	-2.630	0.1110
Nakuru vs Mombasa	-3.689	-3.750	-3.000	-2.630	0.0043

$$\Delta N_t = -0.004 + 0.37\Delta NK_{t-1} - 0.94e_{t-1}\ldots\ldots\ldots\ldots\ldots\ldots\ldots (9)$$

Equation 9 indicates that Mwitemania price changes in Nairobi are dependent on price changes in Nakuru. The coefficient of the error correction term is negative and significant showing that short run price movements converge towards long run equilibrium path and may be stable. The results are consistent with Mukhtar and Rasheed (2010) who noted that correct sign (negative) on the coefficient of the error correction term is an indication of stability of the system. Absolute value of α_2 (0.94) indicates that when prices are not in equilibrium, they would be restored in a period of less than half a month. This speed at which 94 percent of the disequilibria of the previous month shock is adjusted back to equilibrium is very fast implying high degree of co-integration amongst Nairobi and Nakuru markets for Mwitemania bean. Mwangi *et al.* (2014) also found similar findings on French beans, where they observed that negative sign on error correction indicated direction of correction towards the long run relationship and that French beans export adjusted rapidly to correct long run disequilibrium in a period of one month.

$$\Delta M_t = -0.003 + 0.14\Delta NK_{t-1} + 0.32e_{t-1} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ (10)$$

Equation 10 indicates ECM for Nakuru and Mombasa. The error correction mechanism as indicated by the lagged residual is significant and positive meaning that short run price movement along the long run equilibrium path may be unstable. A 1 percent increase in Nakuru prices causes a 0.14 percent rise in Nairobi prices.

CHAPTER FIVE
SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary and Conclusions

The main objective of this study was to contribute to improved livelihoods of actors in common bean trade through efficient marketing of beans across the borders. The focus was to assess the extent of common bean market integration between deficit and surplus markets, thus ascertaining whether Nairobi, Nakuru and Mombasa markets for Rosecoco, Mwitemania and Mwezi moja are integrated and to know the constraints and characteristics of traders in the selected bean markets. The research questions answered in this study were; what are the characteristics of common bean traders? What are the constraints to observed trade in common bean? and, to what extent are bean deficit and surplus markets in Kenya integrated?

Time series data obtained from the Ministry of Agriculture was used to analyze market integration. Augmented Dickey Fuller test was used to test if the price series was stationary and the results revealed that all the markets were integrated of order one I(1). Co-integration tests revealed that Nairobi-Mombasa Rosecoco markets and Nairobi-Nakuru and Nakuru-Mombasa Mwitemania markets were co-integrated.

This study established that majority of retailers and wholesalers who play an important role in the bean trade are women. These traders had knowledge on the most preferred varieties in the market by the consumers making them able to supply them at all times by sourcing the beans from their original or alternate source within and outside the country. Traders armed with market information on the prices and bean varieties exploited the market to their advantage. High transport cost was a major constraint for the traders. This was caused by poor roads and heavy rains and this would at times translate to inefficiencies in the supply of beans to the markets. As a result, the demand in the market exceeded the supply given the irregular supply of beans in the market. The key to enhancing integration of common bean markets is to improve the marketing infrastructure. Study findings show that the most traded varieties by the traders were Nyayo and Wairimu while Saitoti and Yellow bean were the least traded by the traders.

The results indicated that prices of Rosecoco, Mwitemania and Mwezi moja varieties tended to fluctuate over time due to variation in planting and harvesting seasons. Co-integration and error correction model results revealed Cointegration of Nairobi- Mombasa and Nakuru- Mombasa Rosecoco markets and Nairobi- Nakuru and Nakuru- Mombasa Mwitemania markets. The study concluded that a supply shock in one region can enhance integration of spatially located markets as shock can easily be transmitted from one market to the other. If common bean traders can have information concerning price changes in different markets (price shocks), this would enable them to access better paying markets.

5.2 Recommendations

In context of bean traders in Kenyan markets, there is need for the government together with the private sectors to sensitive bean traders on the importance of engaging in common bean trade as a way of contributing to their daily incomes. There is need to enhance market information by both farmers and traders freely for better price transmission and knowledge of the best bean markets to trade in. this could boost competitiveness and consequently increase market integration.

This study recommends that the government together with the private sector should improve infrastructure such as transport and communication services in order to enhance market integration in Kenya. Improved transport system lowers transaction costs thus farmers will produce more beans and in turn traders purchase the required quantity of beans to meet the market demand without exploiting the consumers. The government needs to make key commitments to maintain the roads in Kenya in order to lower the transport cost of beans as this was a major hindrance in the efficiency and flow of beans from one market to the other.

The government together with the private sector should make efforts at promoting different bean varieties in all the regions to both farmers and traders. This would increase market demand and availability of different bean varieties in the market. Additionally, Kenya needs to zero rate agricultural produce being imported to allow traders import more common beans into the country in times of deficit. This will also help bean traders to penetrate the market in East Africa as there

is huge and growing market potential in the region. This would help reduce irregularity in bean supply and thus increase profit margin for the traders.

The results show that, there is integration between deficit and surplus markets justifying price transmission between urban and rural markets in Kenya. Price transmission from high producer markets to consumer markets. Therefore, it was concluded that, if markets are integrated, they form an incentive for farmers to produce in surplus as they are assured of efficient markets and the fact that traders would not take advantage of increased production to lower farmer's benefits. This will foster competition, increase returns accruing to producers and decrease transaction costs between urban and rural markets.

5.3 Suggestions for further research

The study focused on market integration of three common bean varieties in Kenya. However more research should be conducted to document other bean varieties in key markets other than looking at common beans in general to allow a clear distinction between different varieties in the same markets. This would help in formulating market policies that encourage production and supply of diverse varieties in different markets.

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APPENDICES

APPENDIX ONE: INTERVIEW SCHEDULE FOR TRADERS AND TRANSPORTERS

Traders and Transporters/Couriers Questionnaire

Questionnaire Number_____

	Question	Codes	Response
A: Background Information			
1	Interviewer name		
2	Country	1=Kenya, 2=Uganda, 3=Tanzania, 4= Burundi, 5=Rwanda	
3	Border site		
4	Border Town		
5	Name of respondent		
6	Gender of the respondent	1= Male, 0= Female	
7	Age of the respondent (In complete years)		
8	What is your highest level of education?		
9	Are you a resident of this border area?	1= Yes, 0= No	
10	If no, where do you live?		
11	Country of origin of the respondent	1=Kenya, 2=Uganda, 3=Tanzania, 4= Burundi, 5=Rwanda	
12	What is the main category of trade you are involved in?	1=transportation, 2= whole sale, 3= retailer, 4= Other specify…………………	
13	Who is your customer? *If there are multiple*	1= End consumer	

		customers, please rank them in order of importance	2= Retailer 3= Middleman/aggregator (actually purchases) 4= Wholesaler 5= Broker/fixer (only trades) 6= Transporter who wholesales 7= Processor/Miller 8= Any other, please specify	
14	Number of years in the started business		
15	Compared to five years ago, how did the number of customers, change? (Only ask if business is more than five years old	1= Increased 2= Decreased 3= No Change	
16	Do you participate in informal cross border trade	1= Yes, 0= No	
17	Percentage of the trade		
18	Is informal cross border trade your main source of employment?		
19	Give reasons why you participate in informal cross border trade?		
B: Volumes and values of beans trade				

20	Local name	Trade in it [1= Yes; 0= No]	Local Names	Source (country and locality name)	Alternate source of supply (country and locality name)	What types of units do you buy at? 1 = Kilos, 2 = 50 kilo bags, 3 = 90 kilo bag, 4 = 110 kilo bags, 5 = tons, 6= big tins/debes Any other, please specify	Purchasing quantity per month	Purchase price	Selling price	Time taken to sell	Place to where they are sold (country and locality name)	Packaging	Quantity declared (%)	

21	Indicate the month when the beans are available in the market, when buying price, selling price and trade volumes are high, average or low. Codes: 1= high, 2= average, 3= low, 4= not available

Bean local names		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	General availability												
	Buying price												

		Volume of sales														
		Sales prices														
		Availability in usual source														
		General availability														
		Buying price														
		Volume of sales														
		Sales prices														
		Availability in usual source														
		General availability														
		Buying price														
		Volume of sales														
		Sales prices														
		Availability in usual source														
		General availability														
		Buying price														
		Volume of sales														
		Sales prices														
		Availability in usual source														

		General availability															
		Buying price															
		Volume of sales															
		Sales prices															
		Availability in usual source															
		General availability															
		Buying price															
		Volume of sales															
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		Availability in usual source															
		General availability															
		Buying price															
		Volume of sales															
		Sales prices															
		Availability in usual source															
		General availability															
		Buying price															
		Volume of sales															
		Sales prices															

		Availability in usual source												
22	Are the bean varieties normally mixed	1=Yes 2=N0												
23	If mixed do you sort them or market as they are	1=sort 2= minimal sorting 3=No sorting												
24	What are the reasons for sorting	(e.g what market requires, differential price)												
25	Mode of transport	1= 7 ton truck (Cantor), 2= 12 ton truck , 3= 28 ton truck, 4= Land-cruiser taxis, 5= Pick-ups (Hilux), 6= Vans (owned or rented), 7= Matatus/buses/public transport, 8= Carts (donkeys/cows), 9= Cycles, 10= On animals (camels/cows/donkeys), 11= Wheelbarrows, 12= Humans, 13= Any other please specify												
26	What are the 3 main constraints to transporting commodities to you/your clients? _Please rank them in order of importance_	Use codes in Q 24												
27	Do you have access to market information?	1= Yes, 0= No												
28	If, yes, what kind of Market Information do you get?	1= On price, 2= On volume of the commodity, 3= On Quality of the commodity, 4= On Transport costs, 5= On Storage price, 6= On what the competition is doing, 7= Any other, please specify												
29	Main constraints and challenges in bean trade	1= Seasons (heavy rains, etc), 2= Lack of access to credit, 3= Irregular quantities of supply by wholesalers/suppliers/producers, 4= Lack of storage, 5= High transport costs, 6= Lack of good roads, 7= Low profit												

		margins, 8= Heavy informal taxes (bribes), 9= Distances from wholesale/supply markets, 10= Heavy formal taxes (tariffs), 11= Insecurity, 12= Poor road infrastructure, 13= Not convinced that demand will last too long, 14= Any other, please specify	
30	In your view, what actions should be taken by Government to address the above problems		
31	In your view, what actions should be undertaken by the Private sector to address the above problems		
32	Compared to five years ago, how does the volumes of trade changed? *(Only ask if business is more than five years old*	1= Increased, 2= Decreased, 3= No Change	
33	How have the trading regimes affected bean trade in the past five years?	1= Increased, 2= Decreased, 3= No Change	
34	How have customs documents changed compared to 5 years ago?		

35	How have fees and charges at the border points customs documents changed compared to 5 years ago?		
36	Are there new costs and charges introduced Are there new costs and charges introduced		
	What amount of costs do you incur in this trade? • Handling, • Packaging • Transport • Storage and rental cost • Labour cost of work paid by traders • Insurance expenses/costs		
Closure-Thank you very much for your time			
37	Do you have any question?		

APPENDIX TWO: INTERVIEW SCHEDULE FOR CUSTOMS OFFICIALS

Formal and Informal Exports and Imports

Direction of trade: from…………………………to…………………………… Customs Station …………………………………………

Beans Types (Photo)	Month	Amount declared (tones/month)	Value	Tax paid	Quality declared	% Share of not declared	Destinations	Informal Trade as % of total trade (officer estimate)