STAPE FOODS VALUE CHAIN ANALYSIS

COUNTRY REPORT - KENYA

January 2010

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LIST OF ACRONYMS AND ABBREVIATIONS

ACT	Agriculture, Competitiveness and Trade Activity
AGCI	African Growth and Competitiveness Initiative
AGOA	African Growth and Opportunities Act
AKEFEMA	Association of Kenya Feed Manufacturers
ASAL	Arid and Semi Arid Lands
ASARECA	Association for Strengthening Agricultural Research in Eastern and Central Africa
ASDS	Agricultural Sector Development Strategy
ATIRI	Agricultural Technology and Information Response Initiative
BAKE	Bakers Association of Kenya
CAADP	Comprehensive African Agricultural Development Programme
CBOs	Community Based Organizations
CGA	Cereal Growers Association
CGR	Compound Growth Rate
CIMMYT	International Maize and Wheat Improvement Centre
CMA	Cereal Millers Association
COMESA	Common Market for Eastern and Southern Africa
COMPETE	Competitiveness and Trade Expansion
DANIDA	Danish International Development Agency
EAC	East African Community
EAGC	East African Grain Council
ECARRN	Eastern and Central Africa Rice Research Network
ERA	Economic Review of Agriculture
ES	Economic Survey
EU	European Union
FAO	Food Agricultural Organization
FARA	Forum for Agricultural Research in Africa
FIPS	Farm Input Promotions Africa Ltd
GDP	Gross Domestic Product
GFRS	Global Food Security Response
HA	Hectare
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IEHIA	Initiative to End Hunger in Africa
IFAD	International Fund for Agricultural Development
JICA	Japanese International Cooperation Agency
KACE	Kenya Agricultural Commodity Exchange
KARI	Kenya Agricultural Research Institute
KEPHIS	Kenya Plant Health Inspectorate Services

KFA	Kenya Farmers Association
KIPPRA	Kenya Institute of Public Policy Research and Analysis
KMDP	Kenya Maize Development Program
KNBS	Kenya National Bureau of Statistics
KRA	Kenya Revenue Authority
KSU	Kenya Seed Unit
LBDA	Lake Basin Development Authority
MFMCS	Mwea Farmers' Multi-purpose Cooperative Society
MIAD	Mwea Irrigation Agricultural Development
MOA	Ministry of Agriculture
MT	Metric Tonne
NCPB	National Cereals and Produce Board
NEPAD	New Partnership for Agricultural Development (
NGOs	Non-Governmental Organizations
NIB	National Irrigation Board),
PBAK	Plant Breeders Association of Kenya
RATES	Regional Agricultural Trade Expansion Support Program
RATIN	Regional Agricultural Trade Intelligence Network
RECA	Relief Environmental care for Africa
STAK	Seed Traders Association of Kenya
TIAPD	Tegemeo Institute of Agricultural Policy and Development
UGMFA	United Grain Millers and Farmers Association
UPOV	Union of Protection of new Varieties of Plants
USA	United States of America
USAID	United States Agency for International Development
VC	Value Chain
VCA	Value Chain Analysis
WFP	World Food Program
WRS	Warehouse Receipting System
WTO	World Trade Organization

Table of Contents

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

EXECUTIVE SUMMARY

This study, which was commissioned by the USAID-funded COMPETE project, covered eleven staples crops in Kenya (Maize, Wheat, Rice, Sorghum, Millet, Beans, Pigeonpeas, Cowpeas, Chickpeas, Cassava and Groundnuts). The study was undertaken by Stanley Karuga and Dr Alfred of Market Economies Development Ltd. The aim of the study was to conduct a market assessment of these staple foods in Kenya including a value chain analysis (VCA) to provide a framework for the development of a strategic plan to improve the value and or the volume of staple foods marketed in Kenya. The study covered two broad areas-value chain analyses for each crop and business enabling environment for trade in agricultural commodities both nationally and regionally. More details on specific tasks and objectives of the study can be cited in the terms of references appended to this report. This study, which was primarily based on secondary information-with limited interviews in and around Nairobi, was undertaken over a period of 50 days during the period August 2009-January 2010.

Main Study Findings:

- With the exception of maize, wheat and rice, specific-subsector secondary information is very scanty at all levels of the respective value chains. In fact the annual reviews of the Ministry of Agriculture do not normally cover commodities such as chick peas, cassava and groundnuts.
- Kenya's staple food sector has been fully liberalized, with the exception of maize whose prices (NCPB-into depot) are occasionally set by Government thereby influencing free market forces primarily because NCPB is major player. Additionally, there is lack of political commitment on full and uninterrupted liberalization-as demonstrated by the recent export ban on maize by the Governments of Kenya and Tanzania.
- The demand for most of the staple crops is on the rise against declining production resulting in increasing annual deficits thereby necessitating increased imports;
- Growth of both production and trade of staple food crops has generally been on the decline in the last five years primarily due the following cross-cutting constraints:
    - Persistent drought conditions-against limited use of irrigation systems;
    - High cost of inputs including fertilizer, seeds and fuel. This has resulted in low utilization of inputs especially among smallholder farmers and hence low yield achievements as well as reduced competitiveness of Kenya products.
    - Weak extension services to the staple food sector-public and private;
    - Weak research-extension linkages-resulting in low adoption of already developed high-yielding varieties-which are numerous for many of the staple crops
    - Continued subdivision of land to uneconomical units;

    - High post harvest losses occasioned by several factors such poor storage/pest infestation, poor conditions of rural roads;
    - Limited access to credit-because financial providers are often reluctant to offer credit towards production of staple crops with the exception large scale maize and wheat.
    - Lack of proper market facilities for dry staple food crops-an area that requires urgent attention.
- Horizontal linkages at the producer and marketing levels are generally very weak -there are no notable national associations except for CGA which has limited commodity coverage and limited membership. However, CMA represents a fairly strong horizontal linkage type of associations at the millers (maize and wheat). The equivalent of CMA at the small-scale millers level (UGMFA) is rather weak.
- Vertical linkage at all levels of the value chains are extremely weak-with the exception of large scale of wheat and maize production where some farmers have business relationships with millers;
- The staple food sector are characterized by very limited and narrow-based value-addition with the exception of wheat (e.g. the country continues to import starch whereas local cassava industry could support and the same for groundnuts which could be a source of supply of edible oil);
- There is lack of structured trading systems (i.e. absence of contract farming, underdeveloped Commodity Exchange and Warehouse Receipting systems);
- There is inadequate market information at all levels of the staple foods value chains (nationally and regionally);
- While tariff-related issues have significantly been resolved and may be fully eliminated with the recent signing of the EAC Customs Union, non-tariff barriers continue to hamper trade domestically and regionally-with police road blocks and multiple council cess and levies being the most constraining;
- There is very limited awareness of import and export standards especially with regard to SPS as well as NTB reporting mechanisms and monitoring systems among small-medium scale traders and the general public;
- Standards (weights and packaging) are yet to be fully harmonized in EAC/COMESA regions resulting in trade inefficiencies;
- There is limited private sector-based storage facilities-which has partly been discouraged by actions such the involvement of NCPB/Government in storage, marketing and pricing;

Key Policy Implications

Policy implications include the need for the following:

- Enhancing productivity of staple crops to meet increasing demand mainly through promoting increased use and adoption of modern inputs (mainly certified seed and fertilizers), improved research-extension linkages, and promotion of irrigated farming-a matter that should be given high priority;
- Implementation of appropriate land use policy to hedge against continued subdivision of agricultural land to uneconomical units;
- Full Government commitment to free domestic and regional trade-which should include sensitization of policy makers with emphasis on Parliamentary Agricultural Committee;
- Establishment of structured trading systems for staple crops by promoting relevant systems e.g. Warehouse Receipting Systems and Commodity Exchange., and strengthening farmers and traders organizations for more effective and efficient vertical and horizontal linkages as well as linking these two broad initiatives to appropriate credit systems;
- Development of appropriate information gathering and dissemination systems for the staple foods sector (including food balance)-to feed into Government development planning and private stakeholders in business planning especially among farmers and traders;
- Development of marketing and storage infrastructure for staple crops at village and terminal market levels;
- Stepping up initiatives towards full removal of non-tariff barriers which continue to impede on efficient staple food trade and competitiveness-domestically and regional with special emphasis on police road blocks, county cess and levies.
- Enhanced sensitization and involvement of private sector stakeholders on NTB monitoring and reporting systems-which also requires to be strengthened;
- Sensitization of farmers and traders on standards with special focus on the SPS;

Recommendations

- Support initiatives towards enhancing productivity of staple crops through increased multiplication of already released high-yielding varieties, promotion of adoption especially among smallholder farmers, and appropriate inputs use supported by soil tests to determine specific nutrients needs;
- Initiate consultative fora between private sector staple food stakeholders and Government to elicit formal and full commitment to non-interference with free market/trade-in particular in relation to the "Stop-Go" policy on imports and export (that is restrictions/ban of imports and exports) as recently happened with maize in Kenya and Tanzania.

- Support sensitization among policy-makers on the need to maintain free trade of food crops and its benefits towards long term national food security-with special focus on Parliamentary Agricultural Committee;
- Support the formulation of relevant policies towards the development of Commodity Exchange and Warehouse Receipting Systems and enact the necessary legislative framework;
- Review local Government agricultural produce taxation systems and procedures with a view to harmonization, reduction and abolition of multiple-taxation. Traders seemed not to have problems with payment of county cess and levies, the problem lies in the amount (Kshs 40 per bag equivalent for all products which they recommend to be reduced to Kshs 20) and multiple charges.
- Introduce the "green channel" concept to facilitate faster flows of imported staple crops focusing on large and regular imports (this has been done in China and India).
- Formulate markets/marketing policy and implementation strategy for the development of appropriate marketing facilities-with special emphasis on major terminal markets.
- Support public/private sector partnership-based initiatives towards strengthening data collection, storage, analysis and dissemination including but not limited to national and regional production and consumption; intra and extra EAC/COMESA trade flows (volumes and values) as well as in developing regular food balance sheets and institutionalizing them sector planning.

1.0 INTRODUCTION

1.1 Study Context

Staple crops are important sources of both food security and income generation for the majority of households in developing countries, including Kenya. It is against this background that the USAID-funded Competitiveness and Trade Expansion (COMPETE) program has decided to undertake market assessment and baseline studies for selected staple crops towards identifying priority interventions aimed at enhancing economic growth and food security in East and Central Africa. The initiative is being undertaken in collaboration with the East African Community (EAC); Common Market for Eastern and Southern Africa (COMESA); and the East African Grain Council (EAGC). COMPETE is funded by the United States Agency for International Development office for East Africa (USAID/EA) under the auspices of the World Trade Organization (WTO) Aid for Trade framework. It responds to four major US Government initiatives –African Growth and Competitiveness Initiative (AGCI); Initiative to End Hunger in Africa (IEHIA); Global Food Security Response (GFRS); and the African Growth and Opportunities Act (AGOA). COMPETE is part of the USAID/East Africa's new regional Agriculture, Competitiveness and Trade Activity (ACT)-which aims at increasing African trade and competitiveness in regional and global markets by reducing barriers to trade, improving market access, and furthering regional integration. While trade flow analysis of various staple foods product reveal existing potential to increased intra-regional trade, this remains very low despite the various efforts through regional integration.

1.2 Significance, Objectives and Scope of the Study

Market Economies Development Ltd has been contracted by COMPETE to undertake a Market Assessment and Baseline for Staple Crops in Kenya as part of the wider regional based sector development initiative. The crops covered by this report are: maize, wheat, rice, sorghum, millet, beans and pulses (pigeon pea, cow pea, chick pea), cassava and ground nuts. The overall purpose and objective of the study is to conduct a market assessment for each of the above-listed staple foods including a value chain analysis (VCA) that that adequately provide a framework for the development of a strategic plan to improve the value and or the volume of staple foods marketed in Kenya. The assignment included the following components and tasks: (i) synthesizing all relevant value chain assessment reports and mapping out activities of development partners by identifying who is doing what and where. (ii) conducting value chain analyses starting with production/farm gate and moving through all points of market transfer and value-added points, identifying all "major players" along the chain; (iii) identifying and explaining all issues, problems and constraints at each transfer point in the chain; (iv) identifying volume flow between sectors and cover all local use (rural) and consumption of staple foods and staple foods by-products (including household retention); (v) identifying and explaining the value change

between transaction points; (vi) identifying and analyzing, using COMPETE template for trade policy platform, all trade regulations that govern intra-country flow; exports and imports of Staple foods; (vii) assessing the status, impact, opportunity for reform and measures necessary to facilitate reform of pricing and marketing policies; (viii) assessing the status, policy framework and opportunities for structured trading system; (ix) providing insight and personal perspective on the issues and problems and making recommendations on interventions at "links" in the value added chain that may assist the industry in general and the smallholder farmer in particular to improve on volume and/or value; (x) Developing a five year base line of data for volume and value ending with the 2008/2009 season.

1.3 Study Methodology and Approach

The study methodology and approach entailed the following (i) Secondary market research through literature review of all relevant documents; (ii) Field interviews through direct contact with key actors (persons, institutions etc) in the respective value chains in and around Nairobi, as well as through telephone and email for those outside the area. This involved visiting a representative sample of the producer organizations, milling companies to collect data, interview officers, and to develop a "feel" for the industry at the various points of the chain.

1.4 Study Limitations

The main study limitations included the following: (i) Limited field coverage (outside Nairobi) due to the limited time allowed for the study especially bearing in mind the wide range of staple crops that were to be covered (11), and the wide range of information and data required as per the attached terms of reference and associated templates. (ii) The fact that the study coincided with one of the worst food security periods in the history of Kenya, resulting in some respondents being reluctant to provide information considered confidential and sensitivity. This included for example some maize and wheat millers who did not want to disclose their milling capacities, cost of milling and held stocks in light of the recent rationing program for subsidized maize imports; and some key Government departments with responsibility on food security issues who were not keen to offer the latest situation for fear of possible political repercussions. (iii) Limited availability of secondary information/data for some crops that in the Kenyan case are not normally considered critical to national food security and often referred to as "orphan crops", e.g, sorghum, millet, chick peas, cow peas, pigeon peas, cassava and groundnuts. (iv) Cold reception of the consultants among some of the key respondents (mainly institutions) for what appeared to be "fatigue" regarding far too many studies and little or no action towards addressing their problems.

1.5 Structure of the Report

Structure of the rest of the report is as follows:

(I) **PART ONE:** Overview of the national economy and the agricultural sector:
(II) **PART TWO**: Value Chain Analysis for Select Staple Commodities covering

- Chapter 3.0 Maize
- Chapter 4.0 Wheat
- Chapter 5.0 Rice
- Chapter 6.0 Sorghum
- Chapter 7.0 Millet
- Chapter 8.0 Beans
- Chapter 9.0 Pigeon peas
- Chapter 10.0 Cassava
- Chapter 11.0 Groundnuts

(III) PART THREE: Business Enabling Environment for Trade

(IV) PART FOUR: Main Conclusion, Policy Implications and Recommendations

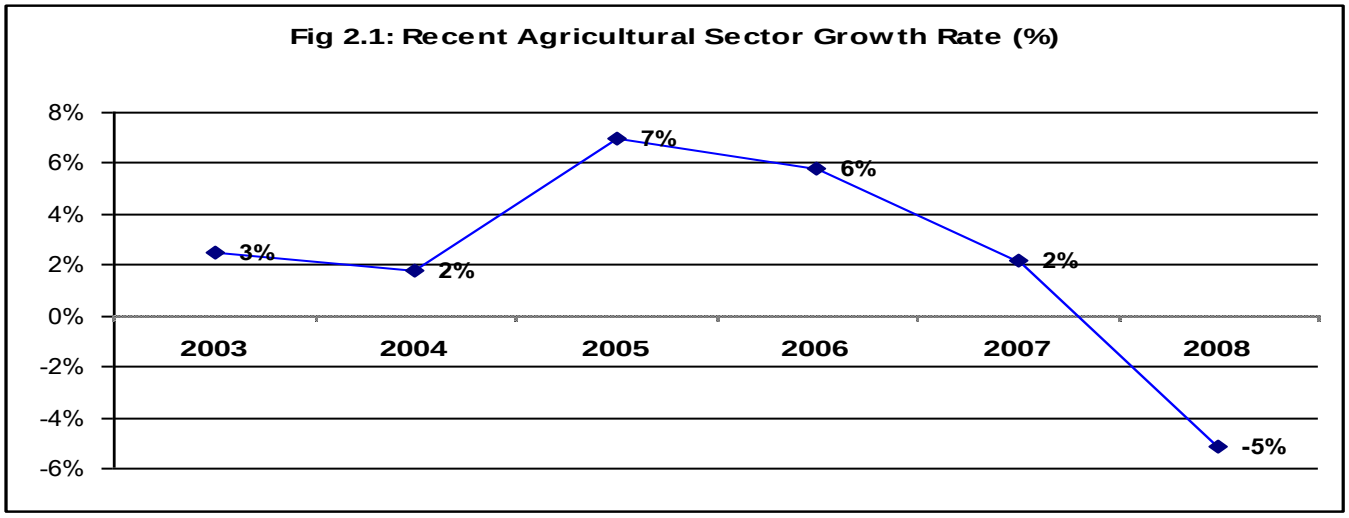
PART ONE: OVERVIEW OF KENYA'S ECONOMY AND THE AGRICULTURAL SECTOR

2.0 AN OVERVIEW OF KENYA'S ECONOMY

Kenya's main economic sectors and their contribution to GDP include Agriculture sector (crops, livestock and forestry) which account for about 24% of GDP directly and an additional 27% indirectly; Manufacturing sector which account for about 11% of GDP; Transport and Communication sector which contribute about 10% to GDP.

2.1 Status and Significance of the Agricultural Sector

Agriculture is the mainstay of Kenya's economy, directly contributing 24% of the GDP annually valued at Kshs 342 billion (US$ 4.6 billion) and another 27% indirectly of GDP (valued at Kshs 385 billion equivalent to US$ 5.1 million). The sector accounts for 65% of country's total exports and supports 18% of formal employment and more than 60% of informal employment in the country (Vision 2030; October 2007). Therefore, the sector is not only the driver of Kenya's economy, but is also the means of livelihood for the majority of the Kenyan people. As indicated in figure 2.1 below, the performance of the agricultural sector remained subdued resulting in deceleration of annual growth rate from the record high of 7.0% in 2005 to -5.1% in 2008.



Source: MOA; Economic Review of Agriculture; 2009

The main factors attributed to this unprecedented decline in sector growth rate include poor climatic conditions characterized by prolonged dry conditions in most parts of the country, post election violence of December 2007/January 2008, high input prices occasioned by high oil prices and general inflation, and the global economic down-turn occasioned by the financial melt-down.

2.2 Main Commodities Produced

Kenya's agricultural sector comprises six major sub-sectors. These include industrial crops, food crops, horticulture, livestock, fisheries and forestry. Based on various official government documents and subsector studies, the main commodities and their approximate production values in 2008 based on domestic value include:

- Industrial crops include tea (US$ 738 million); coffee, (US$ 91 million); sugar (US$ 164 million); pyrethrum (US$ 1.2 million; sisal (US$ 19 million); tobacco and coconuts.
- Food crops include maize (US$ 951 million) and wheat US$ 136 million); rice (US$ 16 million); beans US$ 174 million);
- Horticultural products-vegetables, flowers and fruits (US$ 2.4 billion) both domestic and export;
- Livestock-dairy (US$ 1.5 billion) and beef (US$ 1.0 billion);
- Fish-both fresh water and marine fish (US$ 120 million);

2.3 Agricultural Subsector Growth Dynamics

Kenya's agriculture is predominantly rain fed and its performance is largely influenced by weather conditions from year to year. With the deteriorating climatic conditions, and primarily due to global warming, annual growth rate in agricultural value added has been on the decline from 7% in 2005 to negative 5.4% per annum in 2008. This clearly points to the need to promote irrigation-based agriculture. Smallholders are the dominant producers accounting for 70% of total marketed agricultural production. These farmers cultivate farms averaging 1.6 hectares. There is no recent trend analysis of national household land holding size but the average farm size is believed to be declining rapidly with continued sub-division of household farms resulting in uneconomical landholdings. Therefore, enhancing the performance of smallholders through promotion of intensive farming is critical to future agricultural growth. This should include the provision of quality and timely support services including extension to promote good agricultural practices, optimal usage of modern inputs, infrastructural development to reduce post harvest losses and overall cost of doing business, and storage facilities among other things. There will also be need for promoting farmer organizations and structure trading systems. Kenya has a dynamic national research system which provides improved varieties and appropriate farming technologies. The problem lies in the low rate of adoption among smallholder farmers. The private sector plays a key role in distribution of agricultural inputs through the numerous input supply systems.

2.4 Main Agricultural Sector Challenges and Constraints

Kenya's agricultural sector faces many challenges, but the following are critical and need to be urgently addressed if the sector is to become competitive and also support overall economic growth towards industrialization: (i) Inadequate budgetary allocation-by 2008 the sector received 4.5% of the national budget; (ii) Reduced quality and quantity of extension services-which has declined over the last two decades due to inappropriate methods and sharp reduction in the operational budgets and human resources of the sector ministries; (iii) Poor farmer organization and lack of structured trading; (iv) Low absorption of modern technology-primarily due to inadequate research-extension- farmer linkages; (v) High cost and increased adulteration of key inputs; (vi) Limited capital and access to affordable credit; (vii) High post-harvesting crop losses and heavy livestock losses due to diseases and pests; (viii) Low and declining soil fertility; (ix) Inappropriate legal and regulatory framework- outdated and fragmented legal and regulatory framework; (x) Lack of coherent land policy; (xi) imposition of multiple taxation on farm produce-by local authorities and government departments; (xii) Weak surveillance on offshore fishing; (xiii) Inadequate infrastructure-poor rural roads and other key physical infrastructure leading to high transport costs for agricultural inputs and products; (xiv) Lack of appropriate water harvesting and storage infrastructure; (xv) Inadequate storage and processing facilities; (xvi) Inadequate markets and marketing infrastructure:

2.5 Agricultural Sector Policies

Kenya's agricultural sector is currently guided by Vision 2030 as an umbrella economic development strategy which was developed in 2007. At the sector level, development is currently guided by the Agricultural Sector Development Strategy-ASDS (2009-2020) of June 2009. The thrust of the ASDS, which is the overall national policy document for the sector ministries and all stakeholders in Kenya, is to increase agricultural productivity, commercialization and competitiveness of the agricultural commodities to enable the sector towards contributing to achievement of the goals of attaining national food security, increased exports for foreign exchange earnings and employment creation. Towards this end, the Government has developed subsector/commodity-specific policies to address key challenges and constraints. These include Food and Nutrition Policy (2007); National Cassava Industry Policy (2007); National Seed Industry Policy; Horticultural Policy (2007); National Agricultural Sector Extension Policy; National Oil Seeds Industry Development Policy; National Rice Development Strategy (2008-2018): Sessional Paper on Cereals and Produce (draft); and Nut Crops Development Policy among others.

PART TWO: VALUE CHAIN ANALYSES FOR SELECT COMMODITIES

3.0 MAIZE

3.1 Global Perspective

Maize is one of the world's most important cereals and provides more human food than any other cereal. In Africa, it is the second most important food crop after cassava. It provides nutrients for humans and animals and serves as a basic raw material for the production of starch, oil and protein, alcoholic beverages, food sweeteners and, more recently, bio-fuel. Maize is high yielding, easy to process, is readily digested, and costs less than other cereals. It is also a versatile crop, allowing it to grow across a wide range of agro-ecological zones. Every part of the maize plant has economic value: the grain, leaves, stalk, tassel, and cob can all be used to produce a large variety of food and non-food products (KARVY Comtrade Ltd; Maize Outlook Report). Maize is the third largest planted crop after wheat and rice in the world. Globally, it is mostly used and traded as a leading feed crop but is an important food staple in developing countries. Total global acreage and production of maize have been increasing continuously. Though the acreages have not been so erratic, the production has been a bit volatile mainly due to the variations in the yield predominantly caused by climatic changes. Global maize production reached its highest level of 712 million tons during the period 2004 to 2005. The main world producers include USA accounting for 30% of total world production, followed by China (15%), EU member countries together (14%), Brazil (4%) and India (3%).

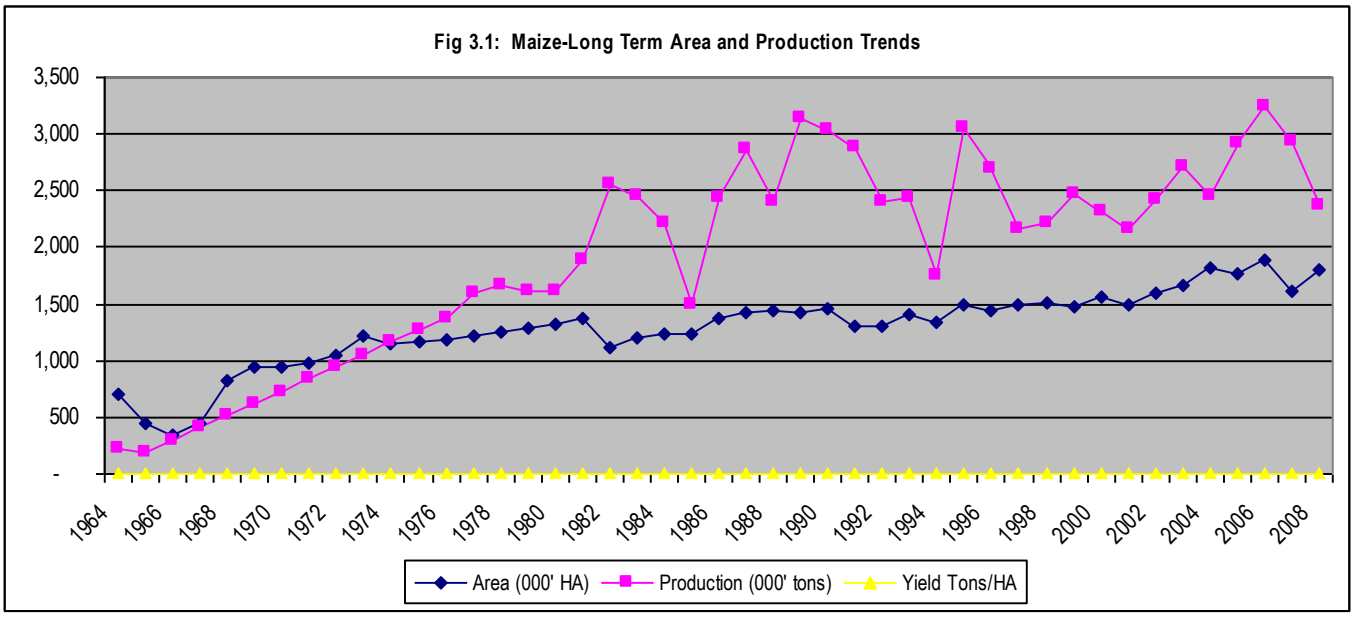
3.2 Domestic Production

Maize is Kenya's main staple food crop and has always been taken to be synonymous with household and national food security. It provides daily food calorie uptake to over 30% of Kenyans and is the country's most frequently produced and marketed crop. Kenya's low income earners spend about 28% of their revenue on maize (Nation Newspaper 25th August 2009). It is produced by over 90% of national households in areas where it is grown[2]. About 30% of all producers sell part of their produce. While the majority of households grow maize primarily for household consumption, a significant proportion, especially in the main producing depends on the crop for cash income. Although depending on crop performance in each year and the anticipated demand-supply situation, small-scale producer households on average retain about 30-50% of total annual harvest for home consumption while the balance is marketed-with the proportion depending on the perceived supply-demand situation and prevailing household cash

[2] *Kenya Institute for Public Policy Research and Analysis (KIPPRA); MOA; MOL& FD and MOCDM; The Kenya Agricultural Sector Data Compendium; Volume II-Crop Production (Dec 2007)*

needs[3]. Medium to large scale producers sell virtually all their harvested produce except for very small quantities (less than 1%) for home consumption, animal feed and seeds-in some instances.

As shown in Figure 3.1 below, Kenya generated 230 MT of maize from and area of approximately 701,000 hectares in 1963/4 crop year implying yields achievement of about 0.3 MT per hectare. Thereafter, annual production increased by about 11% per annum to reach an average of 3.14 million MT between in 1989-the highest annual production in the country's history The Kenya Agricultural Sector Data Compendium; Volume II- Crop Production; Ministry of Agriculture, December 2007 This rapid growth rate was mainly attributed to both yield increases-estimated at 7.9% per annum over the period and area expansion-estimated at 2.9% per annum..



Up until early 1990s, the country remained broadly self-sufficient in maize, with production frequently exceeding domestic consumption thereby generating some surpluses for export. However, from that time to the present, the country has continued experience shortages after every 2-3 years. This has resulted in the country being dependent on inflows from regional and international markets to bridge the gap. Based on the recent Agricultural Data Compendium report by MOA and KIPPRA-December 2007, annual national production of maize slowed down considerably between 1990 and 2003 achieving an average compound growth rate of negative 1% over the period. Based on official Government statistics and various sector reports, the main

[3] The percentage decreases with the per capita/household production.

factors underlying the decline in production since early 1990s to 2003 include (i) decline in yields from about 2.2 MT per hectare in 1990 to about 1.6 MT in 2003 and further down to about 1.3 MT by 2008-primarily attributed to low utilization of fertilizers and improved seeds which in turn has been due to the high and increasing costs as well as lack of requisite technical knowledge among especially smallholder farmers; (ii) slowing down of annual growth rate in cultivated area primarily due to increased population and the concomitant scarcity of land and competition from other land uses; and (iii) the effect of abrupt liberalization of maize marketing in 1993; the increasing cost of inputs, particularly fertilizer and persistent poor climatic conditions (drought) which have been experienced more frequently in recent years (RATES; Maize Market Assessment and Baseline Study for Kenya; April 2003).

As indicated in table 1.0 below, the country's annual maize production in recent years (2004-2008) ranged from about 2.5-3.3 million MT or 27-37 million 90-Kg bags, with an estimated domestic value of between Kshs 40 and 66 billion or US$ 538 and 878 million (MOA; Economic Review of Agriculture; 2009). Over the same period, area under cultivation has average around 1.7 million hectares compared to the average of 1.5 million hectares between 1990 and 2003. During the last five years, yields have averaged around 1.6 MT or 18 bags per hectare compared to the average of 1.7 MT or 19 bags per hectare between 1990 and 2003. While growth in area planted to maize between 2004 and 2008 attained a paltry negative 0.4% growth rate, production declined at nearly negative 1% per annum. At the same time growth in yields per hectare stagnated at about 0.4% per annum.

3.3 Maize Consumption

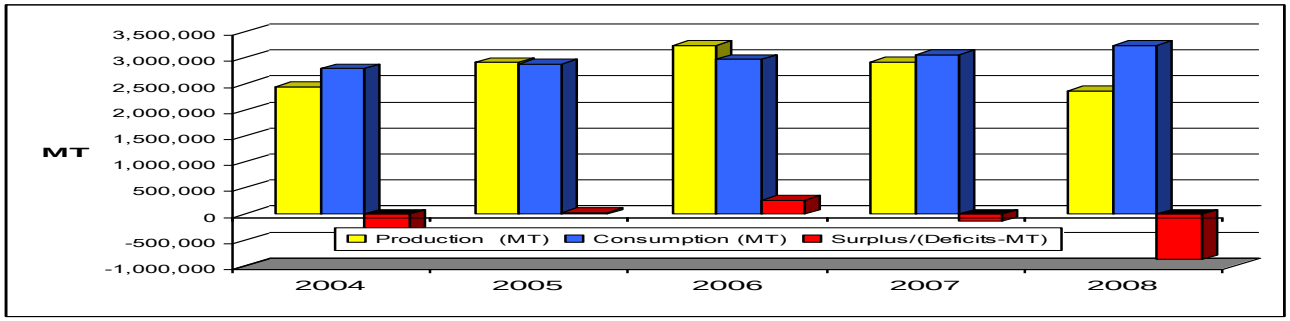
Although Kenya ceased to be a net exporter of maize around 1990, the country exports some maize during good harvest whenever surpluses are generated. Such exports are mainly to Uganda, Tanzania, Rwanda, DRC, Sudan and Ethiopia. During shortages, the country imports maize mainly from South Africa, USA, Tanzania and Zambia.

3.3.1 Recent Production versus Consumption Trends

Based on official Government data on maize production and consumption for the period 2004-2008, Kenya has remained marginally self-sufficient in Maize with imports coming mainly from South Africa, USA, Tanzania and Zambia during shortages. During the period 2004-2008, the country only managed to generate small surpluses in two out of five years amounting to about 27,000 MT in 2005 and about 268,000 MT in 2006. As indicated in table 3.1 below, the country faced maize deficits ranging from about 140,000 MT in 2007 to 870,000 MT in 2008. Because of the prolonged and wide spread drought that the country has faced over the last two years, the country is expected to face the highest maize deficits ever during the year 2009, estimated at over 17 million bags or close to 50% of the country's annual requirement. While annual compound growth rate (CGR) of national consumption between 2004 and 2008 has been in the

order of 3.7% per annum, production has continued to decline at approximately one percent per annum. Unless this trend is significantly reversed, the country will definitely face even bigger deficits in future.

Table 3.1: Maize Production, Consumption and Domestic Values (2004-2008)						
Year		**2004**	**2005**	**2006**	**2007**	**2008**
Area Planted (Ha)		1,819,817	1,760,618	1,888,185	1,615,304	1,793,757
Production	(MT)	2,454,930	2,918,157	3,247,777	2,928,793	2,369,569
	(90-Kg Bag)	27,249,721	32,423,963	36,086,406	32,542,143	26,302,219
Value	Kshs billion	40.38	44.19	46.91	52.26	65.8
	US$ million	538.4	589.2	625.5	696.8	877.3
Consumption (MT)		2,802,150	2,890,800	2,979,450	3,068,834	3,240,000
Surplus/(Deficits-MT)		**(347,220)**	**27,357**	**268,327**	**(140,041)**	**(870,431)**



Based on MOA Data: Economic Review of Agriculture (2009)

3.3.2 Production and Consumption Projections

Maize production projection for the year 2009 by the Ministry of Agriculture as of 30th June 2009 was about 30.1 million 90-Kg bags (MOA; Food Security Situation Report-30th June 2009). Owing to the prolonged drought in most parts of the country, the Ministry has undertaken a series of revisions, first down to 24 million bags and most recently to around 20 million bags. With the annual per capita consumption of maize standing at 98 kilograms per person and with a total population of close to 40 million people it is expected that maize imports will continue into the last quarter of 2010, (Kenya Maize Development Program-KMDP). According to MOA's Food Security Report (June 30th 2009), the national maize stocks as at 30th June 2009 were as shown in table 3.2 below:

Table 3.2: Maize Stocks as at 30th June 2009	
Stocks as at 30th June 2009 (bags 90kg)	6,561,869

Total East Africa Imports (cross border trade) expected between July & August 2009	1,000,000
Post - harvest losses, Industrial use, seeds (10%)	-756,187
NATIONAL AVAILABILITY (bags 90kg)	6,805,682
NATIONAL CONSUMPTION (1st July to 30th August 2009) (3 Million Bags/Month)	6,000,000
Maize Balance as at 30th August 2009 (bags 90kg)	805,682

Source: Food Security Situation-30th June 2009 (MOA)

The Ministry of Agriculture does not normally undertake medium to long term production projections for any of the staple crops. This is perhaps because of uncertainties associated with climatic conditions which has a big influence on the result-given that the commodities are entirely grown under rain-fed conditions. While the Ministry estimates that production in 2009 is likely to be around 20 million bags (1.8 million MT), there are no projections for the medium-longer term periods. Given the changing climatic patterns, no one is willing to venture into maize production projections and the figures we provide in table 3.3 below for the period 2010-2013 are based on the average annual CGR attained over the last 10 years (approximately negative 0.4% per annum-which is quite optimistic given that the rate has been negative 0.9% over the last five years). For consumption we have used the average compound growth rate attained in the last 5 years (about 3.7% per annum). Assuming that production growth rate will continue to decline at annual CGR of negative 0.4% as has been the case over the last decade or so, and that consumption will continue to increase at 3.7% as has been the case over the last 5-10 years, then Kenya is likely to face maize deficits ranging from 12-18 million bags during the period 2009 through to 2013.

Table 3.3: **Maize Production and Consumption Projections (2009-2013)**

Year		**2009**	**2010**	**2011**	**2012**	**2013**
Production (MT)		1,800,000	2,360,000	2,339,000	2,318,000	2,297,000
Consumption (MT)		3,359,880	3,484,196	3,613,111	3,746,796	3,885,427
Surplus/Deficits	MT)	-1,559,880	-1,124,196	-1,274,111	-1,428,796	-1,588,427
	90-Kg Bags	-17,332,000	-12,491,067	-14,156,789	-15,875,511	-17,649,189

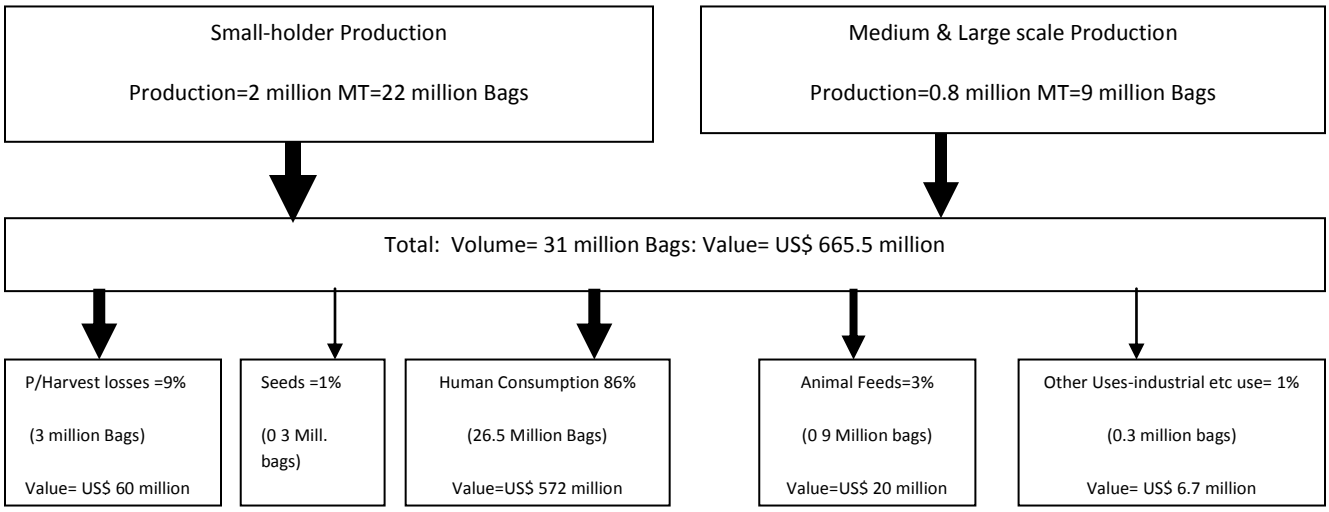
Source: Estimates by Authors based on historical trends

Although the weather variable will be a major determining factor regarding realizable production that the country might achieve, we anticipate that deficits will be the order of the day in the future, unless the country significantly embraces irrigated farming and also address the various constraints discussed later in this report.

3.3.3 Maize Utilization

Figure 3.2 below depicts estimated average utilization of maize in Kenya based on the average production during the period 2004-2008.

Fig 3.2: Maize Utilization Flow Chart



Source: Based on MOA Maize Balance Sheet (2008), Economic Review of Agriculture and other primary sources

3.4 Maize Exports and Imports

3.4.1 Intra-EAC/COMESA Imports and Exports

EAC/COMESA intra-trade data is scanty and unreliable. The data in table 3.4 below was gathered from various sources including EAC, COMESA and KRA, but as evidently clear the data is poorly recorded and in many cases unavailable. Nevertheless, available data indicates that Kenya's intra-EAC/COMESA maize exports in 2008 amounted to 11,983 MT valued at US$ 831,488. Data on export volumes for the previous years (i.e. 2004-2007) was not available. Further, available data on the value exports indicate that the country export maize worth US$ 3.2 million during the period 2004-2008. Sudan has been the main export destination for Kenyan maize accounting for over 95% of total cumulative value between 2004 and 2008. Uganda has been the main source of Kenya's maize imports with cumulative value between 2004 and 2008 estimated at US 1.36 million accounting approximately 99.2% of Kenya's total intra EAC/COMESA value of imports.

Table 3.4: Intra EAC/COMESA Maize Exports and Imports

EXPORTS						
Destination	**Volume/Value**	**2004**	**2005**	**2006**	**2007**	**2008**
Ethiopia	MT	N/A	N/A	N/A	N/A	110
	US$	N/A	N/A	N/A	N/A	125,272

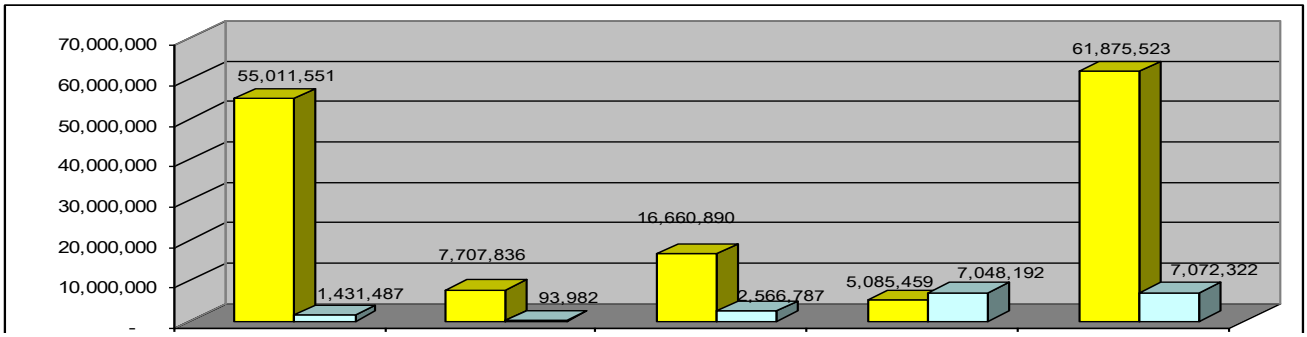
	MT	N/A	N/A	N/A	N/A	N/A
Rwanda	US$	65	N/A	N/A	N/A	N/A
	MT	N/A	N/A	N/A	N/A	0.18
Seychelles	US$	N/A	N/A	N/A	N/A	87
	MT	N/A	N/A	N/A	N/A	1.695.80
Sudan	US$	643,528	1,460,589	187,516	57,303	689,666
	MT	N/A	N/A	N/A	N/A	13.60
Uganda	US$	N/A	N/A	N/A	1,460	2,776
	MT	N/A	N/A	N/A	N/A	10,119.40
Tanzania	US$	N/A	N/A	N/A	N/A	N/A
	MT	N/A	N/A	N/A	N/A	44.00
Zimbabwe	US$	767	N/A	N/A	3,828	13,687
	MT	N/A	N/A	N/A	N/A	11,983
Total Exports	US$	**644,359**	**1,460,589**	**187,516**	**62,590**	**831,488**
IMPORTS						
Source	**Volume/Value**	**2004**	**2005**	**2006**	**2007**	**2008**
	MT	N/A	N/A	N/A	N/A	N/A
Malawi	US$	10,274	N/A	N/A	N/A	N/A
	MT	N/A	N/A	N/A	N/A	2,090.00
Uganda	US$	167,666	3,871	10,719	877,729	302,064
	MT	N/A	N/A	N/A	N/A	N/A
Zambia	US$	15,176	N/A	N/A	N/A	N/A
	MT	N/A	N/A	N/A	N/A	6,521.90
Tanzania	US$	N/A	N/A	N/A	N/A	N/A
	MT	N/A	N/A	N/A	N/A	8,611.90
Total Imports	US$	**177,941**	**3,871**	**10,719**	**877,729**	**302,064**
Source: EAC/COMESA Secretariat and KRA						

3.4.2 Extra-EAC/COMESA Maize Imports and Exports

Quantity-based data on maize and other staple crops was not available. Table 3.5 below indicates Kenya's extra EAC/COMESA imports and exports of maize. Information on the main sources of imports and destinations of exports was not available, but what is emerging is that the country has been a net importer with 2004 and 2008 being the years when the country imported maize whose worth was estimated at US$ 55 million and US$ 62 million respectively.

Table 3.5: Kenya's Extra EAC/COMESA Maize Imports and Exports (in US$)

Flow	2004	2005	2006	2007	2008
Extra-EAC/COMESA Maize Imports (US$)	55,011,551	7,707,836	16,660,890	5,085,459	61,875,523
Extra-EAC/COMESA Maize Exports (US$)	1,431,487	93,982	2,566,787	7,048,192	7,072,322



3.5 Value Chain Mapping

As with all other major agricultural sectors in Kenya, the main functions in the maize value chain include research and development, inputs supply, production, processing and marketing. The following sections briefly describe these functions, the key actors and the main issues.

3.5.1 Research and Technology Transfer Issues

Owing to the importance of maize in Kenya as a staple crop for both food security and income generation for close to 90% of the rural population, GOK has accorded the sector very high priority in terms of research and technology transfer. The Kenya Agricultural Research Institute (KARI)- a parastatal under the Ministries of Agriculture and Livestock, which also houses the Maize Breeders Network for Africa[4], is the main player in research and technology transfer in Kenya for both agricultural crops (including maize) and livestock. Other research and maize variety development service providers include local Universities, and international organizations, particularly the International Maize and Wheat Improvement Centre (CIMMYT). KARI's main responsibilities as mandated by the Agricultural Act include generating agricultural technologies, knowledge and information; catalyzing and facilitating innovative processes; creating and

[4] The MBN is a technical exchange initiative among maize scientists within the eastern and southern Africa region. The network operates with members actively involved in maize breeding programs. These programs must show the willingness and ability to deliver improved maize varieties to farmers in the region. The network was launched in April 2003 and comprises members from Kenya, Malawi, Uganda, Zimbabwe and Mozambique. Its activities are funded by The Rockefeller Foundation.

strengthening partnerships among agricultural sector players for impact on production and conducting strategic, adaptive and applied research. Up until 2008, over 70 maize varieties had been developed and released by both public and private sector seed organizations in Kenya. Of these, over 50 varieties are currently in the market with over 20 modern maize varieties having been adopted by both smallholder and large scale farmers, although there is still a lot of concern regarding the low adoption rate especially among the former category of farmers.

3.5.2 Inputs Supply

Agricultural inputs may be classified into two broad categories, namely; the non-purchased inputs such as land and family labour in the case of smallholder farmers; and purchased inputs e.g. machinery (tractors, associated implements and fuel in the case of large farmers); fertilizers; chemicals; and gunny bags at harvest time.

Land and Labour: Availability of land for area expansion in the past provided the opportunity for significant annual increases in acreage under maize and hence production. In recent years, this has considerably been constrained by the increasing scarcity of arable land for further expansion. This has resulted in area put under maize annually to more or less oscillate between 1.6 and 1.8 million hectares each year, with weather and competition from other agricultural enterprises playing the key role in the variability. According to the RATES study (April 2003), about 90% of smallholder maize producers use labour intensive methods, much of which is provided by family members. The main issues with regard to land and labour relate to the following: (a) Increasing scarcity of the arable land for future area expansion-and therefore the need to intensive production through yield increases per cultivated area; (b) Lack of an energetic labour force as most young people continued to migrate to urban areas in search of white collar jobs (average age of farmers which according to key subsector observers is over 55 years old); and (c) Increasing cost of labour as agricultural wages continue to rise.

Seeds: The use of improved maize seed varieties is no doubt part of the solution towards increased and sustainable maize production to meet the country's food security needs. This line of argument is supported by the phenomenal yield increases in maize yields increases during late 1960s to mid 1970s. During this period, the country's maize seed industry experienced considerable breakthroughs especially in the spheres of varietal development following the establishment of maize research programmes in the country; including KARI-Kitale (1955), KARI-Katumani (1957); KARI-Embu and Mtwapa programmes. However, according to a household survey conducted by Tegemeo Institute of Agricultural Policy and Development (TIAPD) in 2002, over 30% of total planted area under maize was still under local varieties or recycled hybrids, mainly due to what farmers consider as high cost. A study by indicated that there is now increasing evidence that use of certified hybrid seed is declining whereas use of recycled, local varieties and open pollinated varieties which have considerably low genetic potential has continued to increase among smallholder farmers in the country. This is a major

concern in light of the diminishing yields and the subsequent reversal of previous productivity gains (MOA; "the Status of Maize Seed Industry in Kenya": A Value Chain Analysis; July 2004). The players in the maize seed industry include the following:

Function	Main Actors
• Sector Policy, Regulation and Research:	○ **Ministry of Agriculture** (policy framework and extension services); ○ **Kenya Agricultural Research Institute** –KARI (research and multiplication under the various national agricultural research systems/stations including Kakamega, Kitale, Embu, Mtwapa, Katumani, Muguga, Kisii and Kibos) in collaboration with international organizations-such as CIMMYT ○ **Kenya Plant Health Inspectorate Services**-KEPHIS (coordination of all matters relating to crop pests and disease control, administration of Plant Breeders Rights in Kenya and liaison with International Union for the Protection of new Varieties of Plants (UPOV); inspection, testing , certification, quarantine control, variety testing, grading and inspection of plants produce at all border points, development and implementation of standards (locally and imported seeds), approving importation and exportation licenses for plants and seeds, and implementation of national policy on the introduction and use of genetically modified plant species, insects and micro-organisms in Kenya; ○ **Local Universities**-research and training; ○ **NGOs and CBOs**-training/extension;
• Seed Production, Multiplication and Marketing	○ **Seed companies**- These comprise about 35 registered organizations, of which 14 (9 of them being local) are actively engaged in maize seed business-merchandizing about 50 different maize seed varieties with some of the varieties being imported mainly from countries such as South Africa and Zimbabwe. Some of the key seed companies include: The Kenya Seed Company (KSC) which controls approximately 87% of market share in the country; Western Seed Company (WSC) which controls about 3.5% of the market share; Faida Seed which controls about 3% of the market share; East Africa Seed; Freshco; Farmchem; Pannar Seed; Hortitech; Monsanto; Lagrotech; Regina seed; Kenya Highlands and Winrock ○ **Seed growers** (farmers contracted by seed companies to grow certified seed from basic seed provided by seed companies themselves) ○ **Seed agents and stockist** (and export of seeds and plants

	○ **Maize farmers** (who source seed from the formal system-i.e. acting as consumers and those who generate own seed from their maize grain);
• General Sector Development Issues	○ **Plant Breeders Association of Kenya** (PBAK)-lobbying for breeders' concerns; ○ **Seed Traders Association of Kenya** (STAK)-lobbying for member companies and ensuring compliance to code of ethics;

The main issues with regard to maize seeds include:

- Low and declining utilization of hybrid seeds largely due to what farmers perceive as high cost of seed relative to maize grain. According to a recent survey sponsored by MOA, 83% of farmers were of the opinion that maize farming could be increased substantially through reduced costs seeds and fertilizer. The study observed that Kenyan maize farmers face one of the worst seed retail-to grain price ratio estimated at 10:1 compared to Zimbabwe (5:1), Malawi (7:1) and Zambia (8:1). All these reduce seed producer incentives and competitiveness of not just locally generated hybrid seed, but also the final product-maize for consumption. It is therefore critically important that measures are put in place to ensure that farmers have access to affordable improved seed.
- Lack of adequate extension services and awareness among farmers regarding the gains from using quality and certified seed;
- Poor research-extension linkage with research station trial results having no resemblance with farm level performance;
- High incidence of adulterated seeds-resulting in poor crop performance and thereby discouraging farmers' adoption of hybrid varieties;
- Too many laws and regulations-with about 32 different legislations affecting the seed industry in one way or the other-with the Plant Protection Act (Cap 324); Suppression of Noxious Weeds (Cap 325); Agricultural Act (Cap 318) and Seeds and Plant Varieties Act (Cap 326) having the most direct influence in the industry. These laws are not only poorly administered, but also poorly coordinated. It is important that laws and regulations governing the seed industry are reviewed and harmonized with a view to promoting sector growth

Fertilizer: The two main sources of fertilizer supply include commercial importers who in the recent past have accounted for between 80-90% of total national consumption, and donor-supported programs which cater for the balance. Total national consumption of fertilizer has steadily increased from just over 220,000 MT in 1990 to approximately 450,000 MT in 2007,

though it is believed utilization from mid 2007 to the present time has declined sharply due to unprecedented price increases. According to a recent survey conducted by TIAPD, four reasons have been attributed to the past rapid increase in national fertilizer consumption in Kenya (i) Maintenance of stable fertilizer policy by the Government since 1990 (during which there has been absence of import licensing quotas, foreign exchange controls and domestic market price controls all of which minimized market uncertainties) have been the main factors behind the steady increase in national consumption. (ii) Increased investment by private sector in fertilizer distribution in response to the stable sector policy. According to the TIAPD survey there are now approximately around 11 fertilizer importers, 500 wholesalers and about 8,000 retailers countrywide. (iii) Accessibility by farmers to supply points with the increase in the number of retailers (stockists). (iv) Increased competition among importers and wholesalers which led to reduction in fertilizer marketing costs, and therefore cost to farmers up until the recent upsurge occasioned by increase in international oil prices. According the Tegemeo survey, the proportion of farmers using fertilizer nationally towards maize production has increased from 56% in 1996 to 70% in 2007. However, fertilizer dose rates on maize (maize fields receiving fertilizer) have increased only slightly, from 56 kg/acre in 1997 to 59 kg/acre in 2007. This finding was somewhat also corroborated by RATES Study (2003) which observed that about 85% of the farmers use less than the recommended rates, which may explain the low yields achievements relative to the large farmers. Fertilizer usage has increased especially rapidly on the intercropped fields, and less so on mono-cropped fields. The dominant factor influencing smallholder households' decisions to use fertilizer on maize is location and relative cost. The Tegemeo survey estimated that over 90% of smallholders use fertilizer on maize in three of the zones surveyed (the High Potential Maize Zone; Western Highlands, and Central Highlands) while less than 30% use fertilizer on maize in Coastal Lowlands, Marginal Rain Shadow. The main constraints associated with fertilizer utilization include the following:

- Inadequate Fertilizer Application: Although various relevant reports indicate that consumption of fertilizer in Kenya has been on the rise, the problem has been inadequate application (less than recommended rates) as well as inappropriate application (use of fertilizers that are appropriate to soil nutrient needs). This is despite evidence ample evidence that when used in appropriate quantities, is highly profitable, with mean returns of 36% over a season, and 69.5% annualized[5.] A recent survey by Tegemeo Institute involving 1,260 smallholder farmers (Ariga et al; 2008) indicated that total national fertilizer consumption had increased from just over 200,000 MT in 1990 to over 450,000

5 Duflo E.; Kremer M.; and Robinson J.; How High are Rates of Return to Fertilizer? Evidence from Field Experiments in Kenya;)-American Economic Association Meetings, January 2008, New Orleans

MT in 2007. Although varying by region, size of farm and educational status[6,] the study observed that the proportion of sampled smallholder farmers using fertilizer on maize in the main season had risen from 55% in 1996 to about 70% in 2007. The problem however lies in the under-application in relation to research-based recommended rates per unit area and by crop. In this regard, the USAID RATES Maize Sector Value Chain Study; 2003 observed that while 85% of smallholder farmers used fertilizers with a similar proportion using less than the recommended rate-to which the study partly attributed to the low yields achievements by smallholder farmers relative to the medium and large maize farmers.

- Inappropriate Fertilizer Application: Anecdotal evidence suggest that smallholder farmers in many parts of the country, especially in Rift Valley, Western and Nyanza provinces have been applying fertilizers indiscriminately without regular soil tests to determine the exact type of fertilizers that are required to improve and maintain soil fertility. In fact, some localized observations in a few parts of the country have revealed that in certain cases, productivity of maize has been higher without fertilizer use than with fertilizer use (although other factors could also be at play). There has been observations that increasing soil acidity in some areas notably North Rift notably Uasin Gishu primarily because of long term application of certain types of fertilizer with no soil tests to determine soil conditions of soil nutrients (Mwangi et al). To facilitate maize yield increases, it is necessary to carry out appropriate research and identify the short-term needs of the crop and long-term needs of the soil. To determine those needs, frequent soil analysis is necessary, and once the needs are identified, it is possible to use fertilizers in a balanced way (optimum and most appropriate variety) to achieve the highest returns (Wokabi S. KARI);

- Poor Quality of Fertilizers: There has been increasing cases of adulterated fertilizer products in the market. While adulteration and sale of counterfeit products continues to be a problem, these are often isolated events rather than a well organized activity. Nevertheless, this one of the important factors adversely affecting crop productivity, reducing returns to farmers and therefore creating disincentives for continued utilization. In this context, Kenya Plant Health Inspectorate Service (KEPHIS) be supported to become more effective in monitoring and controlling adulteration and counterfeit

[6] *These rates ranged from less than 10% of households in the drier lowland areas to over 95% of small farmers in Central Province and the maize surplus areas of Western Kenya.*

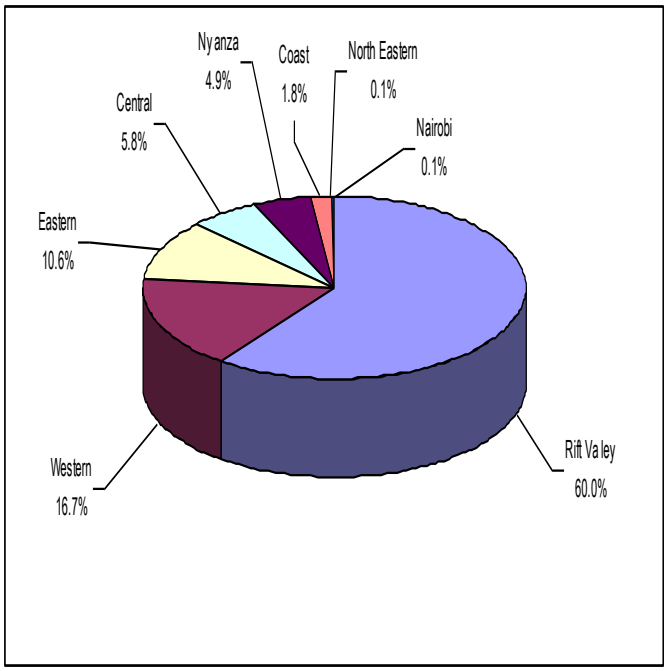
products, as well as intensifying farmer and stockist awareness programs to help protect farmers from sub-standard products (Ariga, et al.; 2008).

- High Cost of Fertilizer: According to recent surveys, farmers have indicated that one of the major reasons for reduced competitiveness of Kenyan maize has been the high and increasing cost of fertilizer relative to the price of maize. While the price ratio of a tone of maize to a tone of fertilizer has historically ranged between 0.4 and 0.6, this had declined to below 0.25 at the time of planting in 2008-implying increased cost of fertilizer relative to maize producer price. The cost of fertilizer in maize production in Kenya accounted for 28% of total production cost for a bag of maize in 2008, up from 19% in 2007 (Mulinge W.; et al-March 2009). High transport costs have exacerbated the problem. Over 90% of up-country fertilizer distribution is done by road, with rail covering less than 10%; the direct cost of rail is cheaper by a third compared to road but rail costs are associated with delays and unreliable deliveries, thus forcing fertilizer wholesalers to use more expensive road transportation. Road transport is becoming increasingly expensive as road conditions deteriorate, competition for transport services have increased due to WFP food distribution, and increasing fuel costs which have doubled between 2006 and 2008. Fertilizer importers also indicate that waiting times at weighbridges along the road adds to fertilizer marketing costs. Towards the end of 2008, the Government ordered that the number of weigh-bridges and road blocks be reduced along the highways and the port of Mombasa to be open 24 hours in order to reduce costs and accelerate clearing cargo from the port (Daily Nation, August 2008). A serious rehabilitation of the Kenya railways could reduce fertilizer marketing costs further and thereby help offset the effects of higher world fertilizer prices over time.

3.5.3 Production

Maize is the main diet for a majority of Kenyans and is therefore produced in almost all parts of the country and by an overwhelming majority of rural households. Figure 3.3 below indicates the main maize production clusters and approximate shares by province which shows that Rift Valley with approximately 60% of total production- mostly coming from large scale farmers-is the single most important region followed by Western province-where production is predominantly carried out by smallholder producers.

Figure 3.3: Main Maize Producing Areas in Kenya, Commodity Flow and Approximate Shares (2004-2008)



Maize is mainly produced by small-scale farmers who account for about 70% of total output. Medium and large scale farmers account for the balance of 30%. The main value chain primary and secondary products are green maize-which has increasingly become popular among Kenyan consumers (accounting for about 5% of total annual maize harvest-having increased from as low as 1% before sector liberalization in early 1990s), dry maize grain, maize flour, corn oil, maize germ and bran for animal feed which according to a recent study (Mulinge et al; March 2009) accounts for about 20% of all milled maize grain. In recent years (2004-2008), Kenya's total maize production has oscillated between 26 and 36 million 90-kg bags. With maize farming being virtually under rain-fed systems, climatic conditions (rainfall occurrence and amounts) is the most important factor underlying the inter-annual variability in production. Due to the wide-spread and prolonged drought conditions which have continued to persist to the present time, production in 2009 is expected to be very low (around 20 million bags) compared to normal annual harvests. Assuming recent declining production trends prevail (negative 0.4%); we expect total production to continue declining to an average annual production of 25 million bags over the next five years.

Small-scale Farmers: The smallholder farmers constitute over 97% of all maize producers in the country. The total number of smallholder maize farmers is not well known but estimates by KARI indicate that approximately 3.0 million households in Kenya are involved in maize

production, implying there are approximately 2.97 million smallholder farmers. Although dispersed right across all parts of the country, the majority of these farmers are found in Eastern, Rift Valley, Central, Nyanza and Western provinces. Except for a relatively small number of small-scale farmers with maize farm sizes above 10 acres, the bulk of these farmers operate with minimum mechanization, perhaps with the exception of a significant proportion in South and North Rift valley region. Very often, the majority of the smallholder farmers intercrop maize with other crops mainly legumes (pulses-beans and peas). A majority of the smallholder farmers, especially those at the lower end of the scale (0-5 acres), principally producing for home consumption, but sell varying proportions for cash each year (depending on household needs and market in terms of food security). There has been no comprehensive survey relating to maize producers and their shares in terms of cultivated are and production but several relevant studies estimate that approximately 70% of total annual output is produced by small-scale farmers from approximately 80% of total annual area planted to maize (see table 3.6 below).

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Table 3.6: Maize Farmers and Production Share

Type of Maize Farmer	Land Holding	Estimated Population	Estimated Area Cultivated (%)	Estimated Production Share (%)	Average Annual Yield Achievements (90-Kg per acre)[7]
Small-scale Farmers	Below 50 acres	2,970,000	80	70	28
Medium-scale Farmers	Over 50 acres	2,500	20	30	15
Large-scale Farmers[8]		1,000			
Source: Estimate by Study Team Based on Indications from Relevant Reports					

The statistics above imply that medium-large scale farmers achieve higher yields per unit area than smallholder farmers. It is estimated that smallholder farmers are achieving just about 54% of what the medium to large scale farmers are achieving per acre. Given that smallholder farmers account for approximately 80% of total annual area planted to maize, this suggests that there is a huge potential to increase production, only if smallholder farmer yields are boosted. Although the situation often varies by region, season (climatic conditions) and other farm level practices including fertilizer utilization, available information generally indicates that average yields by

[7] Based on recent studies (*RATES Maize Study 2003;* and *Mulinge W.; et al-March 2009*) and depending of climatic conditions.,

[8] According to the Kenya Maize Development Program (*Daily Nation Newspaper-9th September 2009)*

smallholder farmers constitute about 50-60% of yields by large scale farmers. The large farmers cultivate maize using fairly mechanized systems and produce primarily for cash with a very low percentage being retained for home consumption (if any).

Seasonality: Maize cultivation in Kenya occurs in a wide range of ecological zones rendering planting and harvesting activities to take place at varying times in each crop year. The table below, which has been adapted from the RATES study (2003), summarizes maize production seasonality in terms of planting, harvesting and marketing by region.

REGION	**MONTHS**											
	JAN	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
WESTERN		Planting (L/R)								Harvesting (L/R)		
		Harvesting (S/R)							Planting (S/R)			
	Marketing									Marketing		
NORTH RIFT	Harvesting		Planting (L/R)								Harvesting (L/R)	
	Marketing (L/R)										Marketing (L/R)	
SOUTH RIFT		Planting (L/R)					Harvesting (L/R)		Planting (S/R)			
			Harvesting (S/R)				Marketing (L/R)					
			Marketing (S/R)									
NYANZA		Planting (L/R)					Harvesting (L/R)		Planting (S/R)			
	Harvesting (S/R)						Marketing (L/R)					
	Marketing (S/R)											
EASTERN			Planting (L/R)				Harvesting (L/R)			Planting (S/R)		
		Harvesting (S/R)					Marketing (L/R)					
		Marketing (S/R)										
CENTRAL			Planting (L/R)				Harvesting (L/R)			Planting (S/R)		
		Harvesting (S/R)					Marketing (L/R)					
		Marketing (S/R)										
COAST				Planting (L/R)				Harvesting (L/R)				
								Marketing (L/R)				

Source: RATES Maize Market Assessment and Baseline Study for Kenya (April 2003)

The dispersed nature of maize production activities offers a potential advantage to Kenya from the point of view of food security (maize) as the production dispersion may curtail crop failure than in most African countries where production is concentrated in a few areas and harvesting is undertaken within a month or two. The geographic spread of the country's maize production and consumption areas provides ideal conditions and strengthens the case for internal and external trade in maize such as the pattern of maize movement from surplus to deficit producing regions/areas of the country (RATES Maize Market Assessment and Baseline Study for Kenya - April 2003).

3.5.4 Marketing

Marketing of maize and its main related by-products is undertaken by several players of which the main actors include: (i) farmers (small, medium and large); local and regional traders; (ii) NCPB (commercial trading and strategic grain reserves-social function); (iii) transporters (sometimes undertaken by regional traders with own vehicles); (iv) local and regional brokers/commission agents; (v) processors (small/posho millers, medium and large industrial millers) wholesalers and retailers (maize grain and maize flour meal); (vi) consumers (household and institutions e.g. schools and hospitals); and (vii) animal feed manufacturers and livestock keepers. As will be shown later in the value chain map, there are two main channels, namely; whole maize grain channel and processed maize products channel (human consumption and animal feeds). The main marketing functions include:

- Small scale farmers selling maize grain to local households, posho millers, small and medium local traders;
- Small traders including local shop-keepers selling maize grain to consumers;
- Posho millers selling flour to local household consumers;
- Small and medium local traders selling maize grain to posho millers and regional traders;
- Medium to large farmers and regional traders selling maize to flour millers, NCPB and animal feed manufacturers;
- Maize importers selling maize grain flour to millers and NCPB;
- NCPB selling maize to millers, large private and public sector institutions;
- Maize exporters (private companies and NCPB) as well as maize millers selling maize grain to regional maize dealers (during periods of surpluses-albeit limited in recent years);
- Maize millers selling flour to wholesalers and retailers including supermarkets; and
- Retailers-including supermarkets selling maize flour to household consumers, hotels and restaurants.

Details of estimates on volumes handled by different players are provided in the value chain map indicated below.

3.5.5 Processing

Milling maize is the main form of value addition to the commodity. Globally, processing of maize occurs either as dry or wet milling. The main dry milling products include maize flour (for making "ugali", bread and pancake mixes, infant foods, biscuits and porridge among other things); fine meal flaking grits (for making ready to eat breakfast cereal cornflakes; coarse and medium grits (for cereal products and snack foods); and fine grits (for brewing) among other products. The principal food products from the wet maize milling are corn starch-which can be variously modified to obtain the desired results in foods (baked products and candies); corn syrup which is mainly used in confections, bakery and dairy products; high fructose syrup, dextrose and corn oil. By-products are used for livestock feed and other applications. Although wet maize milling to make cooking oil occurs in Kenya, the most predominate form of processing is dry maize milling to make maize meal, flour and maize grits. Other products are oil and by-products for animal feed. In Kenya, the extraction rate among medium-large industrial millers average about 80% for grade 1 and 95% from grade 2, implying that it requires 2.5 Kgs of maize to produce 2 Kgs of maize meal flour. Reports from MOA indicate that extraction rate amongst some millers is as low as 70% which is mainly attributed to the efficiency of existing machinery (Mulinge et al; March 2009).

There are three main groups of actors in the maize processing function. One group comprises the medium to large industrial maize millers of whom 109 (maize and/or wheat millers) are members of the Cereal Millers Association (CMA) - a business membership organization-See Appendix 1 for list of members. The second group comprises a large-but unknown number of small maize millers commonly who affiliated to the United Grain Millers and Farmers Association (UGMFA). The third group comprises also of a large number, but unknown micro-millers commonly known as posho millers. In addition, NCPB-which is however not a member of either CMA or UGMFA, sometimes contracts a few millers to carry out maize processing on their behalf. According to NCPB records there are 103 registered maize millers in the country[9]. The exact installed and utilized milling capacities of these millers are not well known because most millers are always reluctant to disclose related information-either for reasons associated with income tax related matters or allocations of maize rations as happened recently. In this regard, NCPB estimates the total national maize milling capacity at 1.77 million MT per year. At the same time CMA data indicates that the combined maize milling capacity of both the medium-large maize millers and micro-small maize millers (posho millers) is in the order of 1.62 million MT per year. Of this total, CMA estimates that 19 of the medium-large millers have combined maize milling capacity of about 1.41 million MT per year or 85-90% of total national maize milling capacity. The association also estimates that posho millers have a combined milling

[9] *As reported in the Daily Nation of September 7th 2009);*

capacity of about 0.21 million MT per annum or about 10-15% of total national installed maize milling capacity.

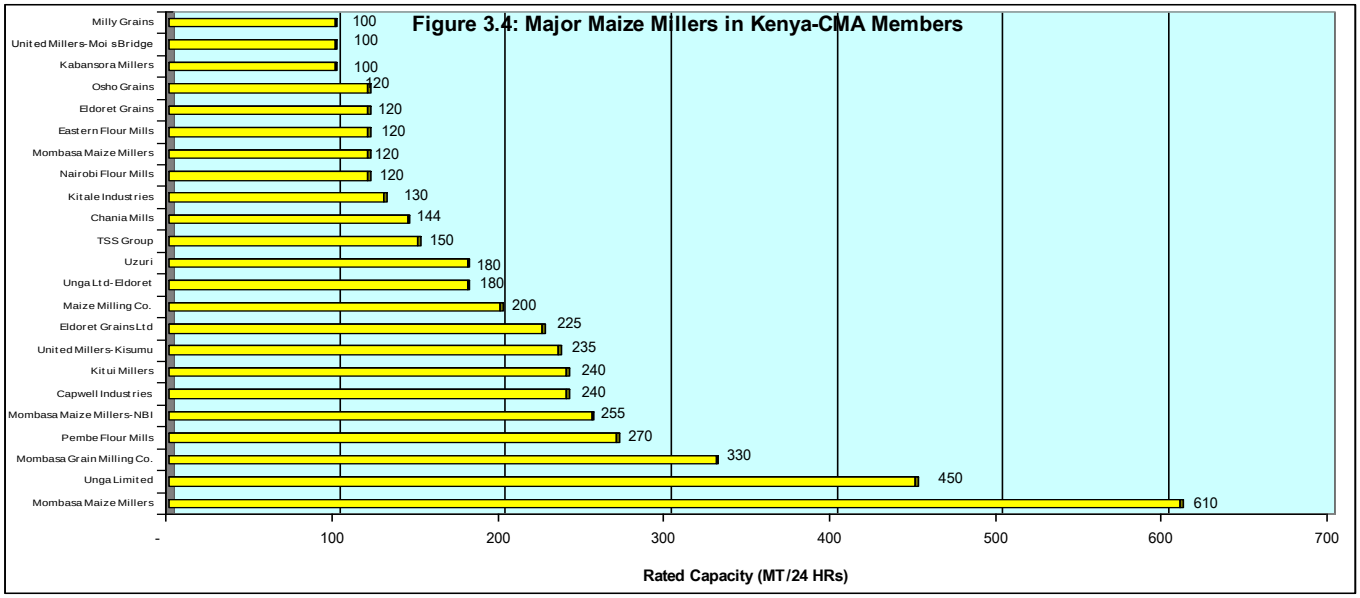
Table 3.7: Milling Capacity by Category of Millers		
Category of Millers	Estimate of Milling Capacity by CMA (Million MT/Year)	Estimate of Milling Capacity by NCPB (Million MT/Year)
Total National Milling Capacity	1.62	1.77
Share of 19 CMA millers[10]	1.41	
Share of All posho millers[11]	0.21	

Medium-Large Millers**:** The medium-large maize millers have horizontal linkages through their respective national associations. The majority of the medium to large scale maize millers are members of the Cereal Millers Association (CMA)-which has a total of 109 members comprising mainly maize and wheat millers. The small-millers, albeit the majority in number of enterprises are also horizontally linked through their association-the United Grain Millers and Farmers Association (UGMFA). However, the majority of the micro and small-scale millers (posho/hammer millers) are not members of UGMFA and are not horizontally linked.

Figure 3.4 below depicts the various large milling companies and their respective installed capacities.

[10] 85-90% of total national milling capacity

[11] 10-15% of total national milling capacity



According to CMA, the current average capacity utilization for its members is in the order of 55% of total installed capacity. The underutilization of capacity is attributed to two main reasons:

- Lack of adequate supply of maize and wheat over the last couple of years occasioned by local and international shortages;
- Competition arising from increased capacity in maize and wheat milling in the region especially in the neighbouring countries in recent years. These include mainly Uganda and Tanzania in response to increasing demand for sifted maize meal in the EAC and COMESA region (Kenya, Zambia, and the Democratic Republic of Congo).

Small- Scale Millers: The number of small-scale millers in Kenya is not well known. However, key sector observers estimate that they could probably be more than 100. **Appendix table 2** provides a list of 75 of these small-scale maize millers that are allied or are members of UGMFA. As will be noted, these UGMFA members comprise small enterprises with processing capacity ranging from as low as 100 Kgs per day to relatively larger mills processing as much as 7 MT per day.

Micro Maize Millers: These include hammer-posho maize millers**.** Data on the total number of these value chain players in Kenya is not available, but key subsector observers contend that they could be over 10,000 country-wide.

3.5.6 Summary of Maize Value Chain Actors and Functions Matrix

The shaded areas indicate the maize value chains functions performed by various actors as described above. As will be noted, traders, millers and wholesalers undertake a multiple of functions in the value chain.

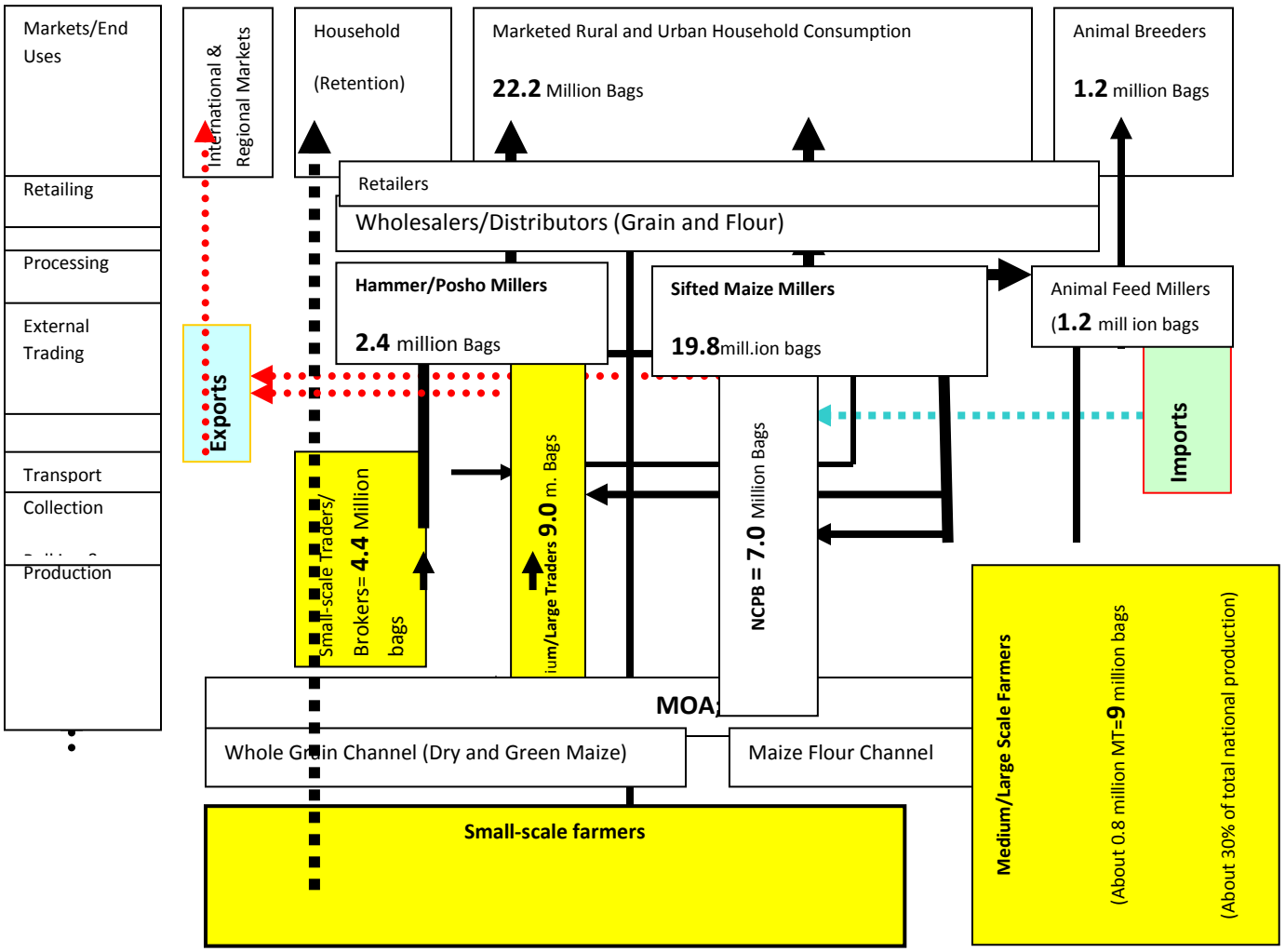
	Participants/Actors							**Support Markets (Type of Services Provided)**
	Domestic/Export-Import Market Channels							
	Input suppliers	**Small-scale Producers**	**Medium/ Large Producers**	**Traders**	**Processors/ Millers**	**Wholesalers**	**Retailers**	
Retail								• Market price information by MOA and EAGC-limited use
Wholesale								• Storage services-private sector-poor quality, and NCPB for private abd government stocks
Exporting								• SPS/Standards Certification services provided by KEPHIS;
Importing								
Processing								• Financial services provided to a limited number of medium/large farmers by commercial banks
Trading								• Market price information provided by MOA, EAGC, KACE and KMDP through print and electronic media
Collecting, Bulking, Storage								• Collection and bulking undertaken by rural assemblers/brokers/ traders
Production								• Extension services by MOA/KARI • Financial services to a limited number of medium/large

								farmers by commercial banks, • A few farmers provided with seeds and financial services by ETC
Input Supply								• Embedded Extension Services by input suppliers

3.5.7 Maize Subsector Map

Figure 3.5 below depicts the maize subsector map, indicating the main channels and players at different levels of the value chain and approximate volume flows along each of the main channels-whole grain and flour channel. Based on key subsector observers, average maize production between 2004 and 2008 was about 31 million bags. Of this total smallholder farmers accounted for about 70% while medium to large farmers accounted for the rest (30%). According to key respondents (NCPB, farmers and traders), smallholder farmers retain approximately 20-30% of their production for household consumption depending on perceived supply situation. They sell the balance 70-80% for cash-though a significant number of household also re-purchase stocks from the market during the last half of the crop year. At the marketing level, small-scale traders, medium to large traders and NCPB are major players. Small scale traders handle 15-20% of total marketed production. Medium-large traders and their agents handle between 30 and 40% of total marketed production, while NCPB is estimated to be handling 25-30%. Millers handle about 25% total marketed volume.

Figure 3.5: Simplified Maize Subsector Map[12]



3.5.8 Value Addition and Distribution

The figures in Figs. 3.6 and 3.7 below depict distribution of value added for both the dry-maize grain channel and the flour channel. Due to supply-demand fluctuations, prices varied considerably during 2008/2009, and the figures provided are meant to be indicative. It appears that both the farmer and the retailer received the highest returns in the maize grain channel, while the farmer followed by the wholesaler received the highest in the maize flour channel.

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[12] *Volume utilization varies from year to year depending on production and market situation and figures provided here are estimated averages. It should also be noted that the marketing systems are much more complex than indicated here and the map represents a simplified scenario.*

Figure 3.6: Value Added Distribution for Maize Grain Channel (2008/2009)

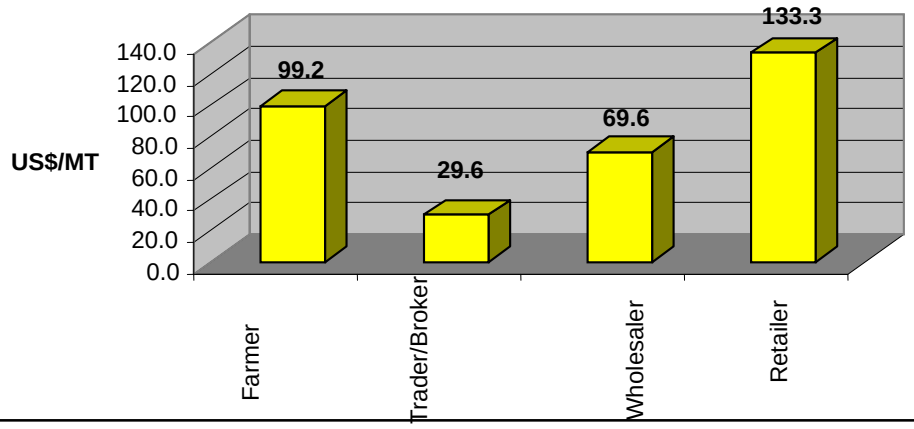
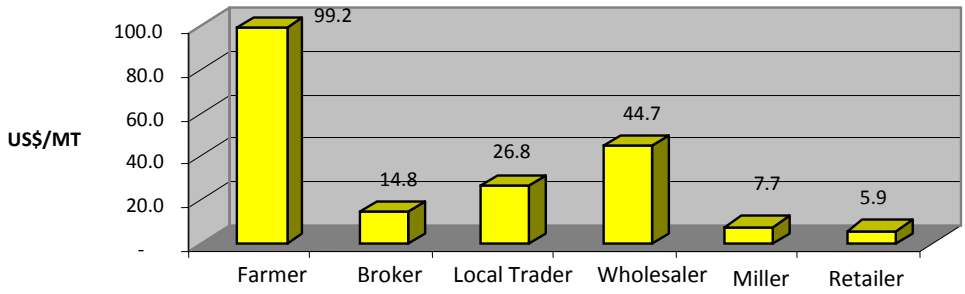


Figure 3.7: Maize Flour Channel-Value Added Distribution (2008/2009)



Source: Based on data from a variety of primary sources including MOA, NCPB, Traders, Millers and Farmers & secondary sources-(Mulinge et al March 2009)Based on data from a variety of sources:

3.6 Analysis of Subsector Constraints and Opportunities

This section briefly analyzes the key constraints facing the maize subsector, the current and potential market opportunities.

3.6.1 Main Subsector Constraints

- Inputs Level

  - High and increasing cost of fertilizer resulting in low utilization, and therefore declining soil fertility and in turn yields per hectare. Based on a recent study (Mulinge et al March 2009), the cost of fertilizer accounted for 28% of total production cost in 2008 compared with 19% in 2007. While there is potential to increase yields to 6 MT per hectare, the average achievements between 2004 and 2008 have been in the order of 1.6 MT per

hectare having declined from as high as 2.3 MT achieved in late 1980s. Recent surveys have indicated that the cost of producing maize in Uganda for instance is almost 50% the cost in Kenya (Mulinge et al) which is mainly attributed input adaptation issues as well as climatic and soil conditions which favour Uganda.

- Increasing incidences of adulterated seeds, fertilizer and chemicals against weak surveillance capacity on the part of the PCPB which has only 7 inspectors country-wide.

- Production Level

  - Over-reliance on rain-fed farming against persistent drought conditions partly due to the green house effect and the concomitant global warming. According to an article in the Daily Nation Newspaper-9th September 2009, "falling maize yield could turn Kenya into a food beggar". An ICRISAT researcher indicated that about 98% of maize in Kenya is rain fed-a situation that has been exacerbated by erratic weather conditions and persistent drought that has extended over several seasons in some areas of the country.

  - Low yields are realized despite indications from research findings that there is potential to push this up to 6 MT per hectare (equivalent to over 300%) through research and improved crop husbandry. The main reasons for the low yield achievements, especially among smallholder producers is mainly due to:

    - Low adoption rate of high yielding varieties among the smallholder producers who account for the majority of maize farmers, the bulk of production and cultivated area;
    - Weak and poorly coordinated mechanisms for dissemination, and improved technology transfer in addition to low adoption rates largely due to poor research-extension linkages;
    - Inadequate fertilizer application (below recommended rates) by as much as 85% of the smallholder farmers due to high and increasing cost and in some cases, due to lack of awareness of economic returns;
    - Low utilization of certified seed due to high and increasing cost (especially in recent years following reduced availability of maize seed); and high processing cost by seed companies;
    - Increasing soil acidity in some areas primarily because of long term application of certain types of fertilizer with no soil tests to determine soil conditions of soil nutrients; high and increasing adulteration of inputs (especially seeds and fertilizers) in the face of inadequate capacity for monitoring like the case of KEPHIS and other relevant arms of government;
    - Inadequate credit facilities and high cost of finance for farmers;

- High post-harvest losses (averaging around 10% according to MOA [13] -but sometimes as high as 40% of total harvested produce) due to lack of adequate and/or poor storage facilities, and poor condition of rural roads. According to MOA (Annual Report 2005), Kenya loses maize worth Kshs 7.2 billion per year to the pesky insect that attacks maize stalks-
- Land tenure system that encourages sub-division of land to unviable farming land sizes;
- Weak extension services;
- High costs of farm operations primarily due to the increasing cost of diesel for farm operations and transport;

- Processing Level

  - Underutilization of installed processing capacity due inadequate supply of maize and disruption in power supply (which according to CMA now averages about 55% of installed capacity);
  - High and increasing cost of milling especially due to the tariffs by the Kenya Power and Lighting Company (KPLC);

- Marketing Level

  - Inadequate, untimely and low utilization of market information-although the EAGC is currently enhancing its role in this regard (covering all cereals) with support from COMPETE under the RATIN initiative. The information provided by EAGC is confined to daily average market prices per 90-bag for fair average quality (FAQ) maize. Although the price information is provided daily, the problem is that business people need reliable price forecast data for strategic business decision-making more than the day's average prices; and also need reliable maize supply and demand situation-which the RATIN project should endeavour to undertake. Other type of information including regulatory trade requirement and average transport costs between key supply and consumption areas could also play additional role in enhancing business decision-making among farmers, traders and processors.
  - Weak farmer organizations (cooperatives/farmer groups)-which is part of the reason for occasional low price offers by traders-as most small farmers sell individually. This is an area that structured trading initiatives should put more emphasis.
  - Lack of adequate and appropriate maize farm and market level storage and bulking facilities among private sector marketing agents-particularly to facilitate warehouse

[13] Food Security Situation, 30th June 2009 (MOA)

receipting. Data is not available but various reports indicate that this is a major constraint. In this regard, it was established that EAGC is currently in the process of negotiating with NCPB to avail some of their depots for use by private sector actors (farmers and traders) as storage and warehouses (to facilitate warehouse receipting);

- Uncompetitiveness of Kenyan maize- relative to maize from other countries in the region and international markets (for example Uganda which is able to produce at half the cost incurred in Kenya)
- High cost of transport and post harvest losses (sometimes as high as 40%) primarily due to poor condition of rural roads (USAID RATES study 2003);
- Lack of appropriate credit facilities for traders (working capital) that can allow volume purchases and medium term storage-Traders lack credit facilities to cater for their financial needs. Credit from commercial banks is not available on the ground and if available is often expensive and requirements to attain it are beyond the reach of most farmers and traders. This renders traders to be non-competitive in marketing of maize.
- Differential quality standards causing confusion to cross border maize importation. For instance the requirement for moisture content in Kenya is 13.5%, while Tanzania's and Uganda's standards are 13% and 14% respectively.
- Poor quality maize-in terms of foreign matter-requiring traders to first clean the maize before selling and high moisture content (above the recommended 13.5%). This problem is not yet serious but some traders referred to it as an occasional problem.

- Policy and regulatory issues:

  - Unpredictable maize import-export policies (what we call in this report the "stop-go" policy). This involves abrupt and sometimes unjustified banning of maize exports by government during shortages and banning of maize imports during surplus periods often instigated by large scale farmers based on the argument that such imports are competing with local producers who are thereby unable to sell mainly to NCPB and millers. This will require vigorous sensitization of policy makers, with particular focus on the Parliamentary Committee on Agriculture and other key groupings of politicians.
  - Market distortions through untimely imports (commercial and food aid supplies)-which in some instances arrive at the harvesting season. One large importer and one exporter of staple crops indicated that they have made large losses in the past due to these "stop-go" policies.

3.7 End-Market Analysis

Maize in Kenya is mainly used for human consumption, and most predominantly in the form, maize flour to make maize meal (Ugali); dry grain (mixed with other products e.g. dry beans and a host of vegetables to make for human food); and of green maize. Other uses include animal

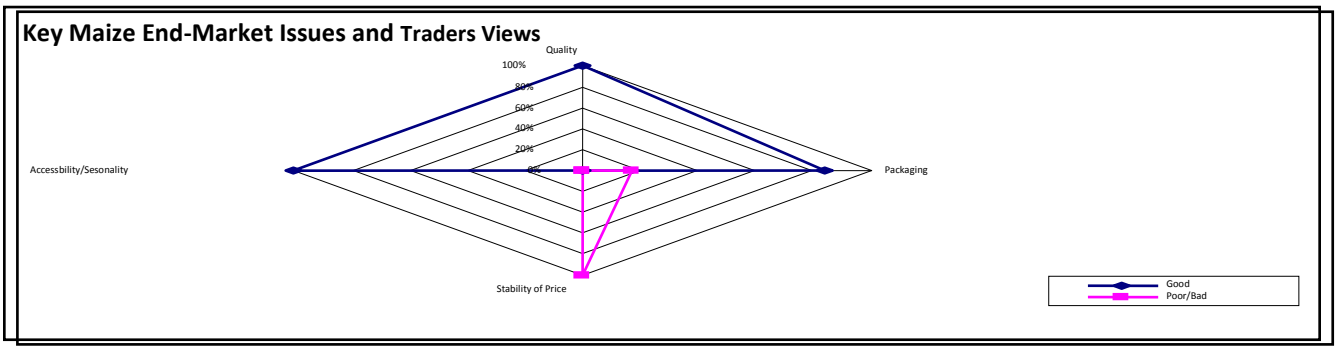
feed which is becoming increasingly important following the growth in the commercialization of the country's dairy, poultry and pig industries; and seeds (including retention by smallholder farmers and hybrid commercial seed). Table 3.8 below provides a summary of end-market characteristics for maize and its related products, main uses and users, prices and supply sources in the year 2008. Reliable information on market share by each end use (which may vary from year to year depending on supply and demand situation) is not readily available and the information provided is based mainly on interviews with NCPB and Ministry of Agriculture officials.

Table:3.8 End Market Characteristics for Maize and Uses

Product	Main Users	Annual National Requirement in 2008-(000, MT)	End Market Price July 2009) - (US$ per MT)	Source of Product		
				Domestic Market (%)	**Imports**	
					Intra Regional (From EAC/COMESA) %	Extra Regional (Outside EAC COMESA) %
Green Maize	Rural and Urban Consumer HH	280	267	90%	10%	0%
Dry Maize Grain	Rural/urban Consumer HH	810	348	80%	15%	5%
	Maize Millers (sifted and posho)	2,430	567	70%	20%	10%
	Farmer for seeds	20	360	80%	0%	20%
Flour	Rural and urban Consumer HH	2,430	487	90%	10%	0%
Animal Feed (Bran)	Dairy, Poultry and Pig Keepers	648	315	80%	20%	0%

Source: NCPB

With regard to other end-market issues, this study also solicited the views and opinions of traders and consumers views with regard to issues of quality, packaging, price and accessibility among others. The diagram below indicates the findings based on a sample of 12 traders of cereals/pulses and other staple crops within Nairobi (Nyamakima, Gikomba and Githurai). The main concerns include high and increasing instability of maize prices resulting uncertainties in business planning and returns, and poor packaging (with 20% favoring lower bag-weight instead of the 90 Kg standard). Quality of local maize did not seem to be a major concern with the wholesale and retail traders at the surveyed markets, but large cereal trading enterprises like Export Trading Company (ETC) indicated that local maize often has a lot of impurities (soil and other foreign matter) increasing unit costs by having to carry out cleaning processes before exporting and reducing revenue by way of weight loss.



At the regional level, a key concern among traders is the lack of harmonization of standards and also knowledge of the specific requirements until one lands the consignment at the port of entry (Nyoro J. et al; 2007 "The Compatibility of Trade Policy with Domestic Policy Interventions Affecting the Grains Sector in Kenya[14]). For example RATES 2003 observed the following divergences in standards:

Table 3.9:Various Maize Standards by Country

Standard	Kenya	Uganda	Malawi	Tanzania	Ethiopia	Zimbabwe
Maximum Moisture content	13.5%	14%	14%	13%	12.5%	14%
Maximum Allowable Foreign Matter	-	0.5%	2.6%	-	-	-
Broken Grains	2%	2%	11.5%	2%	2%	-
Packaging	90 Kg	-	100 Kg	90 Kg	100 Kg	90 Kg

14 Paper presented at the FAO's workshop on Trade and Policy for Food Products Conducive to Development in Eastern Africa, 1-2 March 2007, Rome, Italy

	Bag		bag	Bag	Bag	Bag

3.7.1 Vertical Linkages

Effective vertical linkages facilitate competitiveness of any given industry through enhancing mutually beneficial relationships in a number of areas including, knowledge transfer, upgrading and maintenance of quality standards, effective and efficient delivery of embedded services as well as financial flows. The maize value chain does not have strong and/formal vertical linkages. The overwhelming majority of maize farmers in Kenya undertake production without any contractual business relationships with traders and or millers. However, in recent years and largely because of the increasing scarcity and therefore competition for maize in the domestic market, some millers have attempted to forge some business relationships with large and medium farmers, but with limited success as farmers favour selling to the best bidder on first-come, first-serve basis. It was however noted that a few large institutional staple foods traders such as Export Trading Co. Ltd link with farmers through informal arrangements whereby they provide inputs on credit on condition that they will offer they crop after harvest at agreed prices. Currently, they have such arrangements with about 30,000 farmers in Western Kenya. A few wholesale traders (perhaps less than 5%) also have such arrangements mainly with medium farmers. There are opportunities for promoting vertical linkages at two levels of the value chain, namely; between farmer and regional traders in the case of smallholder farmers who cannot get supply contracts with millers because of their spatial dispersion and limitations in terms of volumes handled individually; and between farmers and millers in the case of medium and large farmers who are able to handle significant volumes individually or in the form of a group for a few of them. In this regard, facilitating fora between millers and farmers with a view to forging formal business relations is recommended.

3.7.2 Horizontal Linkages

Horizontal linkages can benefit firms (value chain actors) in many ways including facilitating bulk purchasing of seeds, Fertilizer and other services; reducing transaction costs for buyers; increasing bargaining power of smallholders; promoting collective learning; influencing the creation of industry standards (e.g quality and packaging) and supplying in bulk to meet large millers needs among other things. Other than through the Cereals Growers Association (CGA) at the producer level; the Cereal Millers Association (with 26 members); and the United Grain Millers and Farmers Association (with 75 members) at the milling level, the rest are small, loose and localized business associations which for example include the following 30 multi-commodity farmer groups that are affiliated to EAGC (**see appendix table 3**).

With the exception of CMA which has been active in recent years in response to maize sector import and export policies and other regulations that affect them more directly, both CGA and UGMFA are not only characterized by weak technical and financial capacities, but also have limited representation in terms of membership. CGA has a total of 50 members (individual,

smallholder farmers[15], medium and large farmers). Other relevant organizations include EAGC (regional organization whose membership includes actors at all levels of the value chain-therefore not strictly a horizontal linkage-oriented entity) and KENFAP (which covers all agricultural sectors and at any level of the value chain).

The situation of individualism in maize sector business is untenable especially for the smallholder farmers and traders, particularly from the point of view of bulk purchasing and bulk selling to reduce transaction costs and enhance bargaining power for higher prices respectively. It therefore recommended that horizontal linkages be upgraded starting with smallholder farmers through sensitization, and facilitating formation of formal regional associations based on clusters of farmers at similar levels of business operation.

3.7.3 Supporting Market Services

Normally, supporting market services would comprise two main categories. (i) Directly paid-for services e.g. financial services (lending, leasing, capital investing and factoring); cross-cutting services (business consulting, legal advice and advertising) and sector specific services including irrigation and veterinary services; (ii) Embedded services e.g. supply, input and raw material supply, market information, financing and technical training. It was not possible to interview an adequate number of actors to determine the position with regard to these services. However one large farmer contacted on phone (Nakuru) indicated that he is getting financial services from commercial banks and AFC but has limited access to most of the other services (both directly paid-for and embedded services). However he indicated that he gets seeds and fertilizers on credit from a local stockist. In this regard, two smallholder farmers contacted in Kirinyaga and one contacted in Mwingi West districts indicated that they neither have arrangements for the provision of paid-for services, nor have access to embedded services. In other words, they depend on themselves and the limited free services that may come their way from either government, NGOs or donor-funded projects. Extension and supply of quality inputs appear to be the most constraining factor for smallholder farmers as far as staple crops are concerned, and more so maize-which is important, in many rural households both for food security as well as cash income. A number of organizations/projects such as the USAID-funded Kenya Maize Development, CGA, Farm Input Promotions Africa Ltd (FIPS) and KACE among others are each trying to promote various types of supporting market services but the problem is lack of these services is widespread and more concerted efforts are needed. Since different categories of farmers and different regions may have varying needs, more research is required in this area.

3.8 Subsector Market Opportunities

[15] CGA indicated that there are 12,000 farmers who account for over 95% of their membership

- Because of high and increasing domestic demand of dry maize both for human consumption and animal feeds, national deficits have ranged from about 140,000-870,000 MT over the period 2004-2008 (averaging 212,000 MT each year since 2004). If the current downward trends in production continue (against rising consumption which has been growing at 3.7% per annum over the last 4 years) national annual deficits are expected to increase to 1.6 million MT by 2013;
- Increasing domestic demand for green maize which is 2-3 times more profitable than dry maize is providing farmers with the opportunity to harvest early, reduce losses and make more money;
- High and increasing demand for maize in neighboring countries especially Sudan and Somalia;
- Potential to increase yields significantly from the current 1.6 MT per hectare to between 4-6 MT per hectare with increased and appropriate application of modern inputs mainly fertilizer especially among the smallholder farmers, improved extension services, improvement of storage and reduction of post harvest losses (which averages 10% of total production but sometimes rising as high as 40% during wet seasons) among others;

4.0 WHEAT

4.1: Production

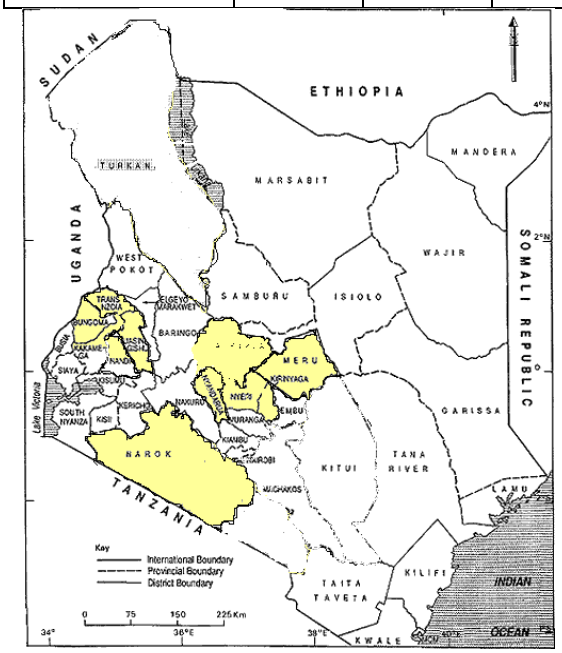
Wheat (Triticum spp) is the second most important cereal staple food after maize. It grows well in areas between 1800- 3000 masl and requires rainfall of between 700 – 1000 mm/annum. Various varieties have been bred at Njoro Research station for various altitudes with baking, confectionery and pasta characteristics. Wheat is mostly grown in the Rift Valley, some areas of upper Central province (Nyandarua, Nyeri) and some parts of Meru (Timau). It is mostly grown in medium and large-scale farms. There are 20 large-scale and 2,000 small-scale farmers spread across Nakuru, Uasin Gishu, Timau and Narok areas.

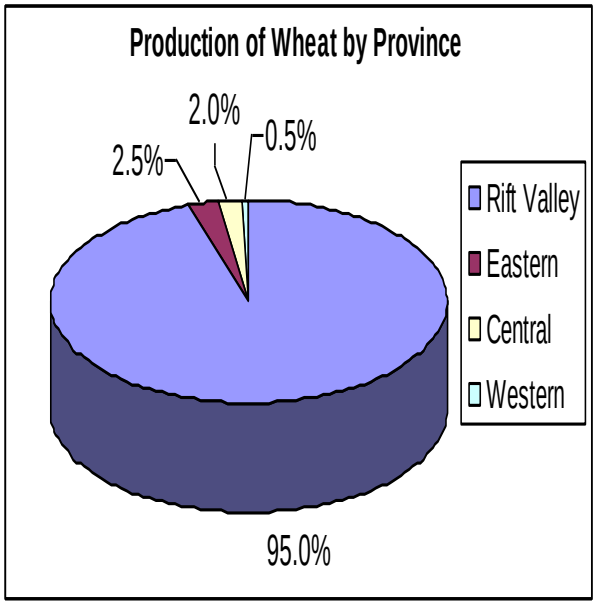
4.1.1: Production Areas

Wheat is mostly grown in the south and upper Rift Valley, some parts of Central province (Nyandarua, Nyeri) and some parts of Meru (Timau) as shown in table 4.1 below.

Table 4.1: Production of Wheat by Province – 2008

	R. Valley	%	Eastern	%	Central	%	Western	%
Crop area (ha)	314,827	95	8,245	2.5	6,633	2.0	538	0.5
MT	276,827	82	47,775	14	1,424	0.4	48	0.4
Yield (bags/ha)	29		3		11		27	



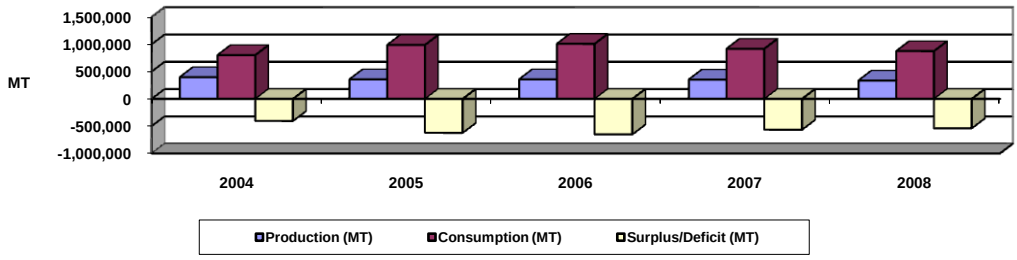


Source: MOA-ERA 2009

Out of the total wheat area of 330,273ha, Rift Valley accounted for 95%, Eastern 2.5%, Central 2% and Western 0.2% while Rift Valley accounted for 82% of total output, Eastern for 14%, Central and Western for the rest of the 3,737,241 bags produced.

Table 4.2: Production, Consumption and Deficits of Wheat

MOA-ERA 2009	2004	2005	2006	2007	2008	Mean
- Production (MT)	397,005	365,696	358,061	354,249	336,688	362,340
- Imports (MT)	404,060	621,839	650,400	564,300	538,500	555,820
- Consumption (MT)	801,265	987,536	1,008,461	918,549	875,188	918,200
- KG/ca	23.4	28.1	27.8	24.7	22.9	25.4
Deficit	-404,060	-621,839	-650,400	-564,300	-538,500	-555,820



Source: MOA-ERA 2009

4.2: Wheat Consumption

4.2.1: Domestic Consumption and Deficits/Surpluses

Figures given by MOA-ERA (2009) on production, imports and consumption are shown in table 4.2 below.

Based on the above, it is apparent that Kenya is a net importer of wheat averaging at 555,820MT/year. Consumption as per MOA-ERA averages at 918,200 MT giving an average per capita consumption of 25.4kg/ca. Consumption based on KNBS-2009 figures averages at 660,280 MT which is 72% of MOA figures while average per capita consumption average is at

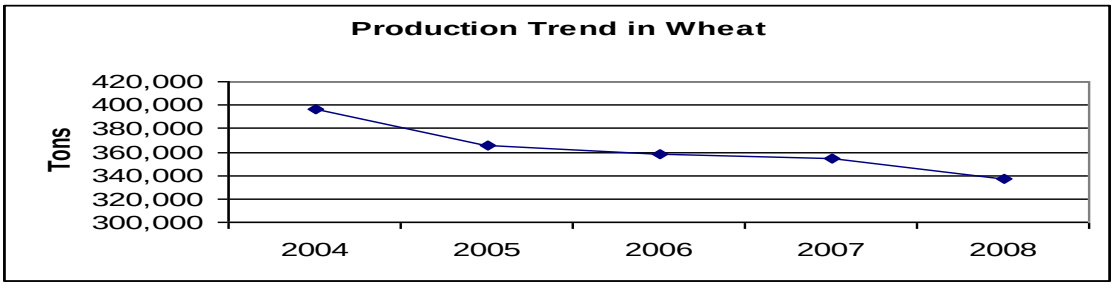
18.3 kg/ca (72%). MOA production figures average at 362,340MT compared to KNBS average figures of 104,440 MT which is 29% of MOA figures.

4.2.1.1: Trends in Production and Projections

Wheat production has been on the decline from 397,005 MT in 2004 to 336,688 MT in 2008. Yields averaged at 27 bags/ha between 2004 and 2007 but declined to 11.32 bags/ha in 2008 due to the post-election violence in 2007/08. Prices were on decline from Kshs.1,995/bag in 2004 to Kshs.1,714/bag in 2006 and averaged at Kshs.1,783/bag. However, since 2007, prices have been on the increase averaging at Kshs.2,800/bag in 2007/08 as shown in table 4.3 below.

Table 4.3: Production Trend in Wheat

Year	2004	2005	2006	2007	2008*
Production - Tons	397,005	365,696	358,061	354,249	336,688
Unit Price per bag (Kshs.)	1,995	1,639	1,714	3,000	2,600
Average Yield (bags/ha)	29	25	26	28	11.32
Total Value (billion Kshs.	8.33	6.66	6.82	10.03	11.2
Growth rate	-	-8.5	-2.1	-1.0	-5.2



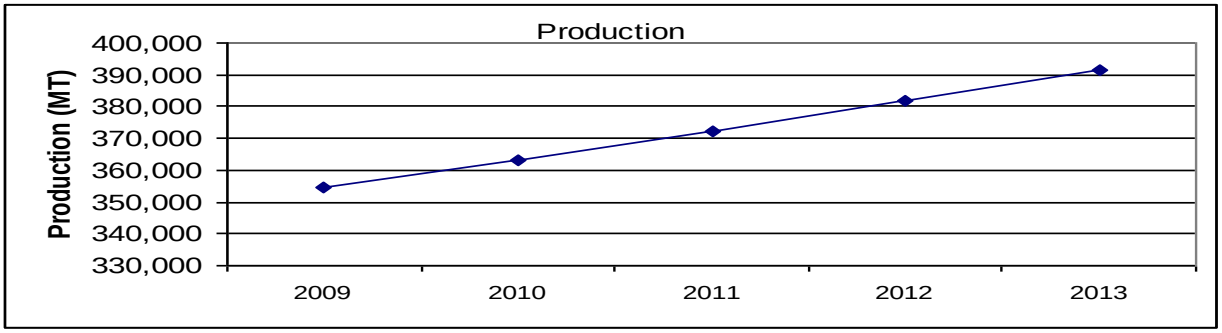
Source: Dept. of Land and Crops Development and Management, and NCPB

*Provisional

For projections, the MOA figures were used. Between 2004 and 2008, wheat production declined by 18%, an annual decline of 4.5% p.a. The average annual production during the period was 362,340MT. MOA (Food Security Report June 2009) estimates the 2009 production at 354,414 MT which is 5.2% lower than the 2008 production. Although wheat production declined by a negative 4.5% p.a. during the period 2004-2008, long term production growth rate

has been between 2 and 3% p.a. Using the average long term growth trends, we project that production between 2009 and 2013 will increase as indicated in Fig. 4.1 below.

Fig. 4.1: Projections of Wheat Production, 2009 – 2013



This projection assumes a 2.5% p.a. increase to bring the production to just below the peak of 2004. However, adequate rainfall can cause a considerable increase especially if there is no drought during the period. Various constraints affect Kenya wheat production and these have to be addressed if increases are to be realized. These include:

- Low use of improved varieties which are available but farmers use 'saved wheat' which leads to low productivity
- High capital costs due to costs of farm equipment, fuel and labour which lead to high production costs
- Imports of grain wheat at low import duties or zero-rated duties which dampen domestic production;
- Imports of wheat flour from COMESA at duty free status due to lifting of COMESA safeguards.

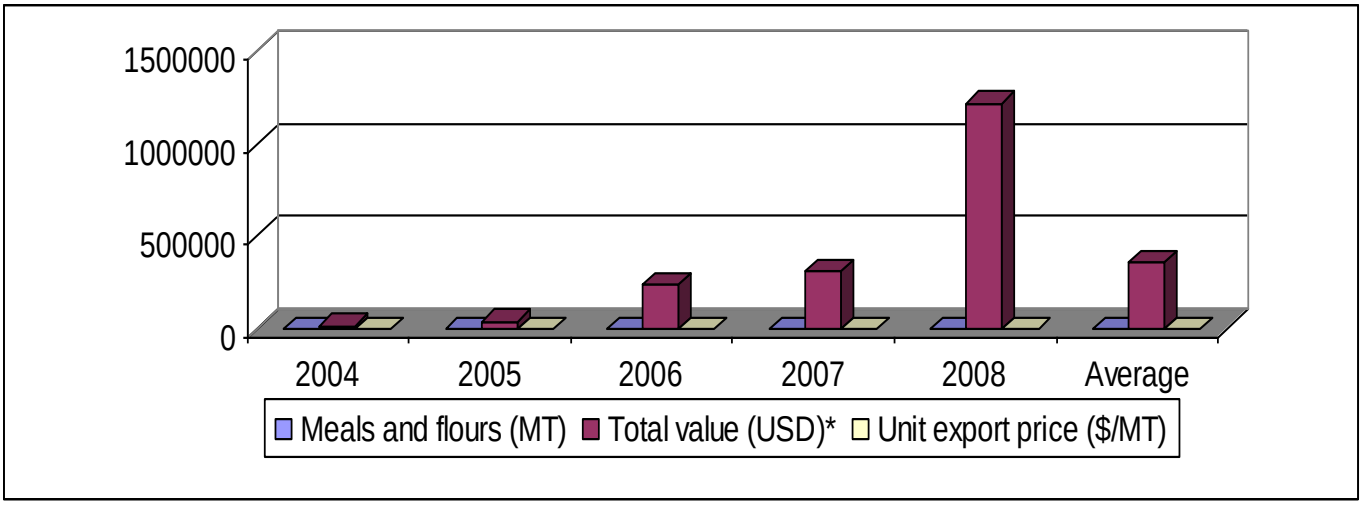
4.2.2: Global and EAC/COMESA

4.2.2.1: Global Export Trends

Kenya only exports meals and flours of wheat. The quantity has increased from 38MT in 2004 to 2,286MT in 2008 while export price has increased from USD 447/MT in 2004 to USD 532.6/MT in 2008 as shown in table 4.4. Exports are minimal but show an upward trend while prices declined up to 2006 but since then, they have been on the increase.

Table 4.4: Quantities and Value of Exports of Meals and Flours of Wheat – 2004 – 2008

	2004	2005	2006	2007	2008	Average
Meals and flours (MT)	38	139	622	688	2,286	755
Total value (USD)*	17,010	41,437	242,823	310,918	1,217,464	356,930
Unit export price ($/MT)	447.6	298	390.4	452	532.6	424



4.2.2.2: Intra/COMESA/EAC Exports and Imports

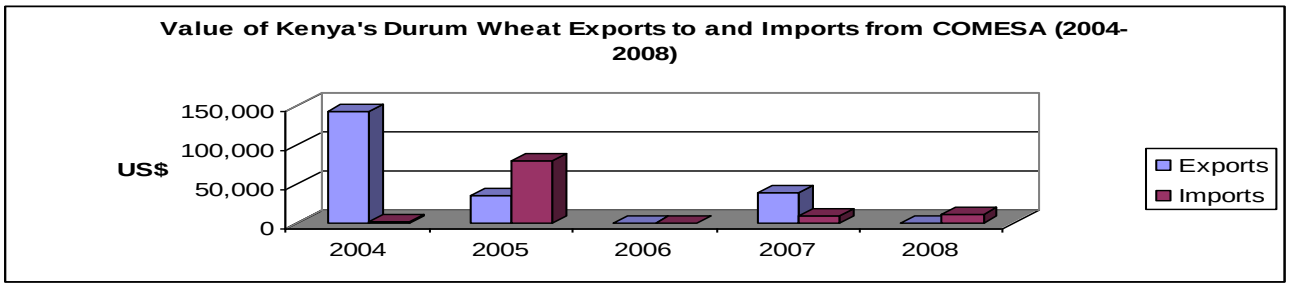
The intra-EAC/COMESA exports of durum wheat averaged at USD 72,288 for 2004, 2005 and 2007 while that of wheat products averaged at USD 314,042. In terms of wheat products, this is 8.8% of average global exports implying that Kenya exports most of the wheat products to EAC/COMESA as shown in table 4.5.

Table 4.5: EAC/COMESA Exports and Imports of Durum Wheat and Wheat Products (USD)

Durum Wheat	2004	2005	2006	2007	2008
Exports	142,493	34,818	0	39,554	0
Imports	2,132	79,149	0	8,948	10,736

Wheat and Meslin

	2004	2005	2006	2007	2008
Exports	24,022	0	351,421	2,413	878,310
Imports	249,514	0	0	51,557	4,769



In terms of imports of grain wheat, the average value of intra-EAC/COMESA imports was USD 25,242 which is only 0.2% of total value of total imports. Intra-EAC/COMESA imports of wheat products average at USD 101,947 which is 1.4% of global imports of flour and products. Kenya has a well developed wheat milling industry and this makes it a major supplier in the region.

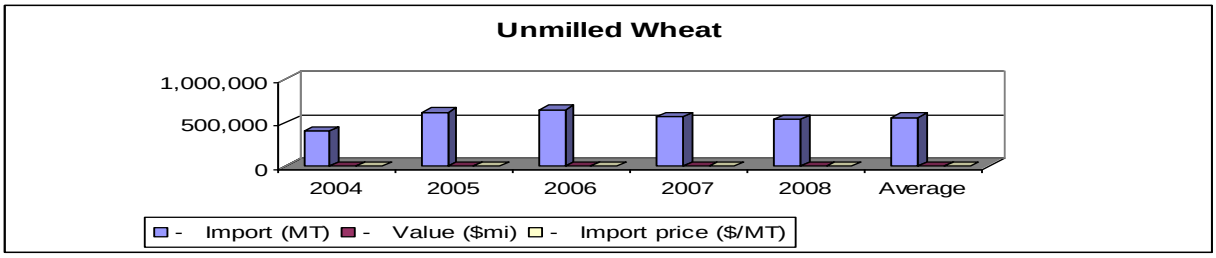
4.2.3: Global and Intra-EAC/COMESA Imports

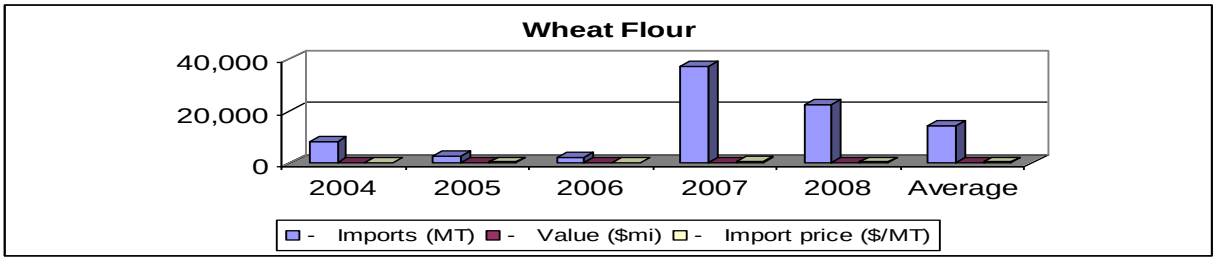
4.2.3.1: Global Import Trends

Kenya imports both un-milled wheat and wheat flour. The quantity of un-milled wheat rose from 404,060MT in 2004 to 538,498MT in 2008, averaging at 555,820MT during the period. During the same period, the quantity of imported wheat flour rose from 8,441MT to 22,514MT averaging at 14,591MT. The value of un-milled wheat imports rose from USD 87.3 million to USD 179.1 mi while that of wheat flour rose from USD 2.6mi to USD 8.6 mi during the same period as shown in table 4.6

Table 4.6: Wheat and Wheat Flour Imports and Value (2004 – 2008)

Un-milled Wheat	2004	2005	2006	2007	2008	Average
- Import (MT)	404,060	621,838	650,445	564,300	538,498	555,820
- Value ($mi)	87.3	109.9	115.5	154.8	179.1	129.3
- Import price ($/MT)	216	176.9	177.6	274.3	332.6	235.5
Wheat Flour						
- Imports (MT)	8,441	2,727	2,015	37,288	22,514	14,591
- Value ($mi)	2.6	0.98	0.50	23	8.6	7.14
- Import price ($/MT)	308	359.4	248	619.5	382	383





Source: KNBS – ES 2009 and calculations

Import prices of un-milled wheat rose from USD 216/MT in 2004 to USD 332.8MT in 2008 and averaged at USD 235.5/MT during the period while that of wheat flour rose from USD308/MT to a peak of USD 619.5/MT in 2007 and then dropped to USD 382/MT in 2008, averaging at USD 383/MT during the period. Importing wheat flour increases the price by 62% above import price of wheat. It is therefore more prudent to import un-milled wheat unless the flour is of a special quality.

4.2.3.2: Extra-EAC/COMESA

Kenya only produces about 30% of its wheat requirements and imports most of its wheat from outside EAC/COMESA. In COMESA, wheat and products come from Mauritius and Egypt. The extra EAC/COMESA exports of durum wheat only averaged at USD2, 427 while imports averaged at USD 69,429 in the period 2004 to 2008 as shown in table 4.7.

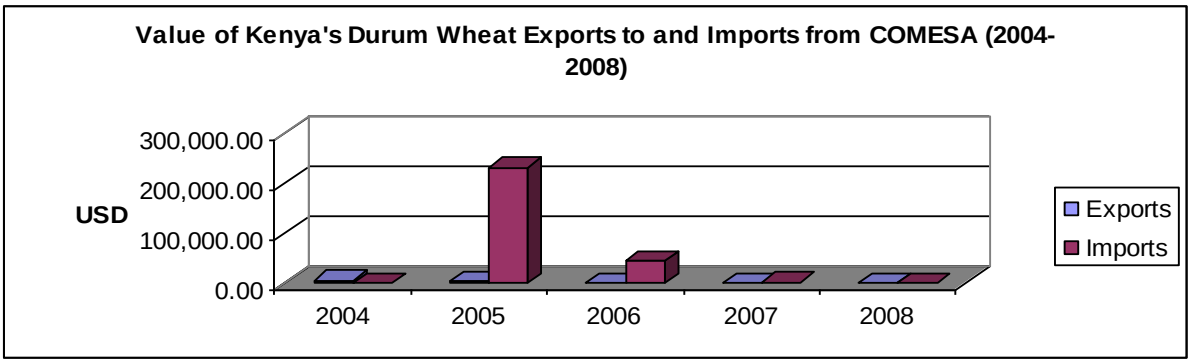
Table 4.7: Extra/EAC/COMESA Exports and Imports (USD)

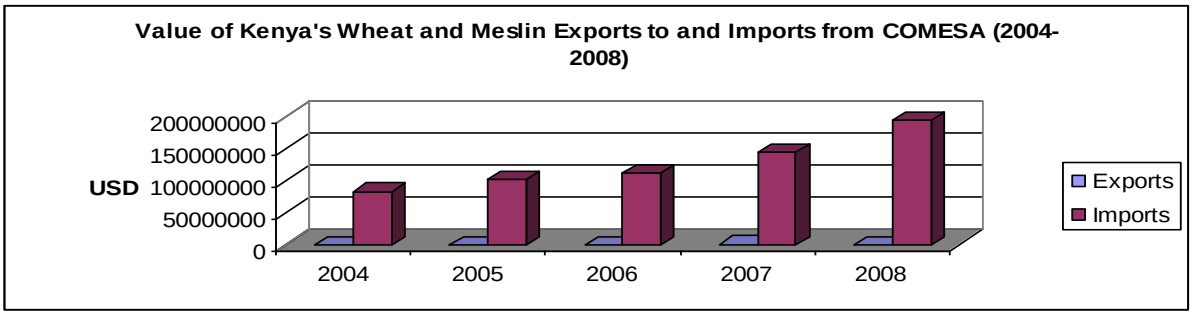
Durum Wheat

	2004	2005	2006	2007	2008
Exports	5,383.2	4,231.8	8.41	0	84.72
Imports	1,141.4	231,405	43,155	2,009	0

Wheat and Meslin

	2004	2005	2006	2007	2008
Exports	0	0	66,418	144,707	59,411
Imports	82,777,953	101,497,814	111,237,738	143,117,725	193,713,004





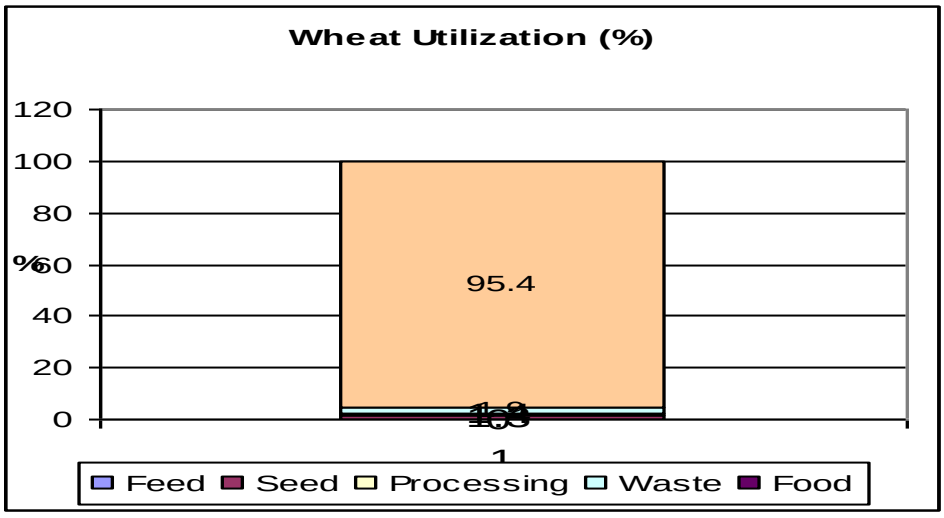
4.3: Value Chain Mapping

4.3.1: Commodity Utilization

Domestic supply of wheat estimated at 1.014 mi MT (Econ. Survey 2007) shows that 1.3% is utilized as seed (13,000MT), 1.4% for processing wheat products (14,000MT), waste 1.9%

(20,000MT) and wheat flour for food 95.4% (957,000MT). The utilization is shown in figure 4.2 below:

Fig. 4.2: Wheat Utilization



Source: Econ Survey 2007-FBS 2005

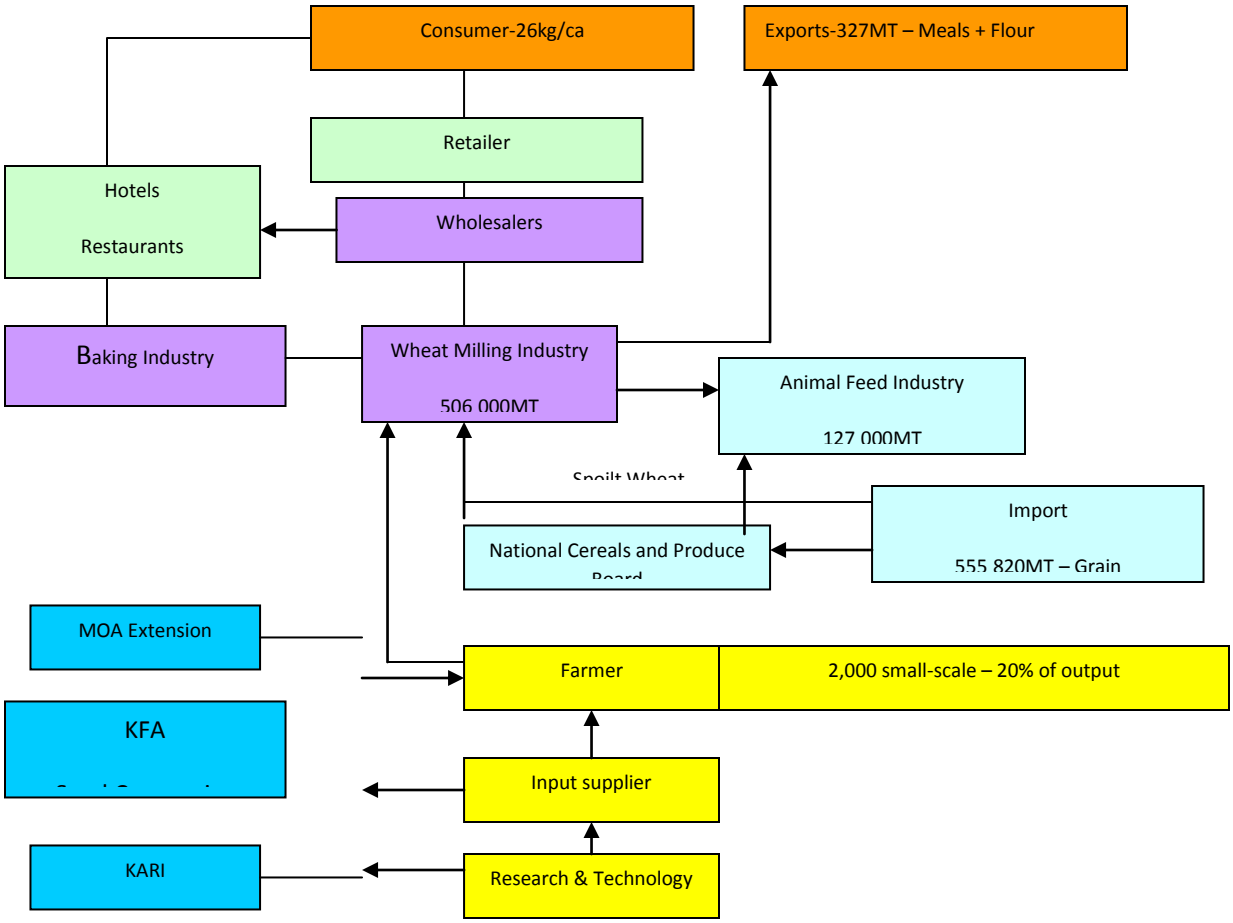
Based on this utilization, the per capita food availability was 28kg/ca for a population of 34.5mi.

4.3.2: Wheat Value Chain

4.3.2.1: Value Chain Map

Wheat in Kenya is grown by medium to large-scale farmers. These sell to National Cereals and Produce Board or directly to millers. The NCPB supplies millers who mill the wheat and sell the flour to wholesalers/retailers or bakeries which produce bread, pasta, biscuits and other confectionery products. The by-products of wheat milling are bran and pollard. As Kenya is not self-sufficient in wheat, it imports on average 536,000MT of wheat (unmilled) as well as wheat flour. Kenya also exports small quantities of wheat flour products to surrounding countries. The simplified wheat value chain is shown in figure 4.3

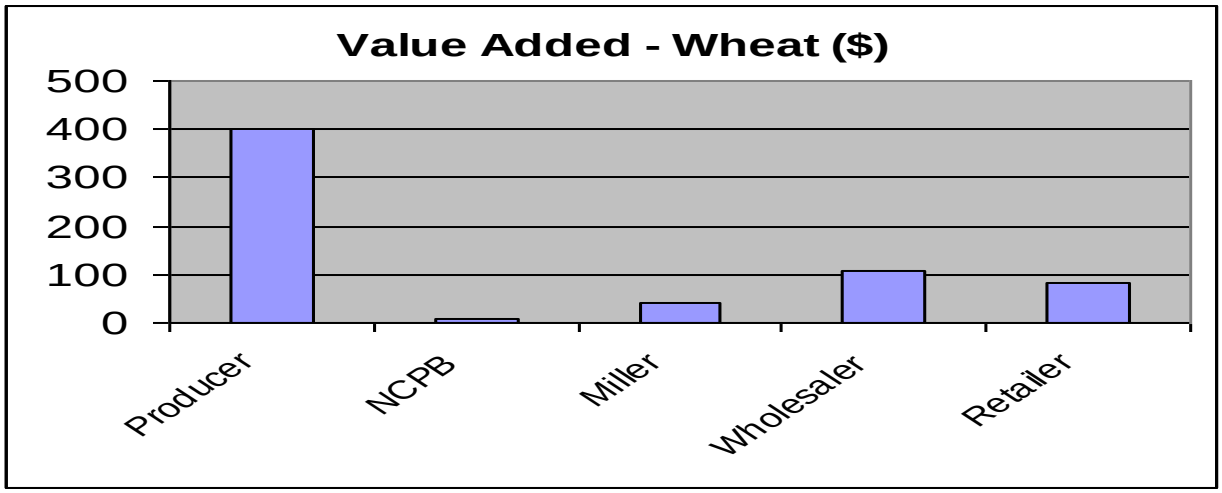
Fig. 4.3: Structure of the Wheat-to-flour and bread supply chain



4.3.2.2: Value Addition in Wheat Value Chain

Currently, domestic wheat is off-season and most of the wheat is imported at USD 400/MT (c.i.f Mombasa) which is transported to Nairobi at USD 15/MT and milled. Retail prices of packaged wheat flour are USD 0.83/kg. Based on the producer price of Kshs.1,340 per MT for the 2008/2009 season, the potential value addition is USD 400/MT, NCPB at USD 10/MT, miller USD 40/MT, wholesaler at USD 109/MT and retailer at USD 83/MT as shown in figure 4.4 below:

Fig. 4.4: Value Added in Wheat



4.4.: Stakeholders and Functions Matrix

4.4.1: Research and Technology and Extension

Research on wheat has been well established at KARI – Njoro Research Station and various varieties have been released for both various altitudes and baking qualities. Seeds are multiplied by KARI-KSU through contract farmers. KARI has developed 110 varieties but only a dozen are utilized by farmers (See Annex W1)

4.4.2: Supply of Seed and other inputs

Kenya has a well established seed industry supplying all types of cereal seeds and other seeds. Currently, the country has about 8 major seed production and marketing companies supplying seeds to the domestic and regional export market. The companies produce maize, wheat, sorghum, millet seeds, etc. Their handling capacities are detailed in table 4.8 below:

Table 4.8: Registered Grain Seed Companies and Handling Capacities

	Company	Types of Seeds	Handling Capacity (Tons)
1	East African Seeds Co. Ltd	Maize	390,000
2.	Farm Chem Ltd	Maize	257,000
3.	Kenya Seed Company	Maize, wheat, sorghum, millet	10,178,000
4.	KARI Seed Unit	Maize, Wheat, Millet	66,300
5.	Monsanto (K) Ltd.	Maize	200,000
6.	Pannar Seed (K) Ltd	Maize	28,000
7.	Western Seed Co.	Maize, Sorghum	874,400
8.	Lagrotech Ltd.	Sorghum, Maize	26,000

Source: Ministry of Agriculture

In the case of wheat, two companies are important; Kenya Seed Company and KARI Seed Unit (KSU). The requirement for seed is from 10,000 – 15,000MT (at planting rates of 75kg – 100kg/ha). Most farmers however use saved seeds and do not buy on a seasonal basis.

Other inputs include tractors/harvesters and farm equipment supplied by farm equipment companies, chemicals supplied by Kenya Farmers Association (KFA) with its widespread branch network and other agro-input suppliers.

4.4.3: Wheat Farmers

Area under wheat production has averaged at 140,000 – 150,000 hectares. Wheat is grown by medium (>5ha) and large-scale (>40ha). There are 2,000 small-scale and 20 large-scale farmers under Cereal Growers Association. These farmers in 2007 produced 354,249MT of wheat from 104,176 hectares. The large-scale farmers produced 80% of output and the small-scale farmers 20% of the output.

4.4.4: Wheat Storage and Sales

The National Cereals and Produce Board buys the farmers wheat and stores it in silos in the wheat growing and consumption areas for sale to millers. Farmers can also sell to millers directly.

4.4.5: Millers

Kenya has 162 grain millers ranging from small hammer mills to large millers. 19 large mills have a capacity of 1.5MT/year but utilization is about 50%. The main millers and addresses are as shown in Annex Table W2.

Constraints experienced by millers have been ranked as follows:

Constraint	Frequency of Millers (16) Ranking Constraint				
	1	2	3	4	5
Limited availability of wheat	6	-	-	10	-
Poor quality of wheat	-	3	10	-	-
High domestic prices	7	3	3	-	-
High transport costs	3	7	-	3	-

Government restrictions	-	-	-	-	13

1 = major constraint and 5 = no constraint

4.4.6: Animal Feeds Industry

In wheat milling, there are considerable by-products in terms of bran and pollard used in the animal feeds industry as shown in table 4.9.

Table 4.9: Expected wheat bran and pollard from one metric ton of local and imported wheat

By-Product	Local wheat (Kg)	Imported wheat (Kg)
Bran	140	100
Pollard	60	100

Pollard and bran production has averaged at 127,000MT per annum. These are critical ingredients in the animal feed industry. There are over 40 animal feeds mills with a capacity of over 800,000MT. They are organized under the Association of Kenya Feed Manufacturers (AKEFEMA). The members include millers and associated industries as shown in Annex Table W3.

4.4.7: Bakeries

Registered bakeries number 148 with 90 employing over 50 employees each. They produce various products, mostly bread, pasta and other confectionery products. Bread production is about 93,000MT while that of biscuits and other products is about 91,000MT. Considerable home-baking, both for household production and sale takes place. These are organized under the Bakers Association of Kenya (BAKE). The baking industry is valued at Kshs.40 billion and employs about 20,000 people directly.

4.4.8: Retail and Other Outlets

Most of the bakeries sell their bread and other products to retailers, in both the rural and urban areas. As indicated earlier, the number of retail outlets number over 3,600 although some do not stock bread. The other major outlets are the hotels, restaurants and other eating places which number 1,600. In the bakery products distribution, it is estimated that about 200,000 distributors and retailers are involved.

4.4.9: Consumers

Based on average consumption of 344,000MT of flour, the per capita consumption is about 10kg/ca while that of bread is 2.7kg/ca while for biscuits is at 2.6kg/capita. Other products like pasta, breakfast cereals and home baking possibly account for 10kg/ca giving a national per capita consumption of 26kg/capita.

4.4.10: Imports and Exports

The bulk of unmilled wheat imports averaging 555,820MT are imported through NCPB which sells to millers. However, there were imports of wheat flour averaging at 5,000MT between 2002 and 2006. In 2007 and 2008, imports averaged at 27,000MT. Kenya exports meals and other flour products averaging at 372MT

Functional Matrix - Wheat

Functions	Participants/Actors					Support Markets
	Domestic/Export – Import Market Channels					
	Input Suppliers	Farmers	Traders	Processors	Wholesalers	Support Services: Financial Services, SPS/Standards Certification, etc.
Wholesale, Retail, Exporting, Importing						
Processing						
Trading						
Collecting, Bulking, Storage						
Production						
Input Supply						

4.5: Constraints and Opportunities

4.5.1: End Market Analysis

4.5.1.1: End Market Users of Products

From milling of wheat, several products are released. These include wheat flour which is used for retailing to households and bakeries for production of bread, biscuits and pasta, among

others. The by-products in milling are bran and pollards which are used in the animal feeds industries. The estimated quantities are shown below:

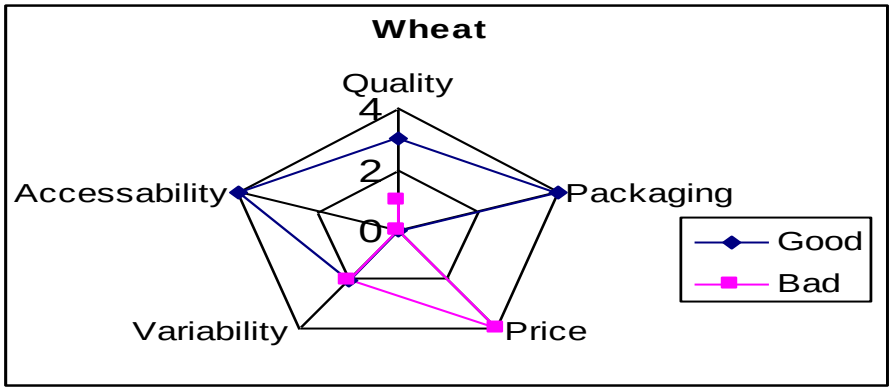
End Market Use and Users of the Product - Wheat

The form of the product at the end market	Users (e.g. millers, households)	Volume of National Requirement in Metric Tons per year	End Market Price in July 2009 in US$ per Metric Ton	Source of the Product		
				Domestic Market	**Imports**	
					Intra regional (i.e. from EAC/COMESA)%	Extra regional (i.e. outside EAC/COMESA)
Grain	344,000MT	660,330	USD 816.7	39%	10%	61%
Flour		344,000MT				
Bran/pollard		127000 MT				
Bread		93,000 MT				
Biscuits		91,000 MT				

4.5.1.2: Consumer Preferences

Consumer preferences for various products showed that price is the main concern together with price variability. Favourable preferences were accessibility, packaging and quality.

The consumer evaluation of wheat flour is as shown in the spider diagram below:



4.5.1.3: Current and Potential End Market Opportunities

Wheat products are in high demand, especially in urban areas where bread and other products are consumed by most households depending on income classes.

4.5.2: Vertical Linkages

Analysis of the industry shows the following:

- Majority of farmers are not vertically linked to millers and they sell their wheat to the National Cereals and Marketing Board which sell to millers. Some large-scale farmers sell directly to millers.
- Millers buy from NCPB and after milling sell through appointed wholesalers who distribute to retailers. Some millers like Unga Millers have vertically integrated into animal feed production and sell their own brands to consumers.

4.5.3: Horizontal Linkages

In the case of wheat, various horizontal linkages exist as follows:

- Wheat farmers are organized under the Cereals Growers Association
- Wheat farmers are also members of KFA who supply inputs and are also members of the Kenya National Farmers Producers Association
- Wheat millers are organized under the Cereal Millers Association
- Animal feed manufacturers are organized under the Kenya Feed Millers Association (AKEFEMA)
- Bakers are organized under the Bakers Association of Kenya (BAKE)

4.5.4: Support Market and Services

Government supports the wheat industry through provision of extension and buying of grain by National Cereals and Produce Board. KARI, a parastatal, undertakes research on wheat and multiplication of seeds by the KARI Seed Unit. The associations in horizontal linkages lobby on behalf of farmers on issues of policy and taxation.

4.5.5: Overall Constraints in the Wheat Sub-Sector

Several constraints have been identified at various levels of this value chain. These are summarized below:

- At research level, it has been noted that although KARI has released over 100 varieties, the farmers are not using these varieties. In 2008, only 3,127.31 MT of certified seed were used which can cover only 31,277ha which is 24% of area planted
- At the farm level, farmers face various problems mostly due to unpredictable weather and changes in output prices. On the inputs side, retail prices of fertilizers have been on the

increase from between Kshs.1,000 to Kshs.3,000/50-kg bag in January/February 2008 to Kshs.2,000 – Kshs.5,000/50-kg bag by October/November 2008. Prices of fuel have also been on the increase

- Millers have complained of limited availability of wheat, poor quality, high domestic prices and high transport costs.
- At the retail level, consumers claim that due to high prices, they buy less frequently
- At export/import levels, the concerns are on the expiry of COMESA safeguards on imports of duty free wheat flour and the duty on wheat flour. Kenya also faces import tariffs on flour exports to Uganda and Tanzania.

5.0 RICE

5.1 Global Perspective

5.1.1 Production

Globally, rice is one of the most important food crops and ranks second only to maize (corn) in terms of total volume of production. Since a large portion of maize crops are grown for both human consumption and other uses, rice is probably the most important grain with regards to human nutrition and caloric intake, providing more than one fifth of the calories consumed worldwide by human species. Total world production of milled rice in 2008 was estimated at around 459 million MT (representing an outstanding 4% increase from 2007) but is expected to increase only marginally to about 460 million MT in 2009 (FAO, Trade and Markets, Rice Market Monitor, June 2009). Asia accounts for nearly 90% of world rice production with the biggest producers including China (26%), India (20%) and Indonesia (9%).

5.1.2 Market Dynamics

The international market for rice is thin and volatile and most countries where rice is an important staple food have traditionally pursued a high degree of rice self-sufficiency to achieve food security. Only 4-7% of world production of rice is internationally traded, and export volumes are driven more by domestic supply and demand balances than by world market prices. As a result, compared to the world market for wheat and maize, rice prices in international markets are rather unstable. A small production shortfall in an important rice producing country often results in a surge in import demand and triggers a sharp rise in international prices. This, in turn, can seriously hinder importers' ability to secure affordable supplies on the world market. Asia accounts for about 70% and 50% of world exports and imports respectively. The three largest world exporters are Thailand (26%), Vietnam (15%) and the United States (11%), while the largest importers include Indonesia (14%), Bangladesh (4%) and Brazil (3%). Although China and India are the top two largest producers in the world, both countries consume the bulk of rice produced domestically leaving little to be traded internationally.

5.1.3 Demand and Consumption

Global demand for rice has been on the steady rise against slow growth in production thereby resulting in increasing scarcity and upward surge in market prices. In early 2008, some of the major producing and consuming countries such as Thailand began rationing supplies of the grain due to fears of global shortages.[16] The low supply relative to demand underlies the wide and

[16] *Thailand Government sucked off some 4 million MT from the market into public inventories at 20% above the market price.*

growing interest in rice research and development under various regional and global initiatives especially in sub-Saharan Africa. These include the New Partnership for Agricultural Development (NEPAD); Comprehensive African Agricultural Development Programme (CAADP); Forum for Agricultural Research in Africa (FARA); Eastern and Central Africa Rice Research Network (ECARRN); Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA); East African Community (EAC) and the Common Market for Eastern and Southern Africa (COMESA).

Global consumption was estimated at 424 million MT in 2008 but is expected to increase to 448 million MT in 2009. With production at around 459 million MT, the world is expected to be only marginally self-sufficient in rice. FAO's forecast of global rice trade in 2008 is approximately 31 million MT after several countries eased restriction on exports which had been imposed in the immediate preceding period. Preliminary global rice export in 2009 is estimated at 30.4 million MT.

5.1.4 African Potential

Rice has a high potential for development in Kenya and Africa as whole given that it is a tropical crop. According to the Africa Rice Centre (ARC), consumption of rice in Africa is growing faster than any other crop primarily due to changing eating habits and the high cost of cooking energy driven by urbanization. Despite past increases in production in sub-Saharan Africa, up to 14.2 million tons (of paddy) in 2006 from 8.6 million tons in 1980, demand still outstrips supply. Sub-Sahara Africa is a net importer of rice, with Nigeria, South Africa, Senegal and Côte d'Ivoire ranking among the top 10 rice importers in the world. With nearly 40% of the total rice consumption of Africa coming from the international market at a cost of over US$ 2 billion in 2006, the continent is precariously exposed to unpredictable external supply and price shocks than those of other continents. Yet, a lot can be done through better crop management without additional production costs. Africa's potential for enhanced productions are diverse and include availability of modern rice technologies, large tracts of uncultivated land and underutilized water resources. In this regard, it is estimated that Africa has about 20 million hectares of lowlands that are considered suitable for rain-fed rice production. In addition, FAO states that 98% of the 200 million hectares of wetlands in Africa offer great potential for rice cultivation; although one must keep in mind the need for environmental conservation. Recent studies by the Africa Rice Center indicate that rice production has been competitive in Benin, Guinea, Mali, Nigeria and Senegal even without the recent price hikes. The Washington DC-based IFPRI pinpoints that investing in rice holds the greatest potential for contributing to growth and poverty reduction Africa (more so West Africa) because of the largely unexploited production opportunity and the high consumer demand.

5.2 Domestic Rice Production versus Consumption

Rice is the third most important cereal crop in Kenya after maize and wheat. It has traditionally been grown by small scale farmers as a commercial food crop both within designated irrigation schemes and non-irrigated lowland and upland areas. In recent years however, large scale producers are emerging for example the Dominion Farms in Nyanza province. According MOA, there are about 300,000 small scale farmers who derive a significant part of their livelihood from rice production.

The long term production trend indicates that rice output has increased by a compound growth rate of about 1.1% from about 13,000 MT in 1963 to an average of 58,000 MT over the period 2004-2008 with an average domestic value of approximately US$ 28 million. Over the same period, cultivated area has increased at approximately 4.5% per annum to reach about 16,700 hectares in 2008, indicating a decline in yields per unit area. Indeed, yields declined at the rate of negative 3.2 between 1963 and 2008 and at over negative 20% over the last 5 years to reach a low 1.3 MT per hectare in 2008 having declined from an average of about 3.7 MT per hectare during 2004-2007. Production growth rate over the last five years has been in the order of 10.4% per annum with production reaching close to 65,000 MT in 2006 and an estimated 73,000 MT in 2008. Between 2004 and 2008, yields per hectare have oscillated between 2.8 and 4.4 MT. Provisional estimates for 2009 are not available but is expected to be significantly lower than yields achieved in 2008 partly due to the prolonged drought conditions that have lead to decreased availability for irrigation water and also the rice blast disease that affected the country in the last two seasons:

Table 5.1: Rice Production, Consumption and Domestic Values (2004-2008)

Year		**2004**	**2005**	**2006**	**2007**	**2008**
Area Planted (Ha)		13,322	15,940	23,106	16,457	16,734
Production	(MT)	49,290	57,941	64,840	47,256	73,141
	(50-Kg Bag)	986,801	1,158,929	1,296,811	945,118	437,628
Average Yields	(MT/Ha)	3.7	3.6	2.8	2.9	4.4
Value	(Kshs billion)	1.3	0.9	3.3	2.7	2.1
	US$ (million)	17.3	44.0	36.0	16.0	25.1
Consumption (MT)		270,200	279,800	286,000	293,722	300,000
Surplus/(Deficits-MT)		**-220,910**	**-221,859**	**-221,160**	**-246,466**	**-226,859**
Annual Deficits as % of total requirements		82%	79%	77%	84%	76%
MOA: Economic Review of Agriculture (2009)						

According to the Ministry of Agriculture, Kenya has a potential of about 540,000 hectares of land that can support irrigated production and a further 1.0 million hectares for rain-fed production. Much of this potential lies in the Lake Victoria basin. Thus with the current estimated area amounting to around 16,700 hectares, the country has exploited only about 1% of

existing potential. According to the Ministry, the current irrigation potential can be increased by a further 800,000-1.3 million hectares with improved surface water harvesting, underground water utilization, storage and other innovative management water technologies.

According to MOA, the country consumes approximately 300,000 MT of rice per year, which implies an annual per capita consumption of about 8 Kgs. Although recent consumption trends (2004-2008) indicate annual growth rate of about 2.8% per annum, GOK estimates of annual growth rate has been in the order of 12% over the last one and half decades or so. As indicated, Kenya has been and continues to be a deficit rice producer with deficits as a percentage of domestic requirements ranging between 75 and 85%. These deficits are met through imports which in recent years have been valued at about Kshs 7 billion (US$ 93 million) per annum. Against this scenario, available data and information on rice consumption clearly indicate that the commodity is fast becoming an important staple crop in Kenya like in the rest of the countries in Sub-Saharan Africa where annual consumption grew by over 5.8% during the period 2001-2005. It is in recognition of this fact that, MOA in collaboration with other key stakeholders such as the National Irrigation Board (NIB), Mwea Farmers' Multi-purpose Cooperative Society (MFMCS), NCPB and Lake Basin Development Authority (LBDA) among others, recently formulated the National Rice Development Strategy (2008-2018). Some of the proposed strategic interventions to be undertaken under the guidance of a "National Rice Stakeholders' Forum[17]" that is being established will include the following among others-though the exact activities have not been indicated:

- Increasing productivity-with some of the activities towards this end including promotion of high yielding and disease resistant varieties, appropriate agronomic practices for different cropping systems; soil and water management techniques in irrigated rice; introduction of appropriate pest, disease and weed control technologies; high quality seed and supply system and appropriate crop rotations in rice farming systems.
- Expansion of area under rice through improving and expanding irrigation infrastructure; increasing the area under irrigated and rain fed rice production; enhancing rain water harvesting for rice production and improving appropriate mechanization techniques for all rice operations.

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[17] To include MOA (to provide and house Secretariat; Researchers (KARI, NIB, Universities and others); Organizations dealing with rice e.g. Dominion; Relevant Agriculture sector ministries like Water and Irrigation, Regional Development Authorities, Local Government, Fisheries, Cooperatives and Marketing, Trade and Culture and Social services; Farmer organizations; Policy makers; Regulatory bodies (KEBS, KEPHIS); Agro-processors; Service providers- Stockists and seed producers; Rice traders and merchants; NGOs (SACRED AFRICA etc) and CBOs

Credit providers (AFC, Banks and MFIs)

- Reduction of field and storage level losses through introduction of appropriate utilization of post harvest technologies; application of improved cultural practices; improvement of harvesting, timing and post harvest handling techniques; developing and introducing appropriate harvesting and processing equipment.
- Facilitating farmers' access to affordable credit and quality inputs by introducing appropriate germplasm and variety maintenance; facilitating adequate production, distribution and marketing of good quality seeds; facilitating adequate supply and marketing of high quality inputs, and ensuring affordable credits to farmer-though it is not clear how all these will be done.
- Extension, advisory support services, development and application of improved technology by providing fully functional research and extension infrastructure; developing, packaging, disseminating and promoting appropriate technologies; developing networks for information sharing among farmer organizations, extension and other stakeholders; strengthening and improving farmer – extension - research linkages; facilitating private sector participation in technology development and transfer and addressing human health against malaria and water borne diseases in irrigated. .

With the above listed interventions among others, the Government hopes to increase the average annual production of rice from the average achieved in the last five years estimated at 48,000 MT to about 115,000 MT by 2013 and to 178,580 MT by 2018 as shown in table 5.2 below. This represents an increase of over 9.3% per annum which the country has never achieved in the past. The Ministry expects to double rice production in the next decade by focusing on key potential ecological areas in Central, Nyanza, Western, Coast and Rift Valley provinces.

Year	**Table 5.2: Rice Production Projections**							
	Rain-fed Upland Rice		**Rain-fed Low Land Rice**		**Irrigated Rice**		**Total**	
	Area (HA)	Production (MT)	Area (HA)	Production (MT)	Area (HA)	Production (MT)	Area (HA)	Production (MT)
2008	2,150	5,851	3,180	8,777	12,500	58,513	17,830	73,141
2013	3,000	9,330	4,000	12,800	18,216	92,902	25,216	115,032
2018	4,100	14,800	5,050	18,180	26,000	145,600	35,150	178,580
Source: Republic of Kenya: Ministry of Agriculture; National Rice Development Strategy (2008-2018): N/A stands for data not available								

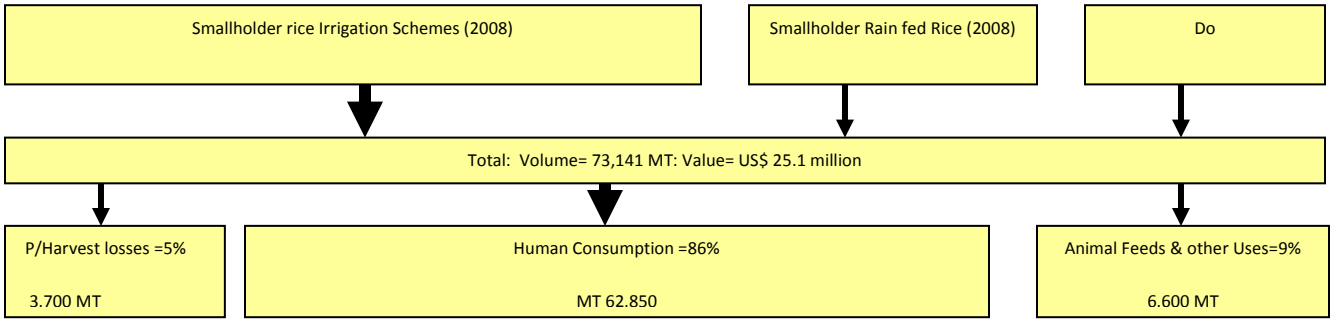
We consider these projections to be highly ambitious if the past performance is anything to go-by. In addition, it appears that the projections were based on a high base figure for the year 2008 of 73,141 MT (see table above) instead of the actual figure of around 22,000 MT or at least the average of 48,000 MT in the last five years. Moreover, many of the constraints facing the sector

such as land tenure related issues, increasing competition from other countries including informally traded produce from Tanzania and Uganda, declining availability of irrigation water are unlikely to be overcome in less than 8 years. Even with the ambitious production projections, the Government still expects the percentage of deficits to total requirement to decline rather slowly from the current 75% to approximately 66% by 2013 and to about 55% by 2018-primarily because of the anticipated higher growth rate in consumption which based on the trends indicated area amounted to about 2.7% per annum, though the MOA indicates the long term trend in consumption has been has been around 12% per annum (Republic of Kenya: Ministry of Agriculture; National Rice Development Strategy; 2008-2018). Unless the current production-related constraints are resolved, it is more likely that production over the next five years will remain below 55,000 MT per annum, implying even greater deficits.

5.3 Rice Utilization Flow Chart

Figure 5.1 below shows rice utilization, which comprises human consumption (86%); animal feed and other industrial uses (9%); and post harvest losses (5%).

Figure 5.1: Domestic Rice Utilization Chart



5.4 Rice Imports and Exports

As indicated earlier, Kenya is a net importer of rice as domestic supplies between 2004 and 2008 have been in the range of 15-25% of domestic requirements. The following sections analyze both intra and extra-EAC/COMESA exports and imports.

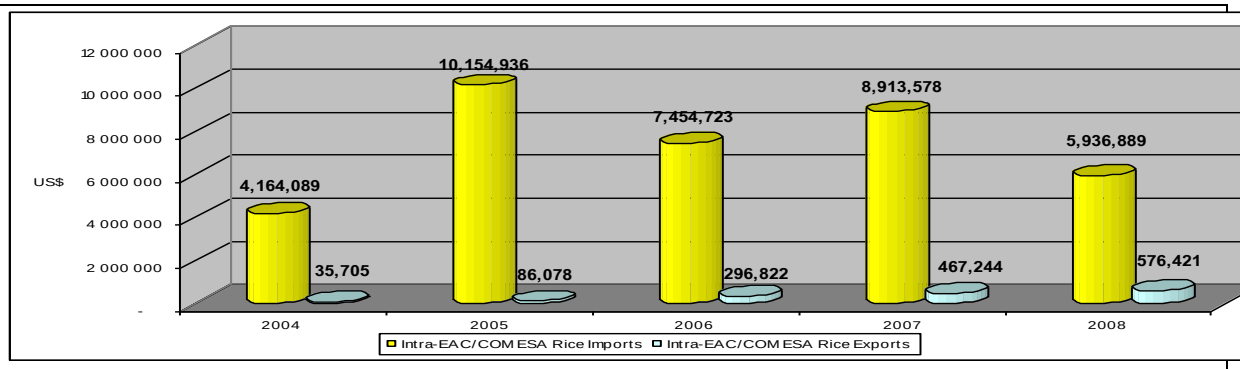
5.4.1 Intra-EAC/COMESA Rice Exports and Imports

Based on available data, Kenya's intra-EAC/COMESA exports of rice (in-husk, broken, semi or wholly milled) over the period 2004-2008 amounted to about 590 MT value at about US$ 526,420. Export volume data for the period 2004-2007 was not available. However, based on export value data, Uganda was the main export destination accounting for 68% of the cumulative

value of intra-EAC/COMESA exports, followed by Sudan accounting for about 32%. Egypt was the main source of the country's intra EAC/COMESA imports accounting for US$ 36.3 million or about 99.2% of total cumulative value of intra-EAC/COMESA rice imports during the period 2004-2008 as shown in Table 5.3.

Table 5.3: Intra-COMESA Rice Imports and Exports

INTRA-COMESA RICE EXPORTS						
Destination		**2004**	**2005**	**2006**	**2007**	**2008**
Sudan	US$	7,099	24,279	78,162	139,009	214,875
	MT	N/A	N/A	N/A	N/A	331.07
Rwanda	US$	53	-	-	-	N/A
	MT	N/A	N/A	N/A	N/A	17.59
Uganda	US$	28,553	61,799	218,660	320,799	360,445
	MT	N/A	N/A	N/A	N/A	237.80
Congo DRC	US$	-	-	-	753	1,100
	MT	N/A	N/A	N/A	N/A	0.81
Comoros	US$	-	-	-	5,973	N/A
	MT	N/A	N/A	N/A	N/A	N/A
Zimbabwe	US$	-	-	-	710	N/A
	MT	N/A	N/A	N/A	N/A	N/A
Seychelles	US$	-	-	-	-	-
	MT	N/A	N/A	N/A	N/A	3.00
Tanzania	US$	-	-	-	-	-
	MT	N/A	N/A	N/A	N/A	0.25
Total Exports	**US$**	**35,705**	**86,078**	**296,822**	**467,244**	**576,421**
	MT	**N/A**	**N/A**	**N/A**	**N/A**	**590.52**
INTRA COMESA RICE IMPORTS						
Source		**2004**	**2005**	**2006**	**2007**	**2008**
Egypt	US$	4,105,488	10,046,055	7,380,026	8,886,667	5,902,162
	MT	N/A	N/A	N/A	N/A	11,706.55
Uganda	US$	58,601	108,880	74,698	26,912	34,727
	MT	N/A	N/A	N/A	N/A	890.00
Tanzania	US$	-	-	-	-	-
	MT	N/A	N/A	N/A	N/A	5,993.20
Total Imports	**US$**	**4,164,089**	**10,154,936**	**7,454,723**	**8,913,578**	**5,936,889**
	MT	**N/A**	**N/A**	**N/A**	**N/A**	**18,589.75**



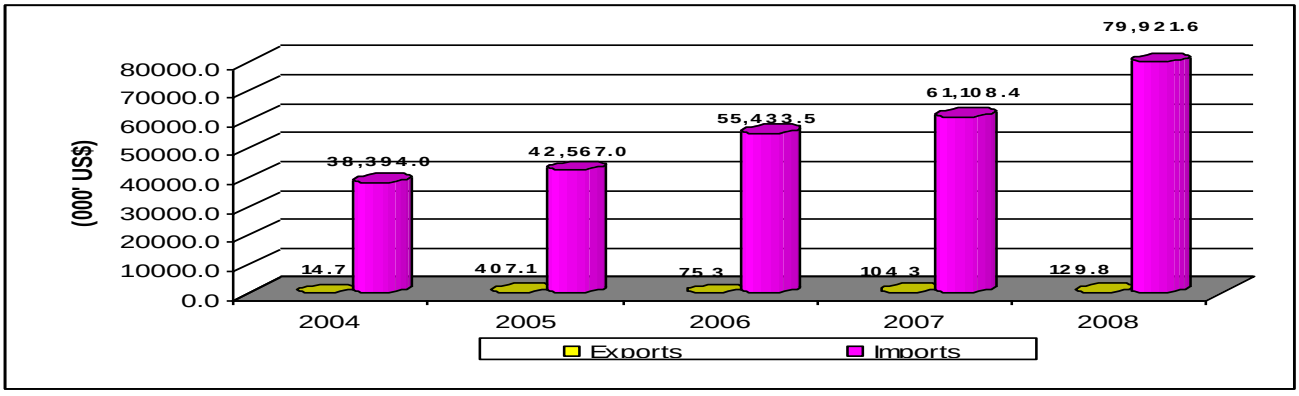
Source: EAC/COMESA Secretariat and KRA

5.4.2 Extra-EAC/COMESA Rice Imports and Exports

As indicated in Table 5.4 below, the Kenya's total value of extra-COMESA rice imports during the period 2004-2008 far out-match extra-COMESA rice exports. In general, the country's exports have been less than one percent of total imports. Over the period, the value of extra-COMESA rice imports have increased at the rate of 20% per annum (CGR) rising from about US$ 38.4 million in 2004 to approximately US$ 80 million in 2008. Data on quantity was not available, but the main sources include Vietnam, Pakistan and Egypt.

Table 5.4: Extra-COMESA Rice Exports and Imports

Flow	2004	2005	2006	2007	2008
Exports (000' US$)	14,693	407,101	75,299	104,287	129,817
Imports (000 US$(	38,393,995	42,567,041	55,433,513	61,108,437	79,921,575



Source: EAC/COMESA Secretariat and KRA

Rice production in Kenya occurs both under irrigated and rain-fed systems. Based on MOA data for the year 2008, area planted, production and yields under each of the two production systems was as shown in table 5.5 below. Production under Government-funded irrigation schemes account for about 80% of total annual national production and 70% of total annual planted area. Rain fed up-land and low-land rice production accounts for the balance 20% of production and 30% of total area (Ministry of Agriculture; National Rice Development Strategy; 2008-2018).

Table 5.5: Rice Production in Kenya (2008)

Production System	**Area-Ha**	**Production-MT**	**Yields (MT/Ha)**
Rain-fed	5,330	14,628	2.7
Irrigated	12,500	58,513	4.7
Total	17,830	73,141	
Percentage Shares	Area as % of National Total	Production as % of National Total	
Rain-fed	30%	20%	
Irrigated	70%	80%	

5.5.1.1 Irrigated Rice

About 95% of rice production in Kenya comes from five (5) of the seven (7) irrigation schemes under the management of the National Irrigation Board (NIB). The main production clusters include Central province (Mwea irrigation scheme which accounts for about over 80% of total annual national production or 97% of all rice irrigation schemes); Western province (Bunyala irrigation scheme); Coast province (Tana delta and Msabweni); and Nyanza province (Ahero, West Kano, Migori and Kuria districts). Other areas which have been producing paddy rice in the past, albeit irregularly included Bura and Perkerra irrigation schemes. In addition, Dominion Farms limited are also currently producing rice around the Yala Swamp. As shown above, the average yields for irrigated rice is about 4.7 MT per hectare and 2.7 MT per hectare for rain fed rice. This compares poorly with the average yields of between 8.6 and 10 MT achieved by the Dominion Farms. Table 5.6 below indicates average planted area, production, value and number of farmers in 2007/2008 for the main rice irrigation schemes which are under the management of NIB as well as by Dominion Farms Ltd.

Table 5.6: Irrigated Rice

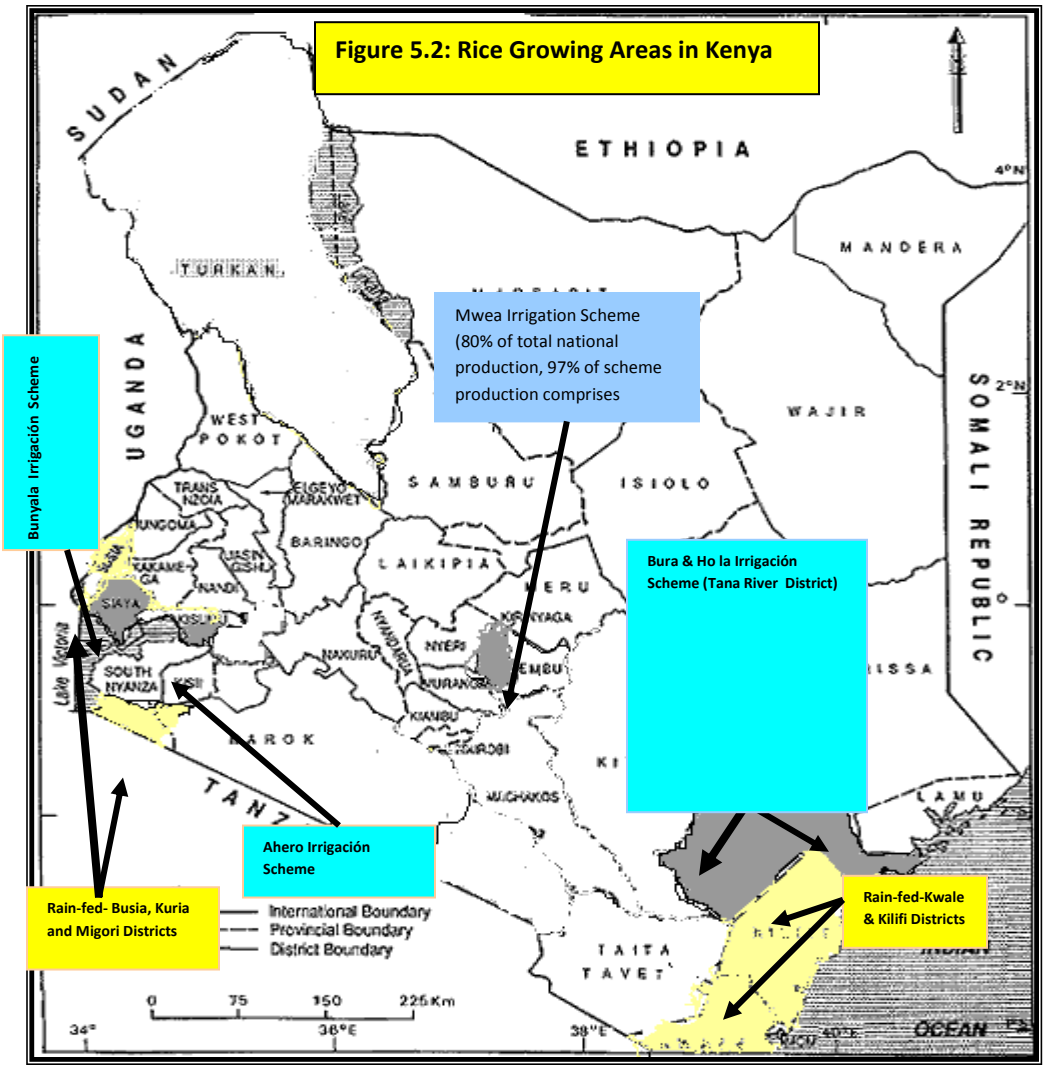
Irrigation Scheme	Area (Ha)	Annual Output (MT)	Gross Value (million Kshs)	Payment to Farmers (million Kshs)	Number of Farmers
Mwea	8,325	51,458	1,544	919	7,267
Ahero	623	851	29	8	553
Bunyala	623	682	23	14	133
West Kano	233	124	8	0	813
Sub-total	9,804	53,115	1,604	941	8,766
Dominion Farms[18]	300	15,000	0.45	--	--
Source: Kenya National Bureau of Statistics; Statistical Abstract; 2008					

5.5.1.2 Rain-Fed Rice

Rain fed rice accounts for about 20% of total national rice production. The main rain-fed rice producing areas includes Kwale, Kilifi, and Tana River districts (Coast Province), Bunyala and Teso districts (Western Kenya), Migori and Kuria districts (Nyanza province). The average yields under rain-fed conditions are estimated at 2.7 MT per hectare. As will be noted, yields per hectare under rain-fed conditions are only about 58% of achievements under irrigated systems.

Figure 5.2 below shows the main rice producing areas in the country (irrigated and rain-fed).

[18] *Based on interviews through telephone.*



5.6 Value Chain Functions and Actors

The main functions in the rice subsector includes research and development, inputs supply- mainly fertilizers, chemicals and machinery; production; processing and marketing.

5.6.1 Research and Development

Mwea Irrigation Agricultural Development (MIAD) Centre: This is the main player in rice research and variety development. It is a research centre which was established in 1991 under a collaborative effort between the Government of Kenya (GOK) the Government of Japan. It is now managed by NIB since the end of the collaboration agreement in 1996. Mandated by CAP 347, the objectives of MIAD include conducting research with a view to increasing rice yields and quality, developing technology to increase utilization of available resources through crop

intensification and diversification; conducting research with a view to reducing various crop production costs; increasing water use efficiency, providing capacity building in irrigated agricultural water management. Some of MIAD's key achievements include rice seed production (about 320 MT per annum); rice germplasm preservation and rejuvenation; soil fertility improvement trials and demonstrations – Soya bean, green grams together with Azolla and straw incorporation to restore soil fertility; rice pest and disease control chemicals efficacy tests; research on rice rattooning; utilization of Azolla to reduce inorganic fertilizers use; utilization of rice straw for soil improvement; development of rice production packages; training of water user associations management and farmers on appropriate irrigation technologies. Other players who collaborate with MIAD in research, variety development and product promotion include: JICA/AICAD, KARI and Maseno University with respect to NERICA rice adaptability trials; JICA and CIMMYT with respect to trials on maize production in paddy field; KARI/IWMI/IPIA in trial on rice, Soya bean cultivation after rice; KEMRI, JICA; ICIPE and University of Illinois (USA) on health related research mainly malaria and parasitic control; SACRED Africa-collaborating with JICA in the development of NERICA rice variety in West Kenya; and Relief Environmental care for Africa (RECA) and World Food Programme (WFP)-Revival of Western rice schemes;

5.6.2 Inputs Supply

The main inputs in paddy rice production include land, water for irrigation, labour, fertilizers and chemicals, machinery, extension services and gunny bags. Other than land and irrigation water which are provided by NIB, the rest of the inputs are acquired privately by farmers from the private sector. NIB allocates 4 acres to each farmer within their irrigation schemes-which in the Mwea irrigation scheme costs Kshs 35,000 per season (one year). The Board also maintains irrigation roads infrastructure and provides irrigation water to each plot through canals at a cost Kshs 2,000 per acre or KShs 8,000 per plot of four acres. The farmer uses a combination of household family labour and hired labour from local sources at a cost of Kshs 200 per day. The farmers buy other inputs such as machinery services (tractors for ploughing at Kshs 2,400 per acre and ox-plough for ground leveling at Kshs 1,500 per acre), fertilizers (DAP and CAN), and chemicals and gunny bags from local suppliers. According to 5 farmers interviewed during this study, extension services are provided mainly by MIAD with limited support from MOA extension staff. The Mwea Farmers' Multi-Purpose Cooperative Society has been working closely with MIAD and MOA in providing extension and marketing services, but its institutional and financial capacity has weakened considerably since 2000 as a result of politically-connected bad debts.

5.6.3 Production

Farmers produce paddy rice (grain-in-husk), which is thereafter threshed to separate rice grain from the husk. Both men and women are involved in rice production. However, men and mainly involved in land preparation (ploughing, rotavation and leveling) and transportation; whereas women and children are mainly involved in planting, weeding, birds scaring, harvesting, threshing and drying. According to the Ministry of Agriculture, there are approximately 300,000 rice farmers in the country (Republic of Kenya: Ministry of Agriculture; National Rice Development Strategy; 2008-2018). Of this total, close to 9,000 smallholder rice growers or approximately 3% operate irrigated plots averaging 4 acres in the three main rice producing irrigation schemes of Mwea, Ahero, Bunyala and West Kano. The majority of the rice producers (97%) produce rice under rain-fed conditions across several districts of the country, mainly Kwale, Kilifi, Tana River, Bunyala, Teso, Migori and Kuria districts. The bulk of rice production in Kenya is undertaken by smallholder farmers under irrigated systems within seven Government-owned irrigation schemes that are managed by NIB, as well individually under rain-fed conditions. However, a foreign-owned corporate producer by the name Dominion Farms Limited recently started producing irrigated rice around the delta of river Yala in Siaya and Bondo districts of Nyanza province[19]. The Company is currently operating 700 acres of irrigated rice which produces twice a year thereby implying 1,400 acres of paddy rice per year, but also plans to open up a further 500 acres over the next 2-3 years. In addition, the Company is also cultivating a further 50 acres under rain-fed rice in East Ugenya. This Company is currently achieving 8.6 to 10 MT per hectare, which is about 180-230% of the average yield realized among smallholder farmers within NIB irrigation schemes. Based on this, it is estimated that Dominion Farms Ltd is producing between 13,000-15,000 MT of rice per year.

5.6.4 Harvesting

Rice harvesting, which is normally done by cutting the rice plant at stem base or head cutting, is predominately done by women and children. After harvesting the crop is then threshed in the field by beating the harvested crop on tarpaulin, plastic sheet or on the ground. The activity is predominantly undertaken by women and children.

5.6.5 Collection, Bulking and Storage

Once harvested, farmers normally pack their paddy rice (grain-in-husk) in 70-85 Kg bags and store it within their households to wait for buyers or look for them immediately and dispose. The majority of the buyers are local traders or their brokers who buy and transport using ox/donkey carts to local urban centers for processing (separating the grain husk from the rice grain).

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[19] *Also undertaking production of seeds for international organizations, development of palm oil and Artemesia plantations, aquaculture, and bee farming*

5.6.6 Trade and Marketing

Before liberalization of the Kenya's cereal sector in 1993, rice marketing, including pricing was controlled by Government through NCPB. Since that time, trading and marketing of rice has continued to be undertaken by both individual and institutional actors at free market prices determined by supply (local and imported) and demand. Private and individual actors in rice trading and marketing include farmers for paddy rice, traders and brokers for both paddy and processed rice. Private and public institutional actors include NCPB which purchase rice through their regional depots, NIB and LBDA through their respective mills; Mwea Farmer's Multi-purpose Cooperative Society; supermarkets in major urban centers; Dominion Farms Ltd in Bunyala and Capwell Industries (Thika) among others. In addition, there are also numerous small to medium traders- mostly women- who buy paddy rice from farmers or milled rice from processors and sell locally or in regional markets.

5.6.7 Processing

Paddy rice, sometimes referred to as rough rice, is the individual rice kernels that are in their natural, unprocessed state. Once harvested from rice fields or rice paddies, the produce is transported to processing mills where it is milled into rice by removing the protective hull leaving only the actual rice kernel for consumption. The end product is referred to as milled rice. Most rice varieties roughly consist of starchy endosperm (69%) also referred to as total milled rice-containing whole and broken grains, rice husk (20%) which often goes to waste but is sometimes used as spread in chicken pens on in farms, and rice bran (11%) for animal feed (especially pigs and chicken) after being mixed with other relevant ingredients. Once harvested, paddy rice is normally packaged in bags weighing between 70 and 85 Kgs and sold to traders or millers (no standards). According to MRGMCS and farmers interviewed at Mwea irrigation scheme, one bag of paddy rice (grain-in-husk) translates to between 40 and 50 Kgs of clean milled rice kernel. As indicated in the table below, the country has seven major rice mills. These include Government/NIB-owned mills which cater for smallholder producers) comprising the Mwea Rice Mills (located at Mwea), Western Kenya Rice Mills (WKRM); LBDA Rice Mill (Ahero) and Tana Delta (Hola); as well as private corporate-owned rice mills comprising 2 mills owned by Dominion Farms Limited situated around the Yala Swamp; and Capwell Rice Mills (Thika)-which accounts for about 70% of the domestic rice market share as shown in Table 5.6 below.

Table 5.6: Rice Milling Capacity and Other Issues

Name of Mill	Installed Capacity (MT/hour)	Current Average capacity utilization (%)	Products	Approximate Domestic Market Share (%)	Location		Ownership

Mwea Rice Mills	24	13.5%	• Rice grain, • Rice Bran • Husk-waste	3%	Mwea	Mwea Rice	• GOK/NIB (55%) • MRGMCS[20] (45%)
WKRM	3.5	40		2%	Nyanza	--	• GOK/NIB (60%) • FCS[21] (40%)
LBDA Mills	3.5	50%		1%	Kibos-Kisumu	--	• GOK/LBDA
Tana Delta Mills	3.0	40		1%	Tana River	--	• GOK/NIB
Dominion Farms	4.0	60%		20%	Bunyala	Dominion	• Dominion Farms Ltd
Capwell Industries	N/A	85%		70%	Thika	Kings	• Capwell Industries Ltd
MRGMCS	1.5	37%		0.5%	Mwea	SPR	• Mwea Rice Farmers Coop.
Others	--	--		2.5%	--	--	• Small-scale family enterprises

Additionally, there over 350 other small to medium rice mills in Mwea (e.g. Kagombe's Rice Mill, Bagara, Rice Mills and Roads into Africa) and also a large but unknown number of small privately-owned rice mills in the rest of the rice growing areas in Kenya. Once processed, the rice is packed either as grade 1 or grade 2 in packages weighing 50 Kg bag (over 75%), 2 Kg packets (12 packets of 2 Kgs each) or 1 Kg packet (24 packets of 1 kg each), and distributed to wholesalers and retailers in the local and regional markets.

5.6.8 Summary of Maize Value Chain Actors and Functions Matrix

Functions / **Actors**	**Participants/Actors in the Rice Subsector**							**Support Markets (Type of Services Provided)**
	Domestic/Export-Import Market Channels							
	Input suppliers	**Individual Small-scale Producers**	**Institutional Producers**	**Trader/Brokers**	**Processors/ Millers**	**Wholesalers**	**Retailers**	
Retail								• Market price information by MOA and EAGC
Wholesale								• Storage services

[20] *Mwea Rice Growers Multipurpose Cooperative Society Ltd*

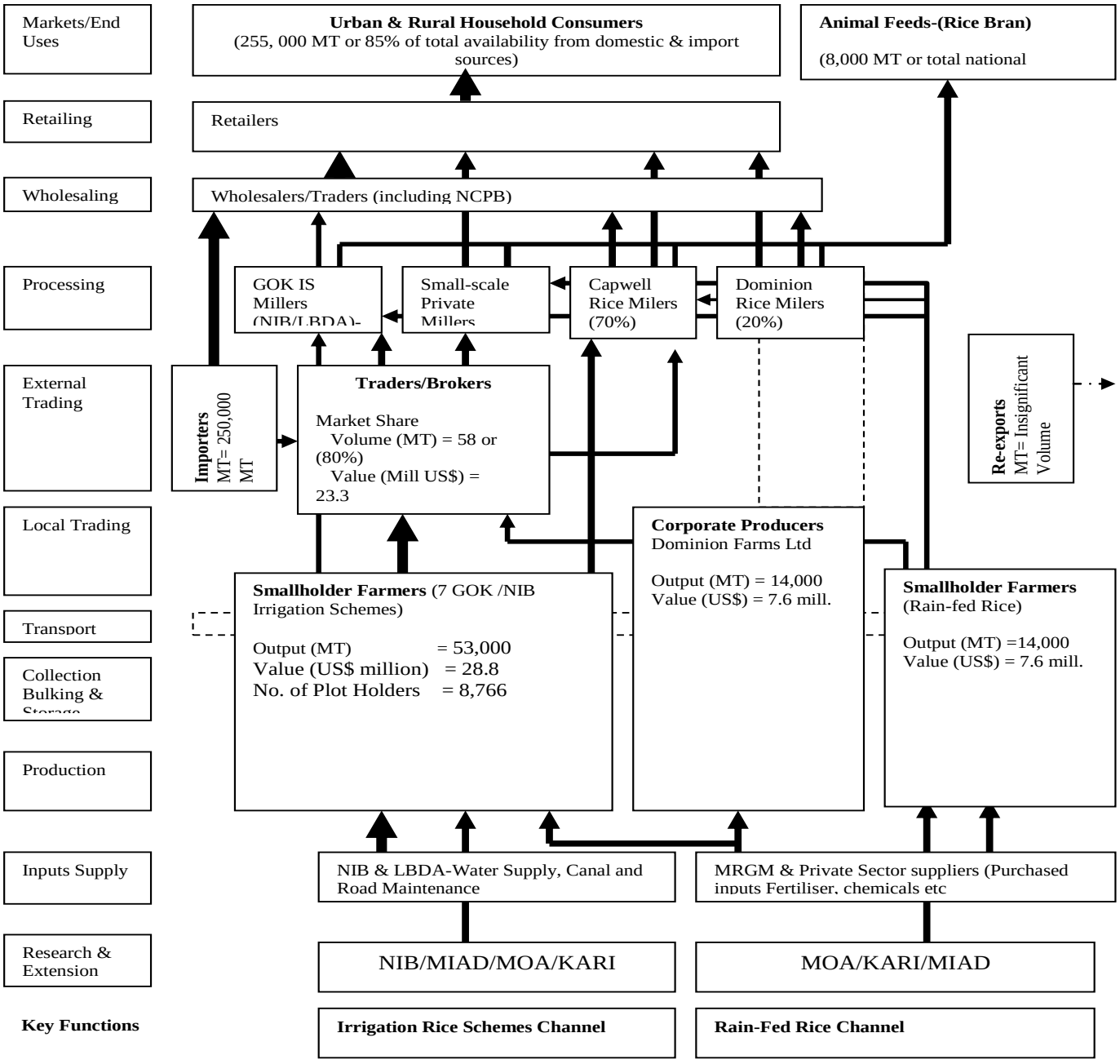
[21] *Several Farmer Cooperative Societies in Ahero, Bunyala and West Kano;*

Exporting								• SPS/Standards Certification services by KEPHIS;
Importing								
Processing								• Financial services to medium/large farmers by commercial banks
Trading								• Market price information by MOA, EAGC and KMDP
Collecting, Bulking, Storage								• Collection and bulking by brokers
Production								• Extension services by MOA/KARI • Financial services to medium/large farmers by commercial banks • Relief Environmental Care for Africa (RECA) and WFP-production techniques
Input Supply								• FAO-Grants • AFC/small commercial banks (Equity Bank/Family Finance-) Credit
Research and Commodity Development								• KARI-Mwea Station • MIAD-release and certification of rice seeds

5.7 Value Chain Mapping

Figure 5.3 below depicts the domestic rice subsector map including the channels, functions and actors, volume flows and value changes.

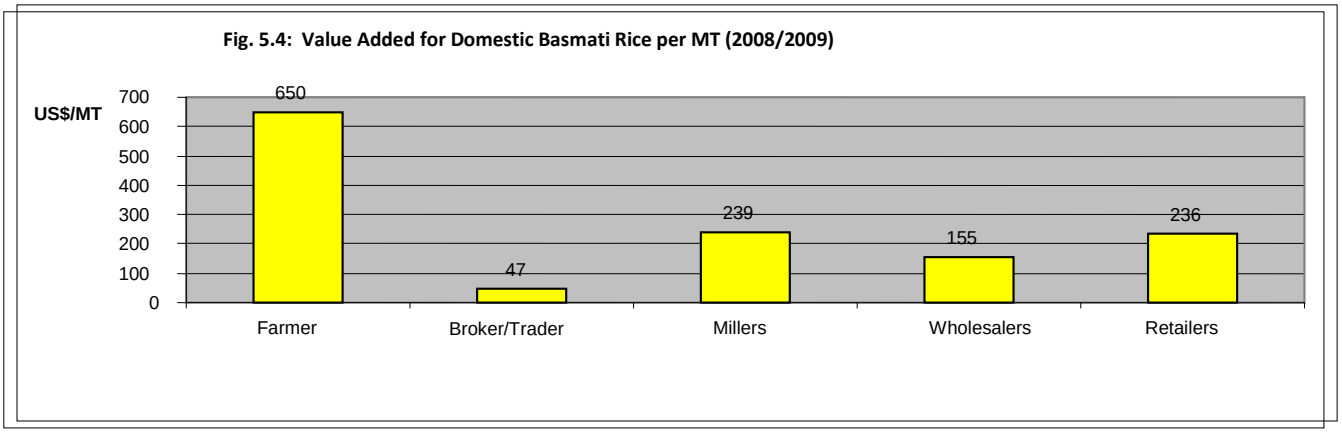
Figure 5.3: Rice Subsector Map



Source: Prepared by Study Team based on field data and information:

5.8 Value Addition and Distribution

Figure 5.4 below indicates that in 2008/2009 the farmer got the bulk of the value added at about US$ 650 per MT of Basmati rice, followed by millers and retailers at US$ 239 and US$ 236 respectively. The broker/trader earns the smallest share estimated at around US$ 47 per MT though one should recognize that this actor disposes his/her product soon after acquiring it.



Source: Based on data collected from farmers, millers and traders at the Mwea Irrigation Scheme, as well as traders in Nairobi

5.9 Analysis of Subsector Constraints and Opportunities

5.9.1 Main Constraints

- Increasing shortage of irrigation water occasioned by the increasing effect of global warming-a problem that is becoming an increasingly serious threat to the rice industry in Kenya. According to MRGMCS, the problem is so serious at the Mwea Scheme to the extent that in only about 25% of farmers are believed to have planted during the last season (June 2009). In addition to the wider interventions towards reversing global warming effects, there is urgent need for more prudent management of existing water resources and investment in additional water harnessing interventions including construction of water dams to tap particularly run-off water resources.
- Labour scarcity primarily due to migration of younger and more energetic people to the urban centers resulting in the increase of labour costs. Traditionally most farm families have been depending on family labour to carry out various farm activities partly to reduce on production costs and partly because it is available on demand during labour peaks. Mechanization and provision of appropriate technologies suitable for farmers would promote rice production.
- Social issues: High prevalence of waterborne diseases such as malaria and bilharzias in the irrigation schemes adversely affects labour productivity.
- Threats from imports especially informally traded rice from the neighbouring countries, particularly Tanzania. There is also rice seed movement across the borders which may not have undergone formal certification that could be detrimental to rice sub-sector

development. However, the trading block presents major trading opportunities and sharing of germ-plasm. There is therefore need to speed up the on- going harmonization process of trade tariffs and seed industry rules and regulations by the partner states.

- High and increasing cost of farm inputs and machinery, fertilizers and chemicals w is discouraging smallholder producers from continued rice farming.
- Poor and inadequate infrastructure especially in the lowland rain-fed rice regions as well as inaccessibility to rice mills resulting in the decline of rice production. Infrastructure development such as roads, dams, irrigation and drainage, electricity, communication and viable public /private sector partnerships will improve the farming systems for small scale farmers hence unlock this potential resulting into poverty alleviation and economic growth.
- Poor access to credit primarily due to lack of land ownership by farmers in the irrigation schemes.
- Uncoordinated marketing due to poor organization of farmers (since the exit of NIB) leading to market dominance by brokers and trader cartels and adulteration of rice (with aromatic varieties e.g. basmati being mixed with lower quality varieties-mainly from Vietnamese and Pakistan imports at the ratio of 3:1 and thereafter sold as basmati rice to unsuspecting buyers).
- Low skills/knowledge on rice crop management-there is low technical know-how on rice production technology among extension staff, farmers and processors

5.9.2 Subsector Opportunities

- Domestic supply gap: The country is faced with large and increasing deficits (about 83% annually), which indicates the large potential within the domestic market.
- Quality and consumer preferences: Compared with the bulk of imported rice, a significant proportion of locally produced rice is of high quality (aromatic variety-mainly basmati rice) which is highly preferred by consumers locally, regionally and globally. This has however being threatened by incidences of importation of cheap poor quality rice that is often fraudulently repackaged and sold locally as high quality Basmati rice-a fact that calls for the need to step up enforcement of compliance on the part of the Kenya Bureau of Standards (KEBS).
- Potential for area expansion for both irrigated and rain-fed rice. Kenya has a potential of about 540,000 hectares of irrigable rice and 1.0 million hectares for rain-fed rice production. With improved water harvesting, storage, underground water resource utilization and innovative management technologies, the current irrigation potential can be increased by a further 800,000 ha to 1.3 million hectares (MOA; National Rice Development Strategy; 2008-2018).

- Potential to increase yields from the current national average from the current 4.3 MT per hectare (weighted average for rain fed and irrigated) to about 9.5 MTfor irrigated rice for example as demonstrated by Dominion Farms.
- Strong research systems- under Kenya Agricultural Research Institute (KARI) and in collaboration with internationally reputable organizations.
- Seeds-Well established seed production and certification system with seed producers under the supervision of the Kenya Plant Health Inspectorate Service (KEPHIS) producing certified seed.

5.9.3 End Market Analysis

The main end-market products for rice include milled rice for human consumption and bran for animal feed which account for 90-95% and accounting for 5-10% of total utilization respectively as shown in table 5.7. Rice husks are basically waste by-products and given away for free though there is potential to use them for energy generation in the mills.

Table: 5.7: End Market Characteristics for Rice and Uses

Product	Main Users	Annual National Requirement in 2008- (000, MT)	End Market Price July 2009) - (US$ per MT)	Source of Product		
				Domestic Market (%)	**Imports**	
					Intra Regional (From EAC/COMESA) %	Extra Regional (Outside EAC/COMESA) %
Milled Rice	Household consumers	300	1,730	20.5%	0.2%	99.8%
Animal Feed (Bran/broken rice)	Livestock Farmers (poultry & pigs)	36.5	267	100%	0%	0%
Husk	Poultry farmers- spread in chicken pens)	N/A	0	100%	0%	0%

Source: Compiled by study team based on field data and secondary sources

Kenyan consumers have a very high preference for aromatic rice varieties-primarily Basmati. Unfortunately, only the Mwea irrigation produces this variety with supplies being around 52,000 MT annually which is merely 17% of national requirements. Rice has traditionally been

packaged in 50-Kg bags, but there is an increasing trend to pack the commodity in 25-Kgs for ease of handling, especially among traders from Mwea who are now transporting the produce using matatus. While the issue of price for the high quality basmati rice (currently retailing at Kshs 145 per Kg) is not so much an issue, the biggest complaints among consumers relates to the adulteration of basmati rice with imported non-aromatic and inferior quality rice-which is literary the norm.

5.9.4 Vertical Linkages

The only notable vertical business linkage in the rice value chain involves the Mwea Farmers' Multi-Purpose Cooperative Society-MFMCS, whose 4,500 members (1,200 currently active and 3,300 inactive) maintain formal contractual business relationships with Mwea Rice Mills. The Cooperative provides embedded services to their members in the form of credit through their affiliate SACCO, provide inputs and extension services in collaboration with MIAD and other service providers. The main problem is that the cooperative society is increasingly facing financial constraints due to side-selling of produce, non-repayment of debts, and low sales of the inferior quality Sindano rice. A few growers also maintain informal business linkages with major buyers such as Capwell and NCPB-but these organizations do not offer any form of support services. In the rest of the country where rice is produced (especially rain-fed rice), there are no formal or well established vertical business linkages.

5.95 Horizontal Linkages

The only notable formal horizontal linkages in the Kenyan rice subsector involve the association among farmers in the Mwea irrigation scheme under the so called Mwea Farmers' Multi-purpose Cooperative Society (MFMCS). While the linkage was much stronger before political interferences in the year 2000, this has weakened dramatically and 80% of the volume produced by members of the cooperative is now being sold through brokers who offer a higher price because they are able to recoup the costs through adulteration of Basmati rice with imported inferior quality from Vietnam, Pakistan and Thailand. The other form of horizontal linkage is at the millers' level, albeit under the auspices of CMA for general cereal milling activities and not specifically for rice. While there are opportunities to strengthen farmers' association especially in the irrigation schemes, the biggest challenge lies in the disintegrated nature of marketing where farmers tend to sell more of their produce through brokers.

5.10 Subsector Market Opportunities

- High and increasing shortfall in domestic supply currently estimated at 75-85% of total national requirement which signifies large and unexploited market potential. Even with the unlikely optimistic scenario of GOK production projections under the auspices of National Rice Development Strategy (2008-2018), it is still expected that the country would still

faces deficits in the order of 215,000 MT by 2013 and approximately 30,000 MT by 2029. In addition to the domestic deficits, the country can also take advantage of regional deficits.

- High and rapidly increasing demand for rice in general not only in Kenya, but also within EAC/COMESA and the world over. This is primarily due to changing eating habits and the cost of cooking energy driven by urbanization and population increase. According to MOA, rice consumption in Kenya is increasing at the rate of 12% per annum; yet annual growth rate in production averaged 5-10% during 2004-2008.

- High and increasing demand for aromatic rice. Compared with the bulk of imported rice, a significant proportion of locally produced rice is of high quality (aromatic variety-mainly basmati rice) which is highly preferred by consumers locally, regionally and globally. According to MOA (National Rice Development Strategy; 2008-2018), Kenya has a potential of about 540,000 hectares irrigable rice and 1.0 million hectares for rain-fed for rice production. MOA further indicates that with improved water harvesting and innovative management technologies, the current irrigation potential can be increased to 1.3 million hectares.

- Potential to increase yields from the current national average from the current 3.5 MT per hectare to about 5 MT per hectare currently being achieved with the newly developed NERICA rice variety with appropriate use of fertilizers.

5.11 Recommended Interventions

- Increasing productivity by promoting facilitating the use of high yielding and disease resistant varieties;
- Expansion of area under irrigation through expanded water harnessing initiatives including run-off water catchment;
- Reduction of field and storage level losses;
- Facilitating farmers' access to affordable credit and quality inputs; and,
- Strengthening advisory support through research and extension service providers.

6.0: SORGHUM

Sorghum (Sorghum vulgare) is a hardy crop which grows in semi-arid areas and can grow from sea level to 2500 meters above sea level requiring a minimum rainfall of 250 mm/year and minimum temperatures of 10°C. In Kenya, it grows in all regions but the dominant producers are Nyanza, Rift Valley, Western and Eastern Provinces. Various varieties have been released for various ecological zones from the coast to the coffee zones of Meru.

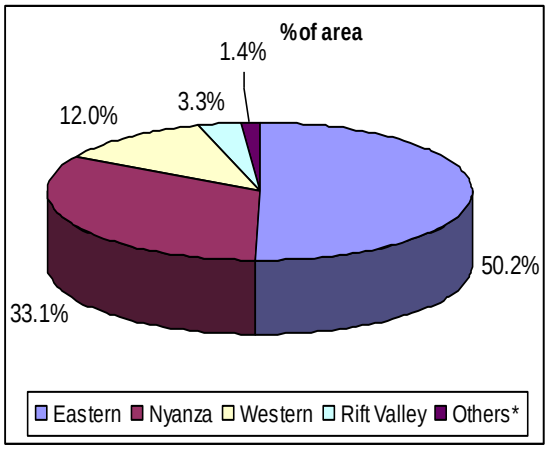
6.1: Sorghum Production

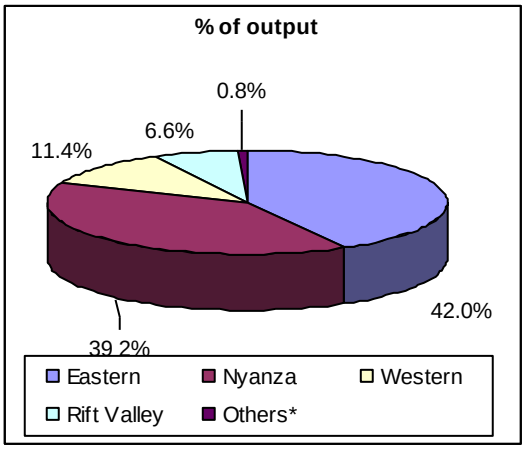
6.1.1: Production Areas

Sorghum is grown in most parts of Kenya but the major producers are Eastern province which accounts for 50.2% of the total area of 104,041 ha, Nyanza for 33.1%, Western for 12%, Rift Valley for 3.3% and the rest for 1.1% of the area as shown in table 6.1.

Table 6.1: Production of Sorghum by Province – 2007

	Eastern	Nyanza	Western	R.Valley	Others*	Total
Crop Area (Ha)	52,240	34,407	12,799	3,414	1,181	104,041
Output (MT)	22,785	21,266	6,181	3,711	319	52,262
Yields (90Kg bag/ha)	5	7	5	12	4	8
% of area	50.2	33.1	12	3.3	1.1	100
% of output	42	39.2	11.4	6.8	0.8	100





Others include Coast (879 ha), Central (205 ha), N. Eastern (97 ha)

Source: MOA – ERA 2009

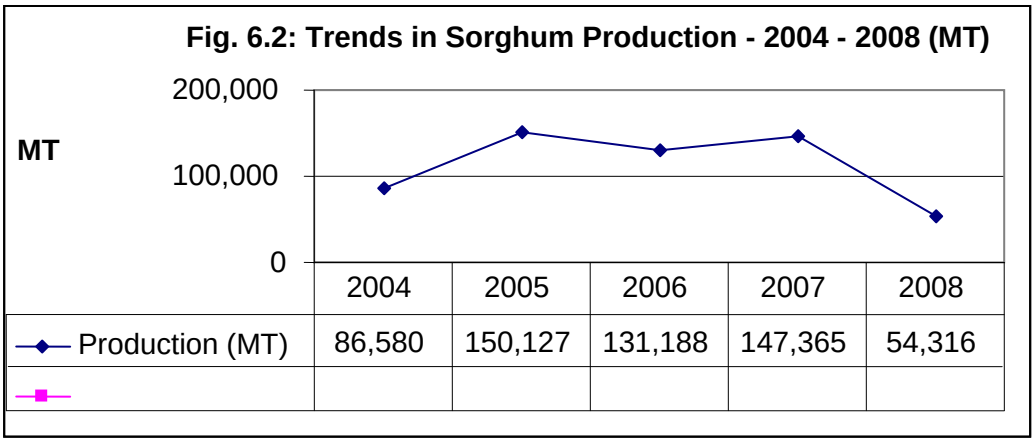
Yields range from 0.0002 bags/ha in Central to 12 bags in North Eastern but average at 8 bags/ha for all provinces. In terms of output, Eastern accounts for 42%, Nyanza for 39.2%, Rift Valley for 6.8%, and Western for 11.4% and the rest for 0.6%. The map for sorghum production area is as shown in Figure 6.1 below.

Figure 6.1: Map of Sorghum Production Areas

6.1.2: Trends in Production of Sorghum

6.1.2.1: Production – 2004 - 2008

Sorghum production was estimated at 123,155 MT in 2004, which increased to a peak of 163,865 MT in 2006 but since then, it has been on the decline as shown in figure 6.2

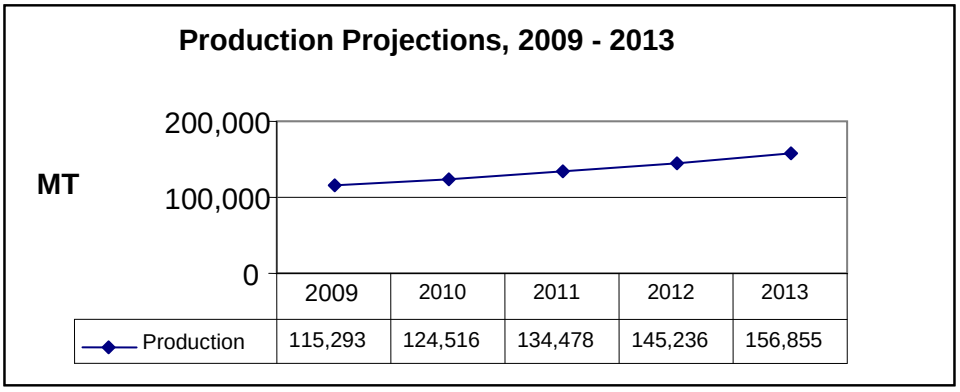


The decline in production has been due to drought and other post-election factors in 2007/08.

7.1.2.2: Projections of Sorghum Production – 2009 – 2013

Analysis of data from 2001 to 2008 shows that annual growth in production between 2001 and the peak production in 2006 was about 12% but since then there has been a decline. Production for 2009 is estimated at 115,293MT. If the rains come, the expected growth rate between 2009 and 2013 is estimated at 8% and the projections are as shown in figure 6.3

Fig. 6.3: Sorghum Production Projections, 2009 - 2013



Although there may be swings in production, the projections show that by 2013, the production will reach 156,855MT which is about 4.5% higher than the 2005 output.

6.2: Consumption of Sorghum

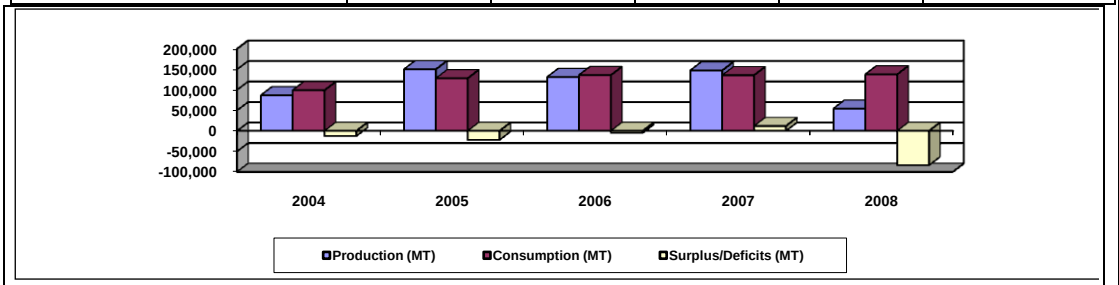
6.2.1: Domestic Consumption and Surpluses/Deficits

According to MOA data (MOA-ERA 2009), consumption of sorghum has increased from 1.1mi bags in 2004 to 1.5 mi bags by 2008. Based on the estimated population, the per capita consumption has increased from 2.6kg/ca to 3.8kg/ca as shown in table 6.2. Kenya is just

broadly self-sufficient in sorghum but in some years, it has to import considerable quantities from surrounding countries.

Table 6.2: Sorghum Consumption, 2004 – 2008

	2004	2005	2006	2007	2008
Production (MTi)	86,580	150,127	131,175	147,365	54,316
Consumption (MT)	99,000	128,250	135,900	135,637	137,800
Population (mi)	34.2	35.1	36.1	37.2	38.3
Per capita (kg)	2.6	3.6	3.8	3.8	4.0
Surpluses (+), deficits (-)	(12,420)	(21,877)	(4,725)	11,728	(83,564)



6.2.2: Intra and Extra –EAC/COMESA Exports and Imports

6.2.2.1: Sorghum Intra-EAC/COMESA Exports and Imports

Kenya's intra-ECA/COMESA exports of sorghum were valued at USD 647,668 for 2004 to 2008. The export countries were Djibouti, Madagascar, Sudan and Uganda. Intra-ECA/COMESA imports were valued at USD 284,470 during the same period respectively. The sources of imports were Uganda and Zambia as shown in table 6.3

Table 6.3: Sorghum Intra-ECA/COMESA Exports and Imports (USD)

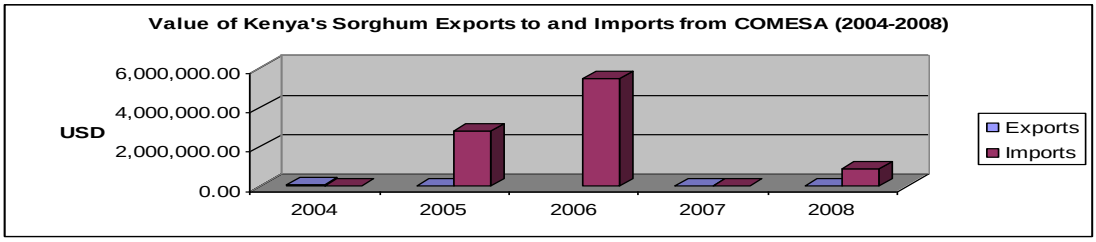
Intra COMESA Exports						
Destination	**2004**	**2005**	**2006**	**2007**	**2008**	**Total**
Djibouti		12,996				12,996
Madagascar					97	97
Sudan	86,065	34,845	18,949	312,525	177,901	630,285
Uganda			2,998	1,292		4,290
Total	**86,065**	**47,841**	**21,947**	**313,817**	**177,998**	**647,668**
Intra COMESA Imports						
Source	**2004**	**2005**	**2006**	**2007**	**2008**	**Total**
Uganda	1,866	34,751		223,976	23,109	283,702
Zambia					768.46	768
Total	**1,866**	**34,751**	**0**	**223,976**	**23,877**	**284,470**
Total Intra COMESA Exports and Imports						

6.2.2.2: Sorghum Extra-EAC/COMESA Exports and Imports

Kenya's extra-EAC/COMESA exports of sorghum are minimal totaling USD 131,747 during 2004 to 2008. Extra ECA/COMESA imports were however comparatively higher totaling to USD 9,241,206 during the same period. Imports rose in 2005 and 2006 but since then, they have been on the decline as shown in table 6.4

Table 6.4: Sorghum Extra-ECA/COMESA Exports and Imports (USD)

	2004	2005	2006	2007	2008
Exports	73,241.07	1,553		33,944	23,009.13
Imports	26,618	2,819,183	5,475,558	16,929.50	902,918



6.2.2.3: Kenya's Intra-EAC/COMESA Exports and Imports

Data on quantities of exports were available only for 2008. The intra and extra-EAC/COMESA imports for sorghum are as shown in table 6.5.

Table 6.5: Intra EAC/COMESA Imports and Exports of Sorghum

Imports (MT 2008)		**Exports (MT) 2008**	
Source	**MT**	**Destination**	**MT**
Zambia	1	Madagascar	0.098
Tanzania	2,940	Sudan	232.2
Uganda	360		

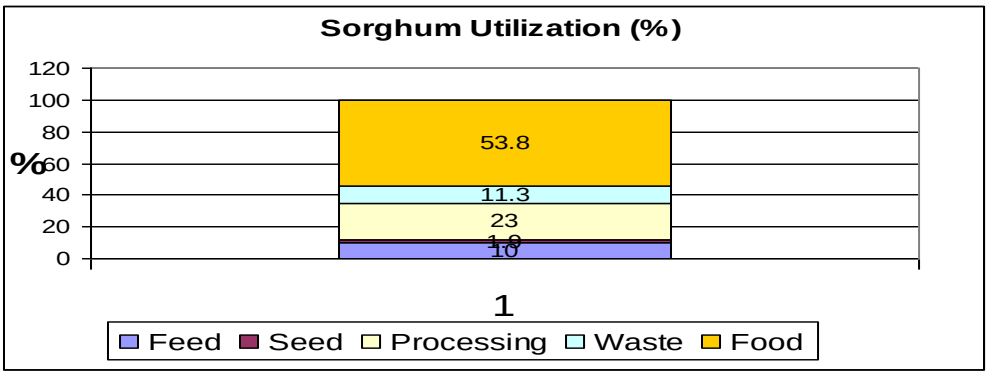
The major source of imports was Tanzania accounting for 89% of all imports while the main export destination was Sudan.

6.3: Value Chain Mapping

6.3.1: Commodity Utilization

Sorghum utilization is based on feed, seed, processing, waste and as food (both grain and flour). Based on the estimated domestic supply of 160,000MT (Econ. Survey, 2007), fed accounts for 10% (15,000MT), seed for 1.9% (3,000MT), processing for 23% (37,000MT), waste for 11.3% (18,000MT) and food for 53.6% (86,000MT). The utilization is shown in Fig. 6.4 below:

Fig. 6.4: Utilization of Sorghum (%) – 2005



Source: Econ. Survey 2007 – FBS 2005

The per capita consumption from the above analysis is 2.5 kg/ca based on population of 34.5mi.

6.3.2: Stakeholders and Functional Matrix

6.3.2.1: Research, Seed Multiplication and Distribution

The KARI Seed Unit at Katumani was started in 1997. For sorghum, it produced four varieties (KARI Mtama 1, Seredo, Serena and Gadam). Seed sales of these improved varieties rose from 6,382MT in 1997 to 30,543MT by 2003 under the USAID funded Agri-business Development Support Project (ADSP). KARI has used various channels to multiply and distribute seeds. These included contracted farmers for multiplication, drought recovery and relief programmes, Agricultural Technology and Information Response Initiative (ATIRI), MOA, IFAD – Eastern province seed bulking project, DANIDA projects in Makueni and Kitui, NGOs (Winrock International in Western and Eastern Kenya, World Vision in Makueni, German Agro Action (GAA) in Makueni) and church organizations. Improved sorghum seed reached 15,974 farmers during the period. The recommendations for various agro-ecological zones are shown in table 6.6

Table 6.6: Production Zones and Recommended Sorghum Varieties

Eco-Zone and Area	Variety	Maturity Months	Grain Colour	Yields potential (Bags/acre)
Moist-mid-Altitude Busia, Siaya, Kakamega, Kisumu, Homabay, Kuria, Migori, Coffee zones of Meru, Embu and Nyeri Districts.	Serena Serodo KARI/ MTAMA	3 3.5 3 – 3.5	Brown Brown Brown	12 12 15
Semi-Arid Low Lands Machakos, Kitui, Makueni, Mwingi, Lower Embu and Tharaka Nithi, Kajiado, Parts of R. Valley, parts of North Eastern Provinces.	1576 KARI/ MTAMA	3 3 – 3.5	White Brown	10 15
Cold Semi-Arid Highlands Nakuru, Baringo, Laikipia, Naivasha, Narok, Parts of Koibatek, Taita Taveta.	E 1291 E 6518	7 8	Brown Brown	12 15
Humid Coast Lamu, Kilifi, Taita Taveta, Kwale, Mombasa	Serena Serodo	3 – 3.5	Brown Brown	12 12

It is noted that six varieties are available with maturity periods varying from 3 months to 8 months and yields ranging from 12 – 15 bags/acre (29.6 – 37 bags/ha or 2.7MT – 3.3 MT/ha). However, as most farmers do not use recommended varieties and farming practices, yields have averaged at just one tonne implying that there is potential for considerable improvement.

6.3.2.2: Information Dissemination Agencies

The government extension service in each district is responsible for information dissemination. KARI has also introduced the Agricultural Technology and Information Response Initiative (ATIRI) for dissemination of research technologies to community based organizations (CBOs) especially involved in seed bulking.

6.3.2.3: Farmers in Sorghum production

The estimated holding under sorghum averages at 0.65ha/hh in major sorghum areas. In 2007, about 155,550 ha were under sorghum indicating about 239,308 growers. These farmers produced about 150,000MT of which 3,500MT was consumed on-farm, 18000MT went to waste (although this will include waste in trading as well), 16,000MT was used as animal feed and 3,000MT as seed and the rest 110,000MT was traded.

6.3.2.4: Middlemen and Small Traders

Middlemen bulk sorghum from local markets and transport to wholesalers. In major growing districts, there may be 50 traders per district giving about 5,000 middlemen possibly dealing with 22MT per year each.

6.3.2.5: Wholesalers

Countrywide, there are about 1,400 wholesalers of all types, (6,320 general, 260 food/drink and general about 803). Wholesalers dealing with agricultural produce are about 413. Wholesalers sell to retailers, grain millers and some export. In Nyamakima and Gikomba markets, there are about 150 wholesalers/retailers.

6.3.2.6: Processing/Milling

There are 162 grain milling companies with over 50 employees. Unga is the main miller. The large mills produce flour and by-products which go to the animal feeds industry. Flour is marketed through retailers. Sorghum is milled in small hammer mills at Gikomba.

6.3.2.7: Retailers

Retailers are found in both rural and urban areas. It is estimated that there are over 3,600 retailers countrywide (529 food and drink, and 3,107 general retailers). These include shops, supermarkets and kiosks which sell to consumers and institutions.

6.3.2.8: Consumers

There are about 6mi households in Kenya with a capita consumption of 2.45 kg/ca/pa who consume 86,000MT of sorghum products.

6.3.2.9: Animal Feeds

Kenya has 40 animal feeds manufacturers producing over 800,000MT. Although sorghum is not a major ingredient, it is estimated that 16,000MT is utilized in animal feeds on-farm and for manufacturing. Milling by-products from large mills also enters the feeds industry.

6.3.2.10: Export and Import Trade

Kenya is not a major player but 3,800MT of sorghum are imported and 1,000MT exported.

Functional Matrix - Sorghum

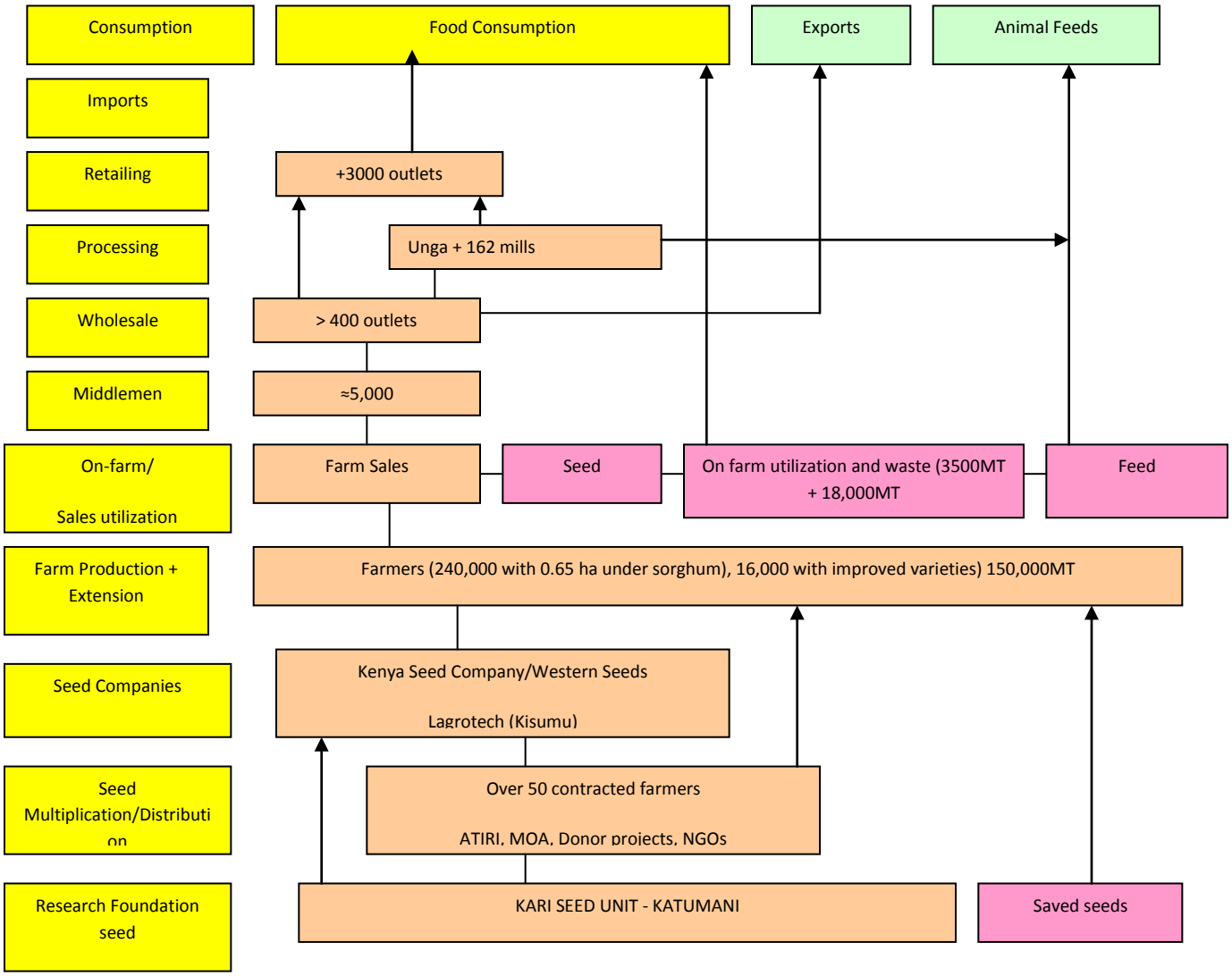
Functions	**Participants/Actors**					**Support Markets**
	Domestic/Export – Import Market Channels					
	Input Suppliers	Farmers	Traders	Processors	Wholesalers	Support Services: Financial Services, SPS/Standards Certification, etc.
Wholesale, Retail, Exporting, Importing						
Processing						
Trading						
Collecting, Bulking, Storage						
Production						
Input Supply						

6.3.3: Sorghum Value Chain

6.3.3.1: Value Chain Map

The sorghum value chain starts with research, seed multiplication and distribution, production, trade channels, home brewing, processing (milling) and finally to final consumers to be consumed as 'porridge' and 'ugali' as shown in figure 6.5.

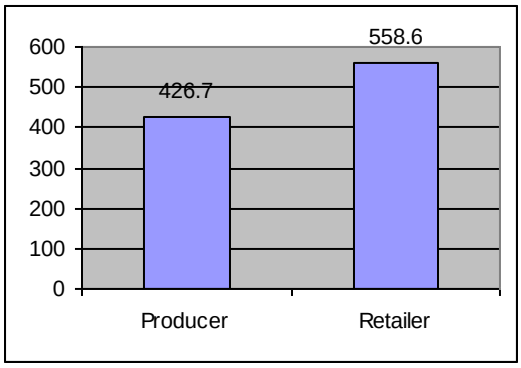
Fig. 6.5: Sorghum Value Chain

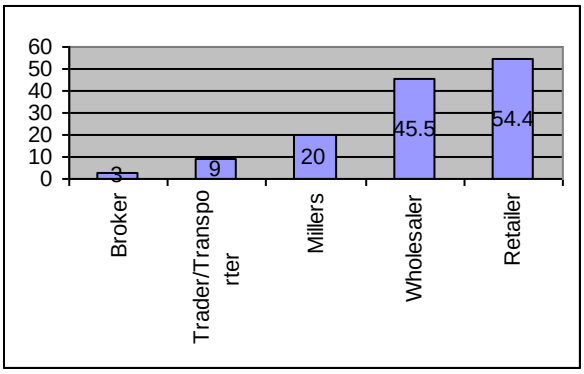


6.3.3.2: Value Addition

Based on produce price of USD 426.7/MT and retail price of USD 558.6/MT, the difference of USD 131.9/MT is shared between marketing costs and margins. The broker realizes USD 3/MT,

trader USD9/MT, millers USD20/MT, wholesaler USD45.5/MT and the retailer USD 54.4/MT. The rest goes to marketing costs as shown below.





6.4: Constraints and Opportunities

6.4.1: End Market Analysis

6.4.1.1: End Market Users of Sorghum

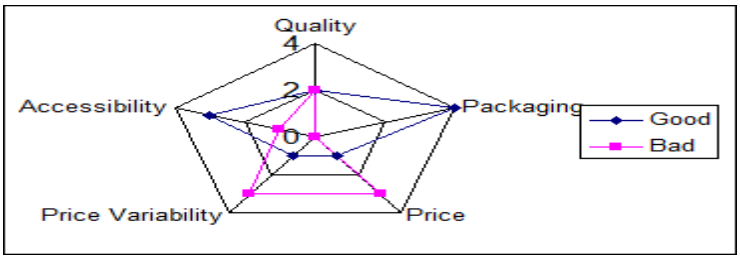
Sorghum is mostly ground at home or in rural hammer millers to sorghum flour for making thin porridge and thick porridge (ugali). Some sorghum is also mixed with cassava and cassava flour to enrich the flour especially in urban areas. Sorghum is also milled in big mills and packaged for sale in large-scale outlets. The end use is shown below:

End Market Use and Users of the Product - Sorghum

The form of the product at the end market	Users (e.g. millers, households)	Volume of National Requirement in Metric Tons per year	End Market Price in July 2009 in US$ per Metric Ton	Source of the Product		
				Domestic Market	**Imports**	
					Intra regional (i.e. from EAC/COMESA)%	Extra regional (i.e. outside EAC/COMESA)
Flour		137,894 Mt	USD 518	38%	4%	58%
Animal Feeds		16,000 Mt				

6.4.1.2: Consumer Preferences

In terms of preferences, consumers cited price, price variability and quality as areas of concern. Packaging and accessibility were considered adequate. The consumer preferences for sorghum flour are as shown in the spider diagram below:



6.4.1.3: Current and Potential Market Opportunities

Sorghum flour is in great demand and it appears the future sorghum is there. With proper packaging as in the case of maize, the market can be expanded to larger retail outlets and even export.

6.4.2 Vertical Integration

The sorghum value chain is loosely linked and there seems to be no formal linkage from producers to consumers. Of the seven traders selling sorghum, millet and cassava flour, the following was observed:

- 28.5% were wholesalers only
- 43% had vertical linkages as wholesalers and retailers
- 28.5% were retailers.

It was also observed that the wholesalers/wholesalers – retailers (71%) also owned hammer mills and were linked as wholesaler – miller (28.5%) or wholesaler – miller – retailer (43%).

6.4.3: Horizontal Integration

Sorghum trading from production to retail is undertaken by individuals who are not organized into any groups. There were some indications that traders at Nyamakima and Gikomba would like to be organized into a group which would lobby for their rights especially with City Council.

6.4.4: Support Market and Services

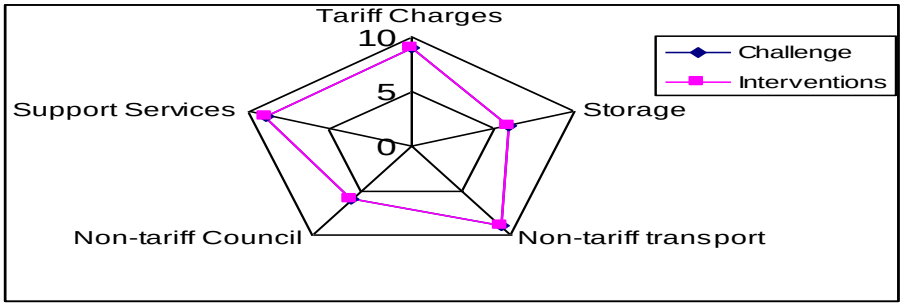
The traders in both markets indicated the following:

- The market infrastructure (storage, sales area, loading/unloading facilities) are inadequate and there is need for a larger staple foods market.
- They do not receive information from any source although some were aware that MOA and KACE collect information.

- There is no organized access to trading credit and individual access credit through their own means (personal savings and banks).

6.4.5: Overall Constraints and Interventions

The traders were concerned about high council cess, harassment by council, bribes during transport, inadequate market facilities especially storage and lack of services like information and credit as shown below:



7.0: MILLET

7.1 Millet Production

Kenya mostly produces the finger millet (Eleusine coracana) which grows from sea level to 2400 masl and grows well in free draining soils with well distributed rainfall. The major growing areas are Eastern (52% of total), Nyanza (19%), Rift valley (15%), Western (13%) and the rest (1%). Millet is grown from saved or purchased improved seeds at 3 – 5 kg/ha and takes 3 – 4 months to mature. The main diseases are blast, smuts, Ergot, head bugs while pests include birds, shoot fly and stalk borers. Yields range between 1.5 – 2.2MT/ha but yields have averaged at 600kg/MT between 2001 – 2007 showing the great potential if improved practices are used. Output has averaged at 68,973MT during the same period.

7.1.1 Production Areas

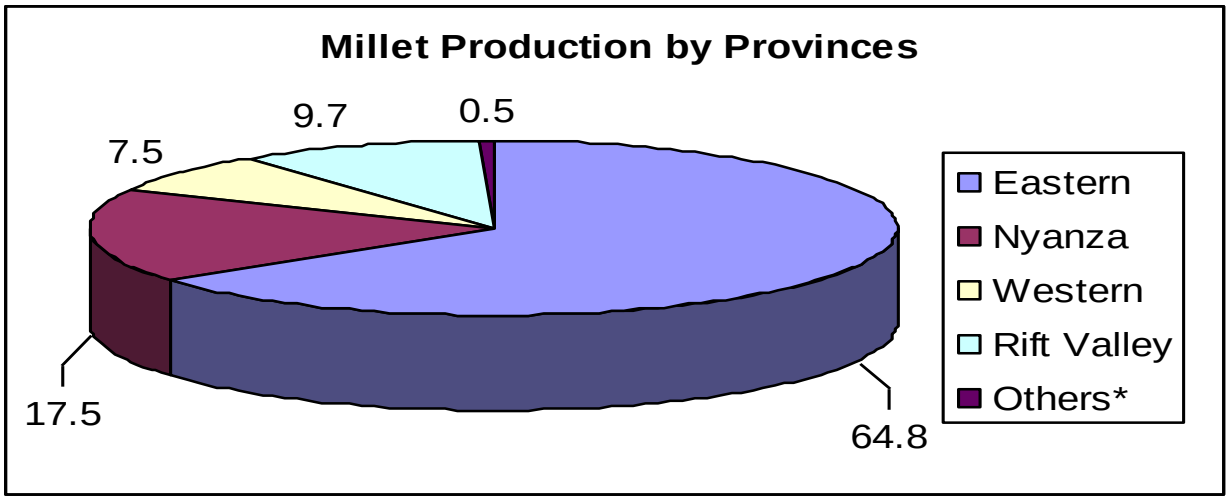
In 2008, about 53,155 were under millet production. The main production provinces were Eastern (64%), Nyanza (17.5%), Rift Valley (9.7%), Western (7.5%) and others (0.5%) as shown in Table 7.1

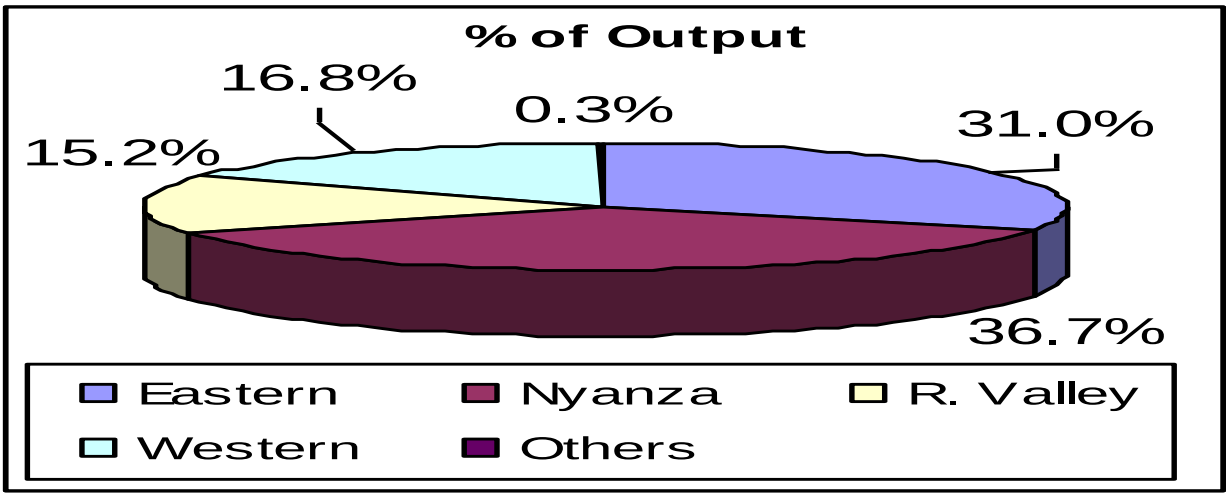
It is noted that yields range from 4 bags/ha in Eastern to a high of 18 bags/ha in Western and averaging at 13 bags/ha. In terms of output Eastern accounts for 31%, Nyanza 36.7%, Rift Valley for 15.2%, Western 16.8% despite its low acreage, and others for 0.3%. The production area map is shown in Fig. 7.1

Figure 7.1: Map of Millet Production Areas

Table 7.1: Millet Production by Provinces

	Eastern	Nyanza	R. Valley	Western	Others	Total
Crop area (ha)	34,426	9,315	5,141	3,983	290	53,155
Output (MT)	11,931	14,092	5,839	6,443	118	38,423
Yields (bags/ha)	4	17	13	18	5	13
% of Area	64	17.5	9.7	7.5	0.5	100
% of Output	31	36.7	15.2	16.8	0.3	100



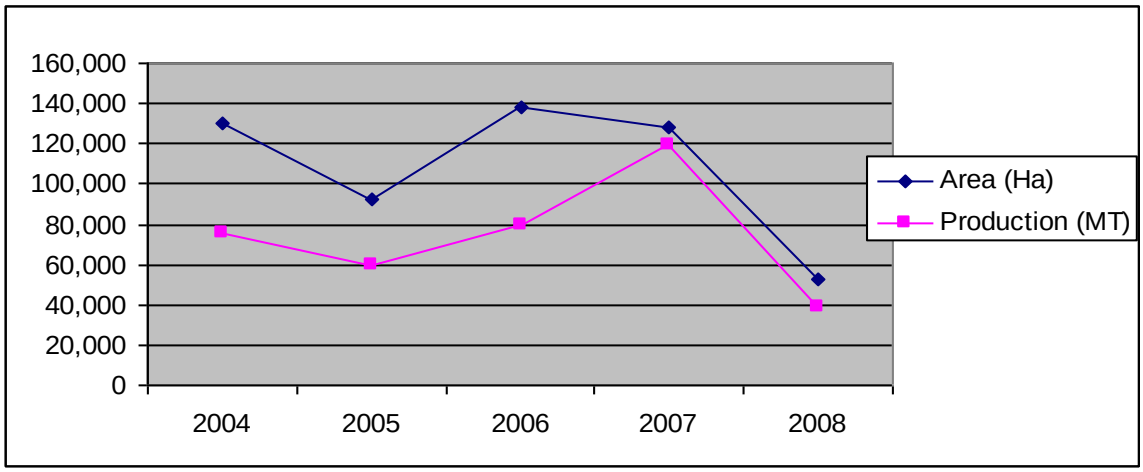


7.1.1.2: Production Trend 2004 -2008

Overall, millet production was estimated at 75,176MT in 2004 but declined in 2005 to 59,481MT and then increased to 119,601MT in 2007 but in 2008 it declined to 38,462MT. Average area under millet during the period was 108,232 ha while the average output was 74,384MT, implying about 8 bags/ha as shown in table 7.2.

Table 7.2: Area and Production Trends, 2004 – 2008

	2004	2005	2006	2007	2008	Average
MT	75,171	59,481	79,207	119,599	38,462	74,384
Ha	129,750	92,430	137,711	128,114	53,155	108,232



Source: MOA-ERA 2009

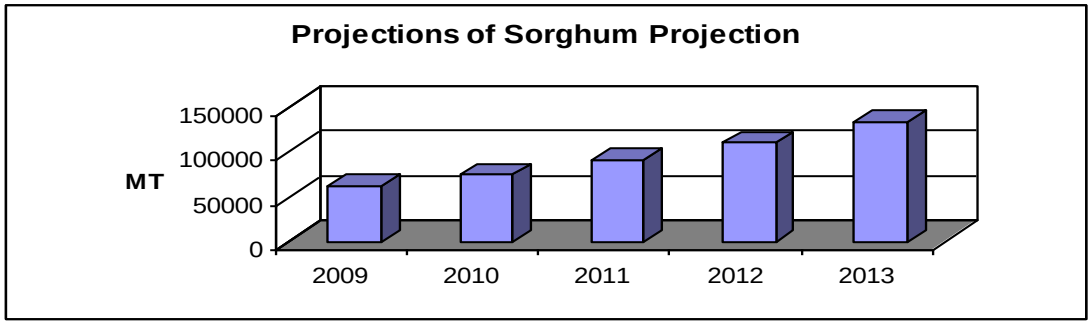
The trend in production seems to be influenced by area planted which seems to rise and fall in alternate years.

7.1.1.3: Projections of Millet Production – 2009 – 2013

The MOA (Food Security Report, 2009) estimates the 2009 production at 60,939Mt which is an increase of 58% over 2008 output but which is 82% of average output of 74,384MT and which is only 51% of peak output during 2004 to 2008. The overall growth rate between 2004 and 2008 was 30% p.a. and there were wide fluctuations during the period. In projections to 2013, it is assumed that the objective is to reach the peak production of 119,599 MT which is an increase of 96% over the 2009 output or a growth rate of 21.5% per year as shown in table 7.3

Table 7.3: Projections of Millet Production 2009 – 2013

2009	2010	2011	2012	2013	Average
60939	74041	89960	109301	132801	93408



The projections aim at achieving previous peak output in 2013. However, depending on the weather, area planted, use of improved technologies and improved farm practices, the output can be achieved earlier. The average production during the period is projected at 93,408MT which is 26% above the 2004 to 2008 average.

7.2: Millet Consumption

7.2.1: Consumption of Millet and Deficits/Surpluses

Kenya imports an average 2000 MT/year to augment its production. Exports are only in some years. The consumption is shown in Table 7.4

Table 7.4: Consumption of Millet and Surpluses and Deficits

Year	2004	2005	2006	2007	2008
Production (MT)	75,171	59,481	79,207	119,601	53,165
Net Imports (MT)	2,065	3,578	65	254	2,000
Consumption	77,236	63,059	79,272	119,853	55,165
Population (mi)	34.2	35.1	36.1	37.2	38.3
Per capita (Kg/ca)	2.25	1.8	2.2	3.2	1.4
Surplus/Deficit (MT)	(2,065)	(3,578)	(65)	(252)	(2,000)

Source: MOA-ERA, 2009

Consumption ranges from 1.4kg/ca to 3.2kg/ca and averages at 2.2kg/ca which is about a half of sorghum consumption.net imports show that Kenya is not sufficient in millet and offers a potential market from neighbouring countries. It experiences deficits ranging form 65 – 3,578MT averaging at 1,592MT.

7.2.2: Export and Import Trends

7.2.2.1: Intra-EAC/COMESA Exports and Imports

The total value of intra-EAC/COMESA exports was USD 71,766 and exports were to Eritrea and Sudan. Total value of imports was USD 7.812 million with 99% coming from Uganda and the rest from Zambia as shown in table 7.5

Table 7.5: INTRA EAC/ COMESA MILLET EXPORTS (USD)

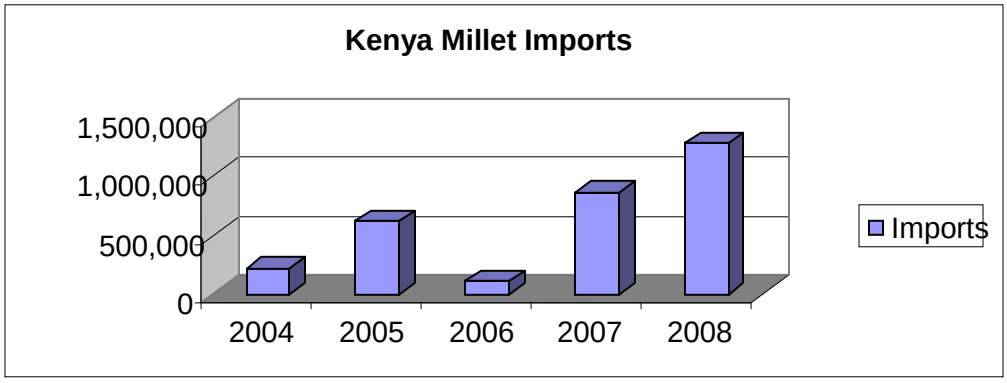
Destination	2004	2005	2006	2007	2008	Total
Eritrea		71,026.30				71026.3
Sudan	92.91	62.83	207.52	376.63		739.89
Exports	**92.91**	**71089**	**208**	**377**	**0**	**71766**
Intra COMESA Imports						
Source	**2004**	**2005**	**2006**	**2007**	**2008**	**Total**
Uganda	47,474.74	15,511.31	207.72	6,346,535	1,395,144	7,804,873
Zambia	4,330.29				2,809.76	7,140
Imports	**51,805**	**15,511**	**208**	**6,346,535**	**1,397,954**	**7,812,013**
Total Intra COMESA Exports and Imports						
	2004	**2005**	**2006**	**2007**	**2008**	**Total**
Exports	92.91	71089	207.52	376.63	0	71,766.19

7.2.2.2: Extra/EAC/COMESA Millet Imports and Exports

Figures were only available for extra/EAC/COMESA imports and shows that Kenya imports millet valued at USD1.3 million in 2008 from outside EAC/COMESA as shown in table 7.6

Table 7.6: Extra/EAC/COMESA Millet Imports (USD)

	2004	2005	2006	2007	2008
Imports	215,158	620,379	108,989	870,220	1,290,480



As Kenya is not self-sufficient in millet, it does not export millet outside EAC/COMESA.

8.2.2.3: Intra EAC/COMESA Exports and Imports (MT)

In 2008, Kenya did not export any millet but imported millet from Zambia, Uganda and Tanzania as shown in table 7.7

Table 7.7: Intra EAC/COMESA Imports of Millet

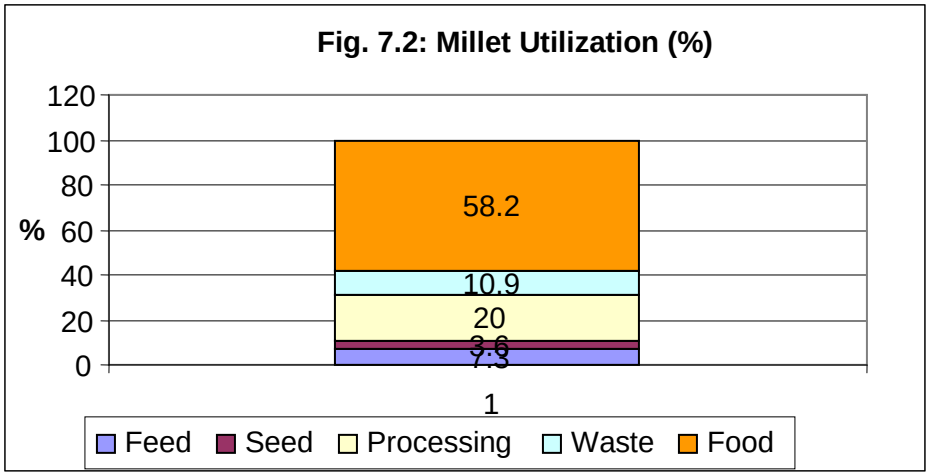
Source	**MT**
Zambia	10.8
Tanzania	5,042
Uganda	5,430
TOTAL	**10,580**

Out of the imports of 10,580MT, Uganda accounted for 51.3%, Tanzania for 47.7% and Zambia for 1%.

7.3: Value Chain Mapping

7.3.1: Commodity Utilization Analysis

Total domestic supply was estimated at 55,000MT of which 2,000MT was imported (Econ. Survey 2007). Feed accounted for 7.3% (4,000MT), seed for 3.6% (2,000MT), processing for 20% (11,000MT), waste for 10.9% (6,000MT) and food for 58.2% (32,000MT) as shown in Fig.7.2 below:



Source: Econ. Survey 2007 – FBS 2005

The per capita consumption is low at 0.9kg/ca based on population of 34.5mi.

7.3.2: Actors in the Value Chain

The stakeholders in the millet value chain are similar to those for sorghum.

7.3.2.1: Research

KARI is the major researcher on millet at its Katumani and Lanet stations and it is involved in variety maintenance, breeder, pre-basic and basic seed production. The Lanet station produces Lanet/FM – 1 for cold semi-arid highlands. Other smaller firms like Lagrotech (Kisumu) and Western seeds (Kakamega) are also involved in a small way. The released varieties and recommended areas are shown in Annex Table M1.

7.3.2.2: Seed Multiplication

KARI-KSU contracts farmers to multiply seeds and has trained over 40 farmers who produce seed under supervision of Kenya Plant Health Inspectorate Services. Seed is bought by KSU for distribution.

7.3.2.3: Seed Distribution

The farmer gets improved seeds through seed companies (Kenya Seed, Lagrotech, Western Seeds, etc) who distribute through agrovet stores (about 15,000 in the country). Other distributors include government drought relief programmes, donor projects (IFAD, DANIDA), NGOs (Winrock International, World Vision, German Agro Action, Adventist Development and Relief Agency (ADRA), Faith Based Organizations (FBOS), etc.

7.3.2.4: Information Dissemination Agencies

The government extension service in each district is responsible for information dissemination. KARI also introduced the Agricultural Technology and Information Response Initiative (ATIRI) for dissemination of research technologies to community based organizations (CBOs) especially involved in seed bulking.

7.3.2.5: Farmers in Millet Production

The estimated holding under millet averages at 0.65ha/hh in major millet areas. In 2007, about 127,114 ha were under millet indicating about 195,560 growers. These farmers produced 119,601MT of millet. Based on figures for the 2005 food balance sheet, 7.2% is used as feed (8,600MT), seed 3.6% (4,300MT), waste at 11% (13,156MT), processing 20% (23,920MT) and food 58.3% (69,726 MT). Per capita consumption is estimated at 1kg/ca and this translates to 1,173MT consumed by growers.

7.3.2.6: Middlemen and Small Traders

Middlemen bulk millet from local markets and transport to wholesalers. In major growing districts, there may be 50 traders per district with an estimated number of middlemen at about 5,000 possibly dealing with 22MT per year.

7.3.2.7: Wholesalers

Countrywide, there are about 1,400 wholesalers of all types, (6,320 general, 260 food/drink and general about 803). Wholesalers dealing with agricultural produce are about 413. Wholesalers sell to retailers, grain millers and some export.

7.3.2.8: Processing/Milling

There are 162 grain milling companies with over 50 employees. Unga is the main miller. The large mills produce flour and by-products which go to the animal feeds industry. Flour is marketed through retailers. Millet is mostly milled in hammer mills.

7.3.2.9: Retailers

Retailers are found in both rural and urban areas. It is estimated that there are over 3,600 retailers countrywide (529 food and drink, and 3,107 general retailers). These include shops, supermarkets and kiosks which sell to consumers and institutions.

7.3.2.10: Consumers

Consumption has averaged at 2.2kg per capita but due to high production in 2007, the per capita production was high at 2.5kg/cap as in sorghum.

7.3.2.11: Animal Feeds

Kenya has 40 animal feeds manufacturers producing over 800,000MT. Although millet is not a major ingredient, it is estimated that 8,600MT is utilized in animal feeds on-farm and for manufacturing. Milling by-products also enter the industry.

7.3.2.12: Exporters and Importers

Between 2000 and 2006, Kenya only imported 2136MT of millet flour between 2000 and 2002. However, Kenya imported millet in all years averaging at 1,560MT. In the case of exports, Kenya also exported 975MT between 2000 and 2002. Millet exports were only 962MT between 2003 and 2005.

Functions	Participants/Actors					Support Markets
	Domestic/Export – Import Market Channels					
	Input Suppliers	Farmers	Traders	Processors	Wholesalers	Support Services: Financial Services, SPS/Standards Certification, etc.
Wholesale, Retail, Exporting, Importing						
Processing						
Trading						
Collecting, Bulking, Storage						
Production						
Input Supply						

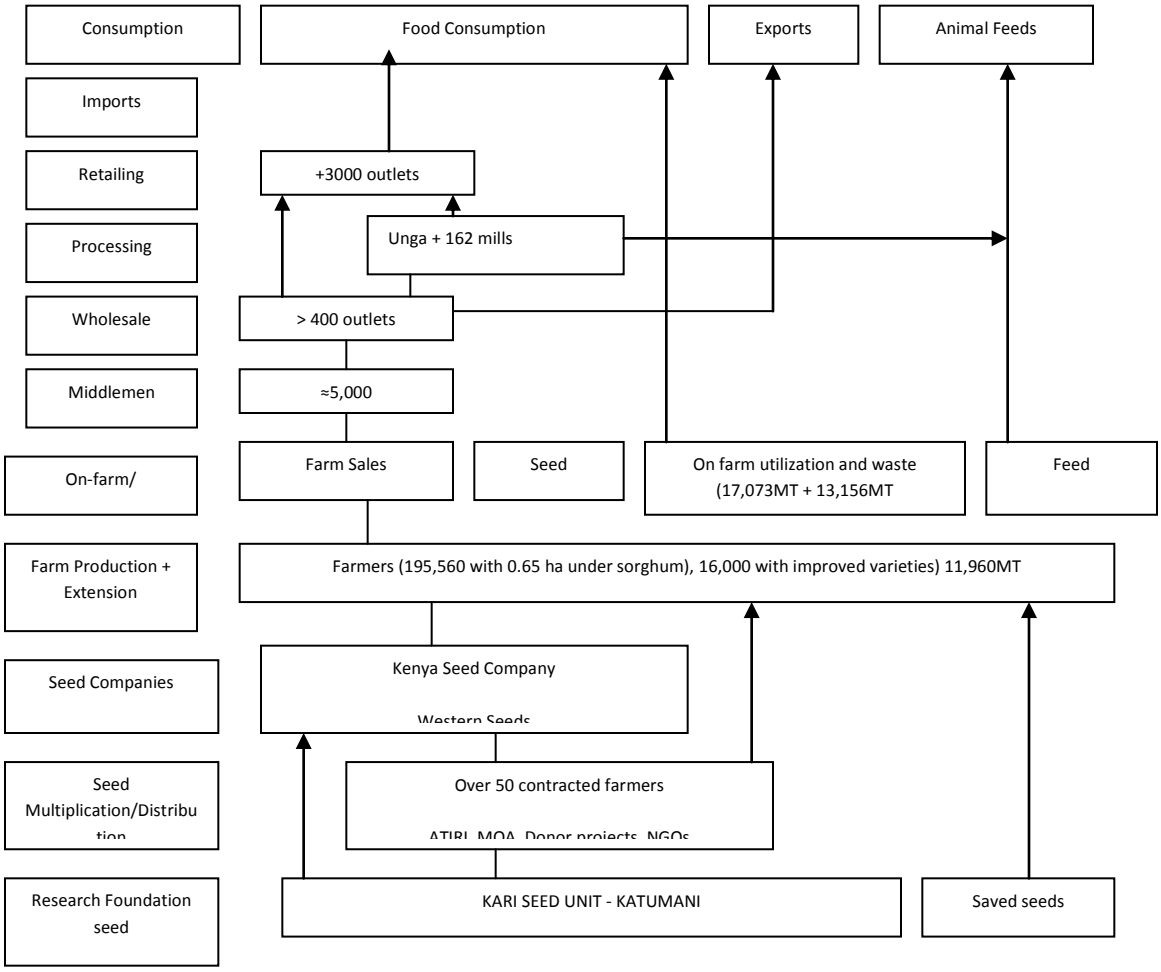
Functional Matrix - Millet

7.3.3: Millet Value Chain

7.3.3.1: Value Chain Map

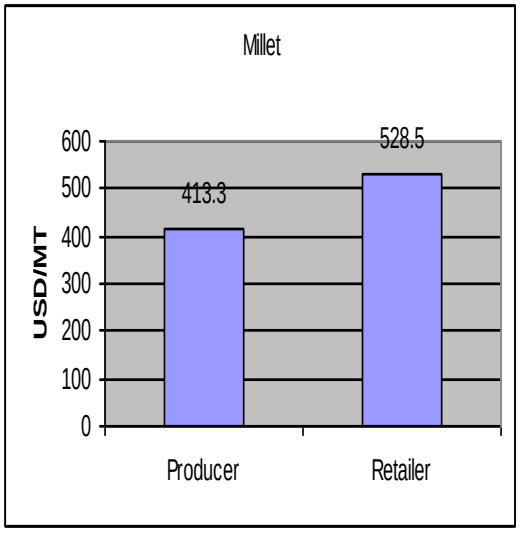
The millet value chain is similar to that of sorghum as they are grown in the same areas and grain traders deal with the two grains. The value chain is shown in figure 7.3.

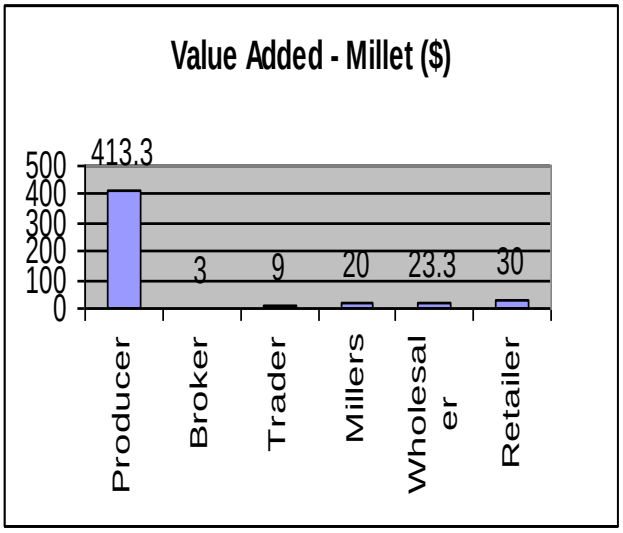
Fig. 7.3: Millet Value Chain



7.3.3.2: Value Addition

From the producer price of USD413.2/MT and the retail price of USD528.5/MT, the difference of USD115.2/MT is utilized by various categories. Brokers get a margin of USD3/MT, traders USD9/MT, millers USD 20/MT, wholesalers USD 23.3/MT and retailers USD 30/MT and the rest goes to marketing and related costs.





7.4: Constraints and Opportunities

7.4.1: End Market Analysis

7.4.1.1: End Market Users of Millet

As in the case of sorghum, millet is ground at home or in rural hammer mills to produce millet flour for porridge and 'ugali'. It is also mixed with sorghum and cassava flour. The end use is shown below:

End Market Use and Users of the Product - Millet

The form of the product at the end market	Users (e.g. millers, households)	Volume of National Requirement in Metric Tons per year	End Market Price in July 2009 in US$ per Metric Ton	Source of the Product		
				Domestic Market	**Imports**	
					Intra regional (i.e. from EAC/COMESA)%	Extra regional (i.e. outside EAC/COMESA)
Flour		38,462	USD 488	80%	20%	-

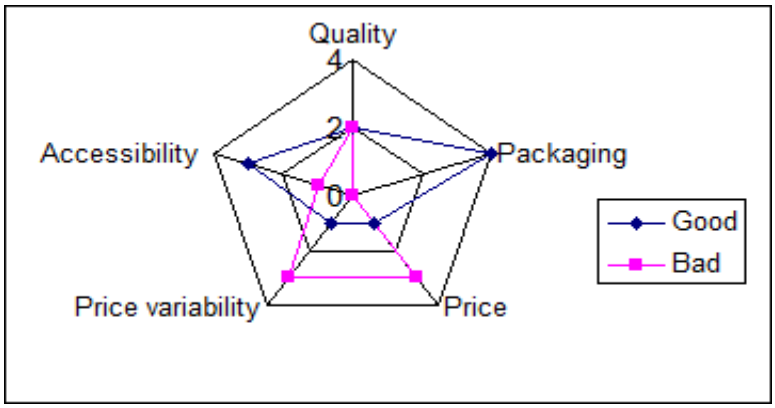
7.4.1.2: Consumer Preference

As in the case of sorghum, price and price variability and quality were of concern while packaging and accessibility were not a major problem.

The end use preference for millet flour is close to that of sorghum as shown in the spider diagram below:

MILLET
Concerns

	Good	Bad
Quality	2	2
Packaging	4	0
Price	1	3
Price variability	1	3
Accessibility	3	1



7.4.1.3: Current and Potential Market Opportunities

As in the case of sorghum, there is a market for millet flour and this market can be expanded by improving packaging for sale in supermarkets.

7.4.2 Vertical Integration

As discussed under sorghum, the millet value chain is loosely linked but some forms of vertical linkages occur as follows:

- Traders trading in sorghum, millet and cassava flours
  - 28.5% were wholesalers only
  - 43% had vertical linkages as wholesalers and retailers
  - 28.5% were retailers.

It was also observed that the wholesalers/wholesalers – retailers (71%) also owned hammer mills and were linked as wholesaler – miller (28.5%) or wholesaler – miller – retailer (43%).

- Traders dealing in sorghum and millet in Gikomba. These are mostly retailers with sales of 7 – 10 bags per month. It was observed as follows for five traders interviewed:
  - One was a wholesaler – miller in sorghum and millet
  - Four were retailers in sorghum and millet

7.4.3: Horizontal Linkages

Millet trading from production to retail is undertaken by individuals who are not organized into any groups. There were some indications that traders at Nyamakima and Gikomba would like to be organized into a group which would lobby for their rights especially with City Council.

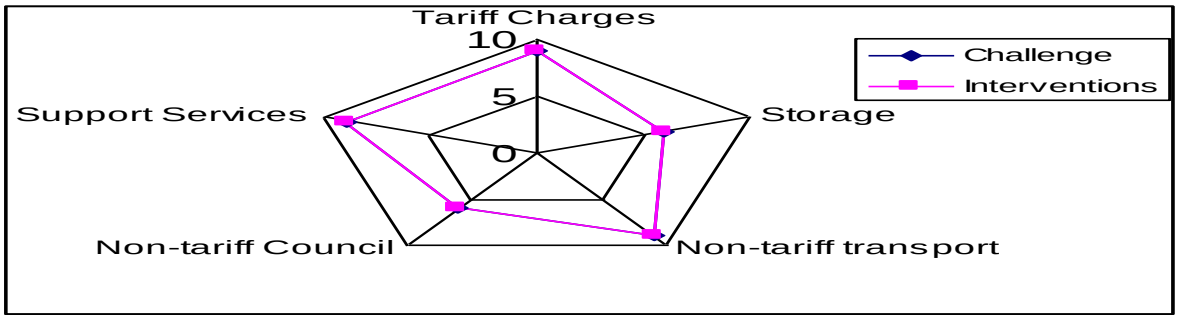
7.4.4: Support Market and Services

The traders in both markets indicated the following:

- The market infrastructure (storage, sales area, loading/unloading facilities) are inadequate and there is need for a larger staple foods market.
- They do not receive information from any source although some were aware that MOA and KACE collect information.
- There is no organized access to trading credit and individual access credit through their own means (personal savings and banks).

7.4.5: Overall Constraints and Interventions

Overall constraints were similar to sorghum as traders deal with both commodities. County cess, county harassment and bribes during transport were considered most serious. Availability of services like credit and information were cited by traders. The issue of storage is acute and all traders called for a new dry food market.



8.0 BEANS

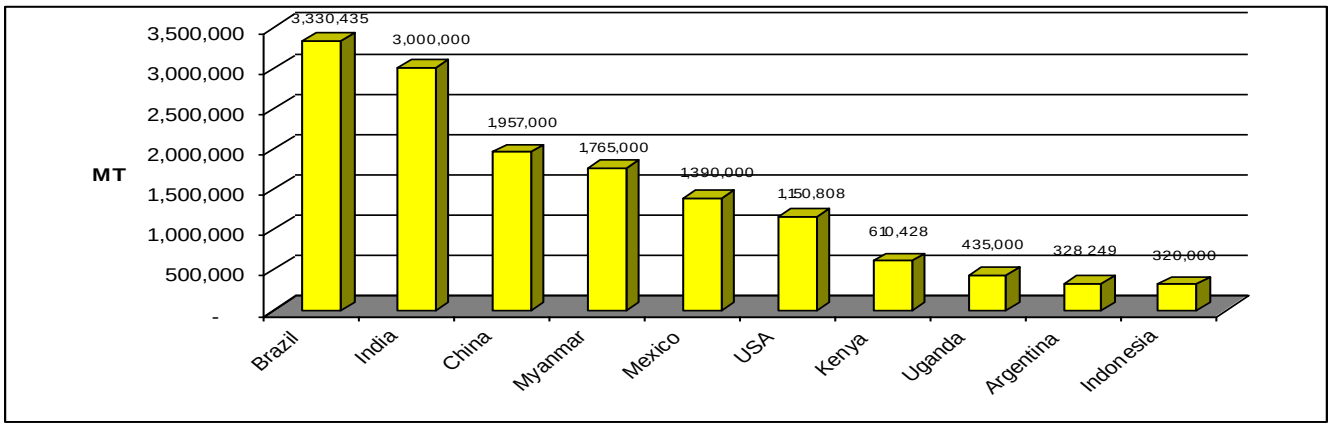
8.1 Global Perspective

8.1.1 Production

Dry beans otherwise referred to as common bean (Phaseolus vulgaris L.) is one of the most widely cultivated legumes in the world. The commodity is the second most important source of human dietary protein and the third most important source of calories for over 100 million people in rural and poor urban communities in Africa. Its protein is cheaper than the animal-based protein, making it highly competitive and important in dietary regimes of poor people in Africa. Many plant parts are cooked -- leaves, green pods, green seed -- but dry grain is the most important product. Per capita consumption of bean is highest in Africa, reaching 55 kg per year in Rwanda and 66 kg per year in western Kenya. Consumer preferences for seed types, color, shape, and brilliance or seed coat luster of dry bean vary greatly even within a country. However, many consumers also place value on sweet taste and fast cooking attributes, and varieties that excel in these respects sometimes obtain higher prices than those having the most attractive seed appearance. The two main environments are the cool highlands of East and Central African countries (including Kenya, Uganda, Tanzania, Rwanda and Burundi) and the warmer mid-elevation areas of DR Congo, Ethiopia, and several countries of Southern Africa. Production tends to be more intensive where human population density is high, although a significant proportion of production occurs in areas of moderately low populations. Sole crop, maize-bean, banana-beans and root or tuber crop-bean intercrops are important among the many bean cropping systems in Africa and for which the crop's rapid maturity and shade tolerance make it particularly suitable. Production is primarily by smallholder farmers, and especially by women (bean is commonly referred to as a woman's crop), traditionally for home consumption and now increasingly for income generation. Often, women and men often have different aims in producing the crop, and therefore seek varieties having different sets of characteristics (Rockefeller Foundation).

Total world production of dry beans was estimated at 19.2 million MT in 2008. As indicated in the figure below, the top ten world producers are Brazil (17%), India (16%), China (10%), Myanmar (9%), Mexico (7%), USA (6%), Kenya (3%), Uganda (2%), Argentina (2%) and Indonesia (2%). The common bean Phaseolus vulgaris is a major staple food crop in Africa with about 4 million hectares being sown every year. In a continent where over 30% of households live below the poverty line (World Bank, 2006), beans are valued as one of the cheapest sources of protein for vulnerable sections of the population, particularly the poor. In 2005, 72% of sub-Saharan Africa bean output was produced by Burundi, Ethiopia, Kenya, Rwanda, Tanzania and Uganda (FAO, 2005) as shown in Fig. 8.1 below.

Fig 8.1: Top Ten World Producers of Beans



8.1.2 Consumption

About 85% of dry beans output are consumed in countries where they are produced, with India, Brazil, Mexico, USA and China being the largest consumers. The top five exporting countries are Myanmar, USA, China, Argentina and Canada, while the top five importing countries include Brazil, Mexico, Japan, United Kingdom and the Netherlands.

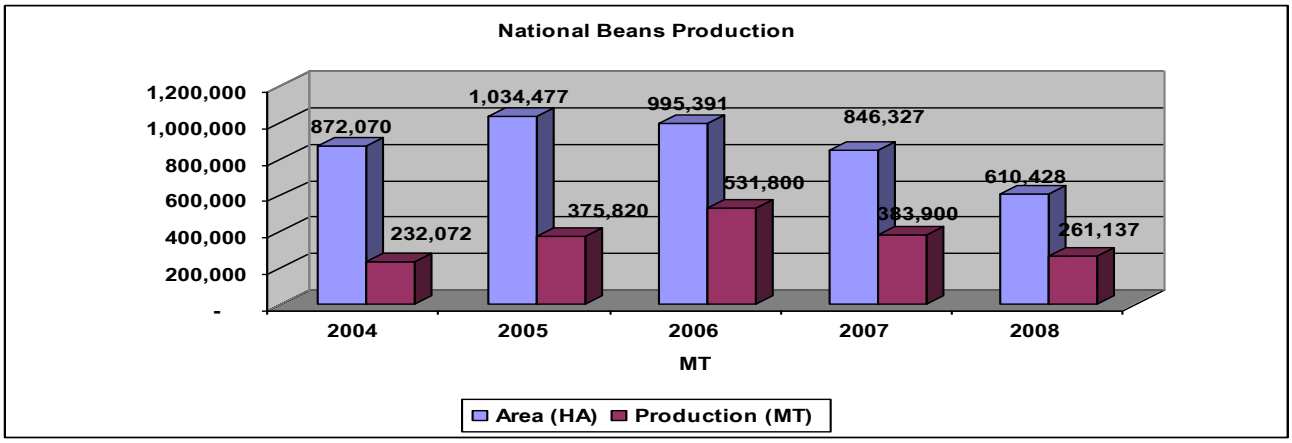
8.1.2.1 Domestic Production versus Consumption

Kenya is the 7th largest world producer of common beans. The commodity is among the most important staple crops in the country, with critical relevance to national food security. It is one of the most popular sources of protein for many Kenyans, mainly the poor who cannot afford to buy meat (Annual Report for the Year 2007, Ministry of Agriculture; 2007). As indicated in the table below, national production of beans between 2004 and 2008 increased at an estimated compound growth rate of 3% per annum. From about 232,000 MT in 2004, the country's production grew at a compound growth rate of about 51% per annum to reach approximately 532,000 MT in 2006. However growth in production over the last two years has somewhat declined mainly due to dry climatic conditions with production in 2008 being approximately 260,000 MT. With production systems being rain fed, production has tended to fluctuate widely but from available data, it appears yields increases (from about 0.3 MT per hectare in 2004 to between 0.4 and 0.5 MT between 2007 and 2008) rather than area expansion has been the more dominant factor underlying production increases as shown in Table 8.1.

Table 8.1: Beans Production and Consumption (2004-2008)

Year	**2004**	**2005**	**2006**	**2007**	**2008**	CGR
Area (HA)	872,070	1,034,477	995,391	846,327	610,428	-9%
Production (MT)	232,072	375,820	531,800	383,900	261,137	3%

Yields/HA		0.3	0.4	0.5	0.5	0.4	13%
Retail Price-Kshs/Kgs		33	28	28	49	50	11%
Consumption (MT)		310,000	400,450	460,000	524,400	624,036	19%
Value	Billion Kshs	7.73	10.44	18.02	16.29	13.10	14%
	Million US$	103.1	139.2	240.3	217.2	174.7	

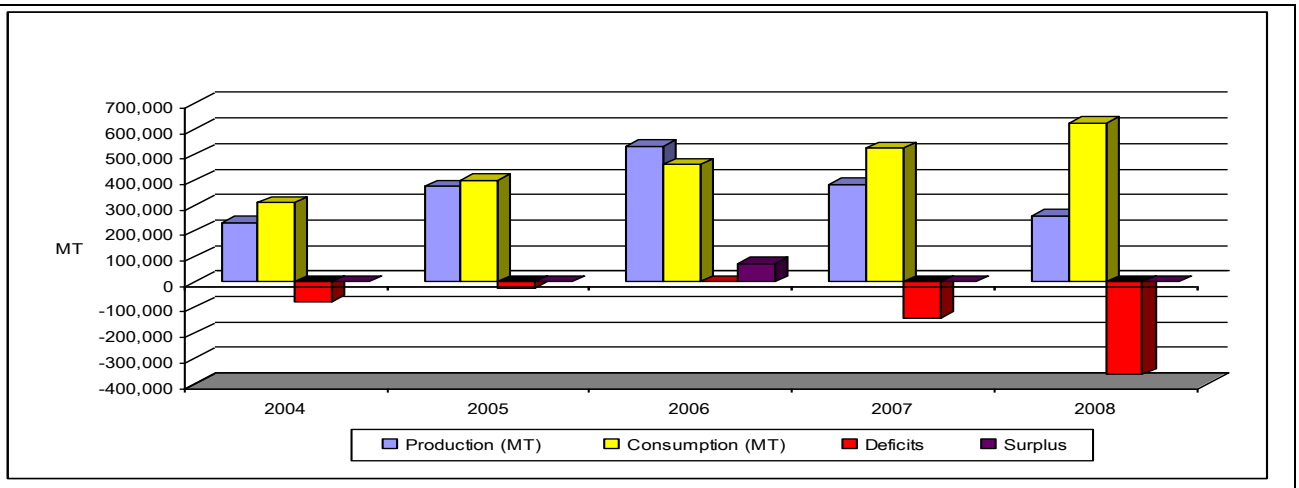


Source: Based on data contained in the Economic Review of Agriculture; 2009 (MOA)

While production has fluctuated widely over the last five years, consumption has continued to increase steadily at a compound growth rate of approximately 19% per annum. Consequently, it has become increasingly common for Kenya to import beans as domestic demand overwhelms production. The country has been consuming approximately 464,000 MT over the last five years against annual domestic production averaging about 357,000 MT from an average of about 872,000 hectares, thereby resulting in average deficits of over 107,000 MT annually. The country imports the deficit mainly from Uganda, Tanzania and Central Africa. As indicated in table 8.2 below, Kenya has experienced deficits in beans production in all the years since 2004, except in 2006 when the country generated surpluses estimated at 16% of total national annual consumption.

Table 8.2: Beans Production and Consumption in Kenya

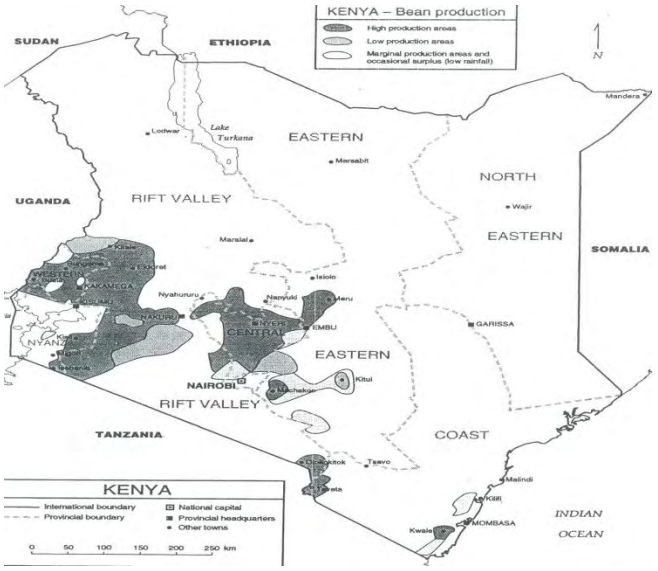
Year	**2004**	**2005**	**2006**	**2007**	**2008**
Production (MT)	232,072	375,820	531,800	383,900	261,137
Consumption (MT)	310,000	400,450	460,000	524,400	624,036
Surplus/(Deficits)	-77,928	-24,630	71,800	-140,500	-362,899



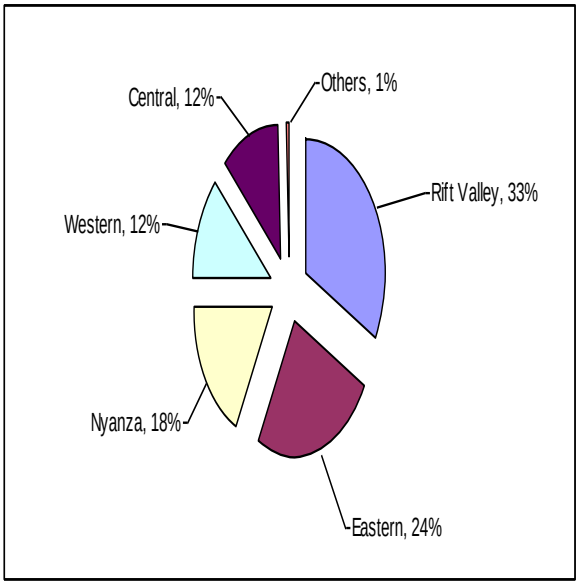
Source: Based on data contained in the Economic Review of Agriculture; 2009 (MOA)

As indicated in figure 8.2 below, the main producing areas for dry beans (based on 2007 data) include Rift Valley (33%), Eastern (24%) and Nyanza (18%), Western (12%) and Central (12%).

Fig 8.2: Main Beans Producing Areas in Kenya



Source: Dry Beans Subsector in Kenya: A Rapid Appraisal with Emphasis on Market Information Needs and Extension Issues, A.Ouedraogo et al (1994)



Source: Annual Report for the Year 2007 (MOA)

8.2 Intra-EAC/COMESA Beans Exports and Imports

Kenya is a net importer of beans despite being the seventh largest producer in the world. The country is however well placed because it is close to Uganda-an important world producer which sometimes generates exportable surpluses most of which ends up in Kenya. The country's total value of beans imports for the period 2004-2008 amounted to about US$ 5.3 million, while the total value of exports for was estimated at US$ 624,000 over the same period (see table 8.3 below). Thus the country imported about 10 times what it exported. On the one hand, Ethiopia has been the main source of imports accounting for about 92% of total cumulative value of imports of beans during the period 2004-2008, while Sudan been the main export destination. While Kenya's annual value of intra EAC/COMESA exports of beans increased 19% per annum (CGR) between 2004 and 2008, the annual value of imports increased at 68% per annum (CGR) over the same period.

Table 8.3: Kenya's Intra EAC/COMESA Beans Exports and Imports

EXPORTS						
Destination		**2004**	**2005**	**2006**	**2007**	**2008**
Congo DRC	US$	-	-	-	-	870
	MT	N/A	N/A	N/A	N/A	0.67
Eritrea	US$	-	643	-	-	-
	MT	N/A	N/A	N/A	N/A	N/A
Madagascar	US$	N/A	814			12,042
	MT	N/A	N/A	N/A	N/A	1.55
Uganda	US$	-	-	-	-	-
	MT	N/A	N/A	N/A	N/A	15..00
Rwanda	US$	-	-	-	244	-
	MT	N/A	N/A	N/A	N/A	N/A
Sudan	US$	18,221	19,581	496,364	45,091	23,780
	MT	N/A	N/A	N/A	N/A	42.33
Zimbabwe	US$	-	-	2,910	3,493	-
	MT	N/A	N/A	N/A	N/A	N/A
Total Exports	**US$**	**18,221**	**21,038**	**499,274**	**48,828**	**36,692**
	MT	**N/A**	**N/A**	**N/A**	**N/A**	**59.55**
IMPORTS						
Source		**2004**	**2005**	**2006**	**2007**	**2008**
Ethiopia	US$	236,941	555,454	1,215,789	1,381,720	1,448,861
	MT	N/A	N/A	N/A	N/A	14,188.2
Uganda	US$	-	754	-	388,034	451,868
	MT	N/A	N/A	N/A	N/A	2,070.00
Tanzania	US$	N/A	N/A	N/A	N/A	N/A
	MT	N/A	N/A	N/A	N/A	1,989.98
Total Imports	US$	**236,941**	**556,208**	**793,149**	**1,769,754**	**1,900,729**
	MT	N/A	N/A	N/A	N/A	**18,248.18**

Source: EAC/COMESA Secretariat and KRA						

8.3 Extra-EAC/COMESA Import and Export of Beans

By comparing the table above and the table below (which are both based on KRA formal trade data) indicate that Kenya's value of extra EAC/COMESA imports and exports of beans have been significantly higher that intra EAC/COMESA imports and exports. During the period 2004-2008, the value of Kenya's extra EAC/COMESA imports of beans had a cumulative total of US$ 7.4 million or about 59% of both total intra and extra EAC/COMESA imports combined which amounted to US$ 12.7 million. At the same time, the country's extra EAC/COMESA export of beans had a cumulative value of about US$ 1.25 million or about 67% of intra and extra EAC/COMESA exports of beans combined which amounted to about US 1.88 million over the same period. However regional food trade observers believe that the volume of intra-EAC/COMESA imports and exports captured by KRA officials is probably 5-10% of the actual primarily because much of the trade occurs informally through the porous borders.

Table 8.4: Extra EAC/COMESA Import and Export of Beans

Flow	2004	2005	2006	2007	2008
Extra EAC/COMESA Imports (US$)	1,898,512	1,463,854	62,877	1,452,860	2,561,072
Extra EAC/COMESA Exports (US$)	4,162	100,494	16,236	32,571	1,102,587

Source: EAC/COMESA Secretariat and KRA

8.4 Value Chain Mapping

The main functions in the beans value chain include production by smallholder farmers; assembling by agents/brokers; and transportation by traders in the own-transport vehicles and also by independent transport owners; wholesaling and retailing by traders in rural and urban markets. The following sections characterize the subsector in terms of these functions and the relevant actors and their transactional relationships, as well as overlays or volume flows through the various channels.

8.4.1 Research and Development

Past national research initiatives did not accord high priority to the beans sector compared to other food commodities such as maize and wheat. Partly as result of this, bean yields have been on the decline in the last decade due to pests, diseases and low soil fertility However, in recent years, key research organizations including KARI and local universities have now accorded the

subsector high priority and have been coming up with high yield bean varieties that are well adapted to both local conditions and effects of land pressure. In particular, KARI has included pulses among the 7 priority enterprises in the food sector. Collaborative effort between these actors has resulted in the development of pests and disease resistant and high yielding bean varieties such as KK 15, KK 08 and KK 22. The biggest problem however lies in lack of effectiveness in terms of dissemination of information and technology and consequently low adoption among producers. In recognition of this fact, one KARI researcher commented as follows:

> *"Quality bean varieties so far developed can yield between 1,500 and 2,500 kilograms of beans per hectare. However, most poor farmers in Kenya do not have access to good bean seeds, and produce only 400 kilograms per hectare. That means millions of poor farming families are losing between 70 to 85%*

In addition to KARI, local universities and NGOs, beans subsector research has also been receiving support from to local research institutions, the subsector has also been receiving support from the Eastern and Central Africa Bean Research Network (ECABREN)-a network of bean researchers and their partners in 9 countries, affiliated to the Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA).

8.4.2 Inputs Supply

The main inputs in beans production in Kenya include labour (mainly family labour) and seeds (mostly retention from household harvest). Beans producers usually make little or no use of modern inputs such as fertilizers and agro-chemicals to control pests and diseases despite the evidence that use of these inputs has a beneficial effect in terms of increase weight of the grain and therefore better market prices (Ouedraogo I; 1994). The use of purchased modern inputs including fertilizer and other chemicals is limited, despite the fact that the commodity is increasingly being grown for commercial purposes. Most farmers either use own-generated beans as seed or buy from local markets. Smallholder farmers use improved seeds only when there is government or donor interventions in terms of drought recovery programs. Seed Companies in Kenya consider production of beans seed as risky business, given the fact that the crop is a self-fertilized, open-pollinated crop. Unlike hybrid maize seeds, which farmers buy every season if they have to maintain high yields, the self-pollinated bean seeds may be retained by farmers with no significant yields differential compared to certified seeds. After a good harvest, farmers retain enough seed supply for the following season, while after a poor harvest; they will be short of seed supply and for the next planting season and will either purchase seeds from local markets (supplies from other regions) or receive government/donor supplies depending on the severity of shortages.

8.4.3 Production

Production of dry or common beans is wholly undertaken by smallholder farmers. The crop is generally intercropped with maize, but also with other crops such as sugar cane and coffee. Cultivation occurs in most areas where smallholder maize farming is also undertaken. Although it was mainly produced as a subsistence crop in the past, it is now an important source of income for most smallholder farmers in Kenya. According to KARI, approximately 1.8 million households are involved in the production of pulses in general. However, the number of households involved in growing common beans is not known, but subsector observers estimate that they comprise about 85% of the total number of farmers involved in the production of pulses in general which implies about 1.5 million households countrywide. Several varieties of beans are produced in Kenya, but the most commonly produced due to their higher adaptability to wide range of ecological conditions, yields performance and consumer preference include Rosecoco, Mwitemania, Wairimu, Mwezi Moja, and Nyayo[22].

Both beans cultivated area and production increased by approximately 4% per annum between 1963 and 2008, with planted area rising from a mere 52,000 to 610,000 hectares. Over the same period production increased from about 64,000 MT to 532,000 MT (valued at US$ 240 million) in 2006; but declining to about 260,000 MT (valued at about US$ 174 million) in 2008-primarily due to poor climatic conditions. Of the total production, farmers retain about 60% for home consumption, while the balance 40% is sold in the local market-mainly to local households and traders, as well as regional traders. Over the period 1963 and 2008, yields performance have been dismal having increased by a mere 0.05% per annum and declining to negative 1% during the period 2004-2008 (MOA and KIPPRA; The Kenya Agricultural Sector Data Compendium, Volume II; Crop Production; December 2007). Although the farming calendar has continued to be destabilized by the changing climatic patterns occasioned by the global warming effect, Kenya's beans production calendar is indicated below. Most regions grow beans during both the short rains (Sep/Dec) and the long rains period (Feb/June).

Region	Jan	Feb	March	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Eastern												
Central												
Western												
Nyanza												
Rift Valley												
Ouedraogo I; et al (1994)												

[22] *Ouedraogo I; Kere P; Osore J; and Matheka F- Dry Beans Subsector in Kenya: A Rapid Appraisal with Emphasis on Market Information Needs and Extension Issues; January 1994).*

8.4.4 Assembling

About 40% of total annual production of beans is marketed, with the balance 60% being retained for household consumption. Consolidation of produce is undertaken by several types of assemblers; farm gate agents/brokers who are either farmers who have accumulated some little business capital or resident small-scale traders; or regional agents/traders who are often non-residents. Resident farm gate assemblers visit farms often at harvest time and buy beans often in cash although they may get it on credit whenever adequate trust has been built between the buyer and the seller. These assemblers, who are often handle relatively smaller volumes (1-3 bags), may include some local farmers who have accumulated a little capital. Once they buy, they transport the produce using buses or matatus to local urban centers to sell to regional traders. The non-resident assemblers are often medium level traders (handling 10 bags per business trip) often purchasing directly from farmers or from the farm gate assemblers and transporting by one-ton pick-ups to the local market centers to sell to regional traders or their agents. The large traders (handling over 10 bags per trip) often buy directly or through their agents from a variety of sources including small-scale farm gate local resident assemblers or medium level non-resident local traders. They often buy on cash-basis (with no supply contract arrangements) and transport the produce to local market centers for further consolidation after which they transport to larger urban centers using trucks of 5-10 bags. Nyakima in Nairobi is a major market destination for many of the wholesale traders. All categories of assemblers often comprise individual traders operating as family businesses. Very often, most of these players are more active during the harvesting season than the off-peak period. Because of limitations in operating capital, most women tend to be in the small to medium-sized category of traders, while men dominate the large assemblers' category.

8.4.5 Wholesaling

Beans wholesalers can be defined as traders who deal (buy and sell) exclusively in bags as the minimum transaction volume. Wholesaling is undertaken by these types of traders as individual business entities or even institutional such as NCPB. They operate at several levels of the value chain; at the rural assembling level; regional level (long distance assembler/wholesaler) and at consumer level. Full-time wholesaling of beans is a rare phenomenon as well-capitalized traders operate exclusively as bean wholesalers when the market is active and beans move quickly, that is mainly during harvest time. During the off-peak season, these actors either combine wholesaling with retailing or go out of beans business altogether. Only those who have secured institutional contracts (NCPB, armed forces, schools, hospitals etc) often remain as wholesalers throughout the season.

8.4.6 Retailing

Retailing of beans is often undertaken by small local traders at market centers in open market places and cereal shops, as well as regional traders who buy local traders/brokers and to some

extent farmers. However, mixed retailing and wholesaling is the norm for most of the bean traders whether in small rural urban centers or in larger urban centers including Nairobi, Mombasa, Kisumu and Nakuru among others.

8.4.7 Summary of Functions Matrix

The table below provides a summary of the key subsector functions and actors as well as support market services. As will be noted, some of the key players in the subsector, especially farmers, agents/traders and wholesalers play multiple roles.

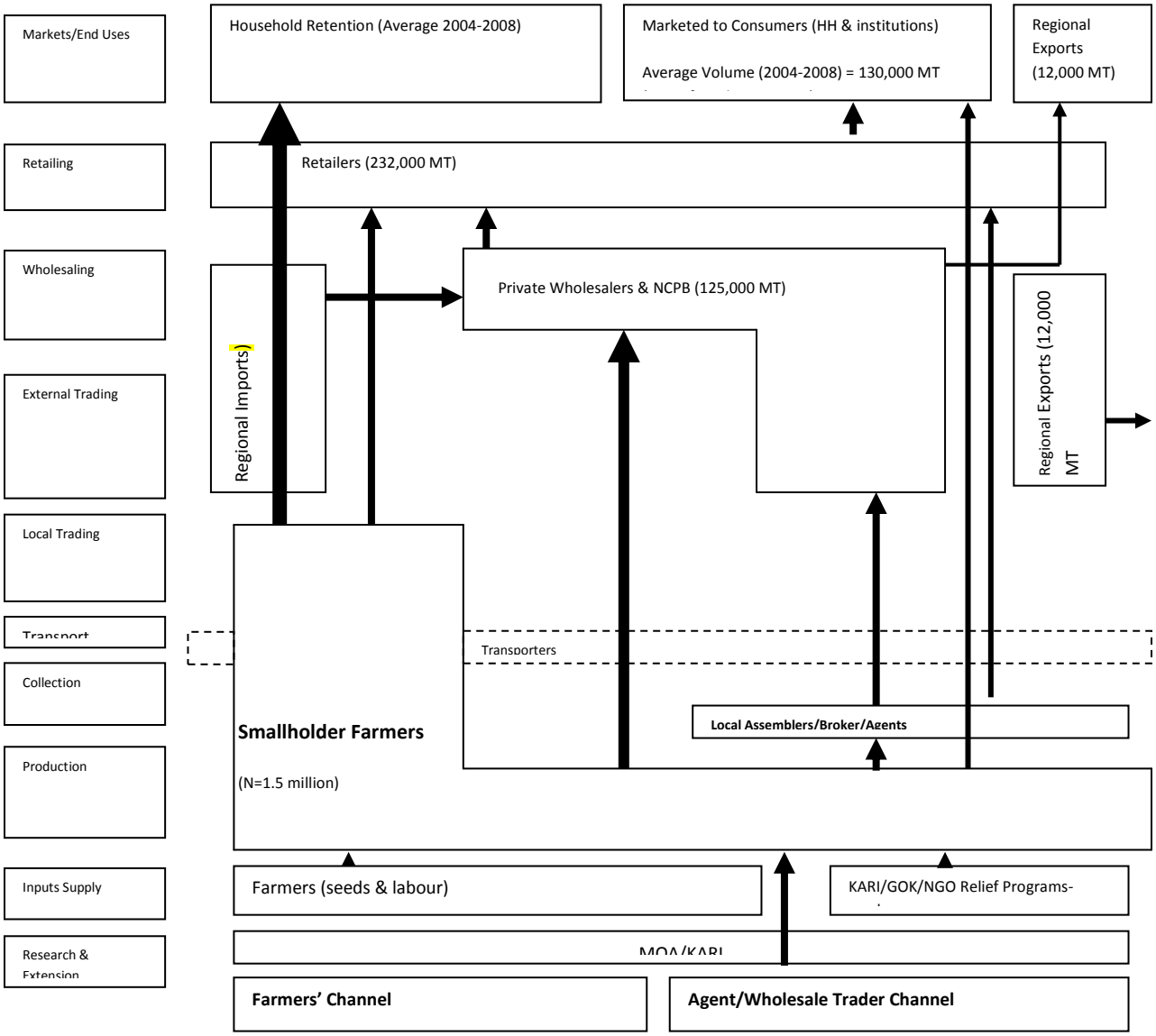
Functions / **Actors**	**Participants/Actors in the Beans Subsector**					**Support Markets (Type of Services Provided)**
	Input suppliers	**Farmers**	**Trader / Brokers**	**Wholesalers**	**Retailers**	
Retail						• Limited support market services with financing mainly being provided from family sources and small merry go-round groups of women
Wholesale						•
Exporting						• SPS/Standards Certification services by KEPHIS;
Importing						
Domestic Trading						• Domestic market price information by EAGC & KACE daily
Collecting, Bulking, Storage						• Limited local Government market facilities (und
Production						• Very limited or no financial services • General extension services by MOA
Input Supply						• Limited sources of hybrid seeds
Research and Commodity Development						• Undertaken by KARI /with complementary support from ECABREN and other organizations

8.4.8 Sub-Sector Map

Figure 8.3 below depicts the overall beans subsector map, showing the various functions, actors and volume flows through the two main marketing channels; namely farmers and agents/wholesale trader channels. As indicated, bean producers have many marketing channels. During harvest time, traders are willing to venture into villages to assemble beans at the farm

gate. Later, with dwindling supplies, and thus increased transactions and unit costs, such farm gate operations are no longer profitable and bean producers with marketable surpluses must take their produce to local market centers. Some farmers, mainly older women (35-45 years of age) are also intermediaries, traders' agents or small-scale independent assemblers.

Figure 8.3: Beans Subsector Map

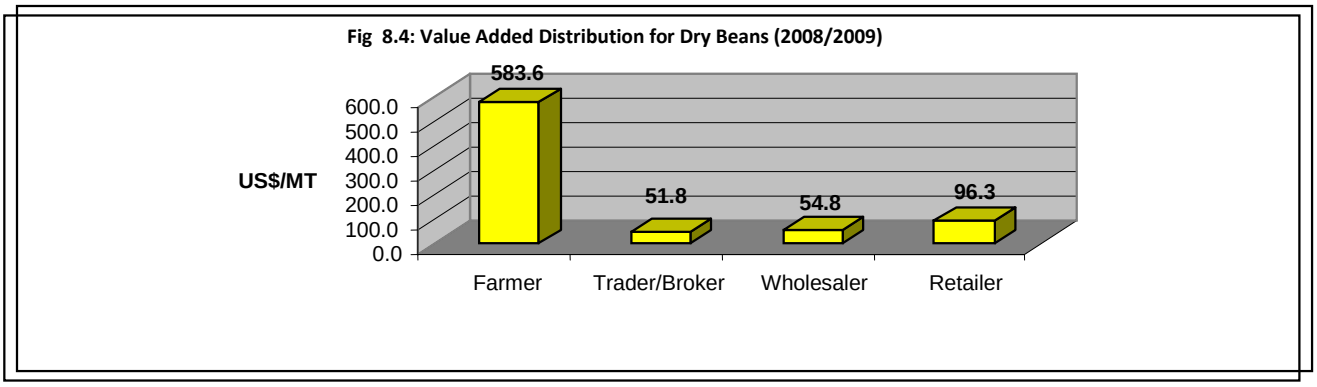


Source: Based on Available documents and field interviews.

8.4.9 Value Addition and Distribution

Figure 8.4 below provides indicative value added distribution for dry beans during 2008/2009 crop year which suggest farmers were the main beneficiaries, followed by retailers, wholesalers

and broker. Scarcity of the commodity during 2008/2009 seemed to benefit farmers than the rest of the actors.



8.5 Analysis of Opportunities and Constraints

8.5.1 End-Market Analysis

As indicated in the table below, common beans has one main use- human consumption which utilizes over 90% of total supply either as stew (green/dry) or in the form of traditional dishes such as githeri which is normally mixture of maize and other vegetables. The other but relatively less important use is seeds.

The form of the product at the end market	Users	Volume of National Requirement in Metric Tons per year	End Market Price in July 2009 in US$ per metric ton	Source of the product (2004-2008)		
				Domestic Market	Imports[23]	
					Intra regional (i.e from EAC/COMESA) percentage	Extra regional (i.e outside EAC/COMESA)
Green beans	Households	Minimal	N/A	100%	0%	0%
Dry Beans	Households/Institutions	625,000	890	77%	41%	59%
Seeds	Farmers	17,845	890	96%	N/A	N/A
Source: MOA-ERA 2009, NCPB, and interviews						

Kenyan consumers have a high preference for Rosecoco, Mwitemania, Wairimu, Mwezi Moja and Nyayo bean varieties. Due to increased market demand against inadequate national

[23] *These are approximated figures based intra and extra prorated values as data on volumes is not available.*

production, Kenya has been relying on imports from the region especially Tanzania, Uganda and Rwanda. Due to the short supply relative to demand the price of beans has continued to increase from around Kshs 3,300 per bag in 2004 to Kshs 6,000 per bag in 2008/2009-a situation most consumers consider unsustainable from the point of view of affordability and therefore household food security particularly given that beans has always been an important source of cheap protein for the poor households. In recent years, availability of beans has deteriorated resulting in increased competition for limited supplies and therefore increases in consumer prices. While most traders and consumers would like to see smaller units of say 50 Kg-bags, beans are commonly traded in the 90 Kg bag-a weight most actors argue is too bulky for easy handling especially by women who are the main players in the industry. Some traders have also cited the quality of beans to be low mainly in terms of foreign particles (dust and soil) forcing most of them (traders and consumers) to incur cleaning costs before presenting the product for sale or consumption. Two traders at the roadside market near City Stadium confirmed this matter and indicated that they often incur additional cost by having to clean the produce using saw dust or other means.

8.5.2 Vertical Linkages

Business linkages in the beans sector are even more underdeveloped than in maize. Trade in beans occurs under very informal and temporarily business relationships with farmers/traders/assemblers having no supply contracts. However in Nyamakima, women traders have some form of business relationship (albeit informal) with brokers and regional traders either in Kenya or outside (Uganda and Tanzania). There are no farmers' or traders' associations and business is through short-lived relationships, mainly during the harvest season. The highly distinct seasonality of supply is partly responsible for the lack of long term vertical relationships between actors.

8.5.3 Horizontal Linkages

Horizontal linkages entail purposefully established businesses relationships among actors in a given segment of the value chain e.g. producers and traders. During the study, there was no indication of such formal linkages and the respective subsector players tended to operate individually except for the loose merry-go round women groups that in any case formed for different reasons

8.5.4 Supporting Markets

Support market services are largely non-existent in the case of beans and other pulses. Currently, there is no beans-specific policy framework and no institutional financial support mechanism. The only notable market support services include research and variety development by KARI

and market price information which are provided daily by KACE, EAGC and Safari Com mobile phone service provider. The rest of the services are rarely available.

8.5.5 Subsector Constraints

The main constraints facing the beans subsector in Kenya include:

- High incidence of pest attacks and diseases, especially attack from nematodes;
- Low yields achievement which stands at about 420 Kgs per hectare compared with 1,000 Kgs per hectare under inter-cropped systems and 2,000 Kgs per hectare under single stand farming system. In this regard, it is worth noting that about 98% of the total acreage under beans is inter-cropped mainly with maize (Professor Kimani, University of Nairobi).
- Low availability and utilization of high quality seeds because of the reluctance of seed companies to engage in the beans seed business due to the high risks associated with the genetic nature of the crop (that is self-fertilization and open-pollination);
- Poor crop husbandry with minimal or absolutely no utilization of modern inputs-fertilizer and chemicals;
- Lack of horizontal and vertical linkages between farmers and traders, resulting in weak knowledge transfer, attraction of embedded services etc and quality standards;
- Inadequate institutional capacity to address the needs of the sector nationally and regionally and lack of conducive environment for bean production and commercialization (ECABREN priority setting mission; stakeholders workshop; May-July 2003);
- High cost of transport due to increasing cost of diesel and poor condition of roads which also leads to high post harvest loses;

8.5.6 Current and Potential End-Market Opportunities

The current and potential end market opportunities for the beans value chain include:

- High and increasing market demand nationally and regionally-with national deficits currently estimated at 60% of national requirements;
- Existence of a strong seed-base industry in the country;
- Potential for increasing yields from the current 420 Kgs per hectare to 2,000 Kgs per hectare which research has demonstrated to be achievable-meaning the country can raise production by over 3 times.

9.0 OTHER PULSES

Other pulses covered in this study include pigeonpea, cowpeas and chickpeas. Compared with other staple crops such as maize and beans, these commodities are relatively less important in Kenya in terms of volume of production and from the point of view of national food security. Consequently, there is very limited secondary data and information regarding these crops, particularly for cowpeas and chickpeas. In fact, chickpea is such an insignificant crop in Kenya that even MOA agricultural reports do not cover the crop. However, for pigeonpea a recent study on pigeonpea value chain by ICRISAT (Shiferaw et al, June 2008) has been a major source of value chain information provided in this report.

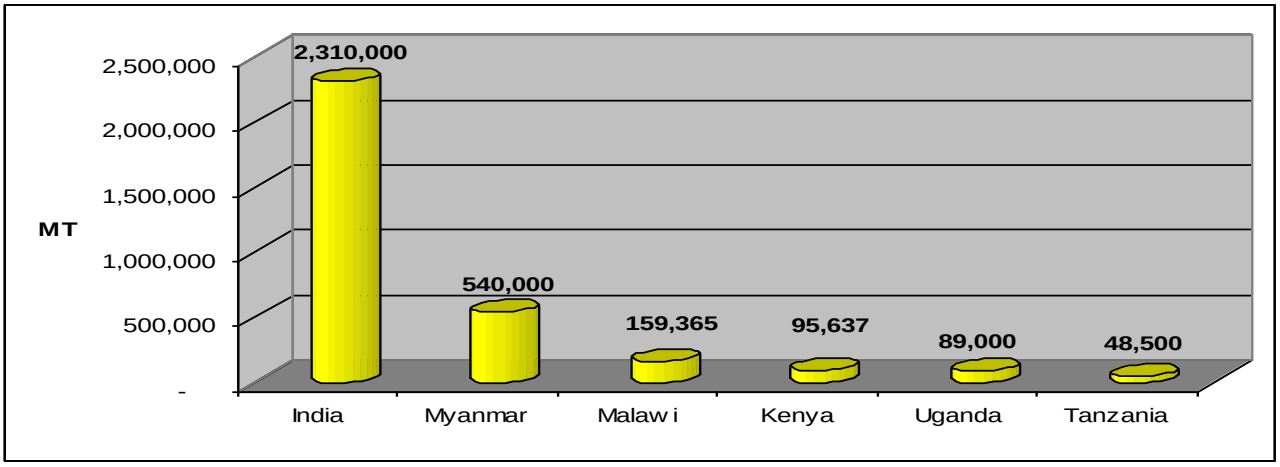
9.1 PIGEONPEA

Pigeonpea is an annual or short-lived perennial crop widely cultivated in the semi-arid tropics. It provides multiple benefits to the rural poor. First, its protein-rich edible peas can be consumed both fresh and dry and provides a cheap source of protein for the poor farmers in the dry lands. Second, its leaves and hulls are used as livestock feeds and the stems as fuel wood. Third, it has the ability to fix atmospheric nitrogen into the soil-which is significant because most soils in semi-arid regions are deficient in nitrogen and phosphorus (Shiferaw et al, June 2008).

9.1.1 Global Perspective

Total world production of pigeonpea in 2007 was about 3.3 million MT with India being the single most important producer accounting for approximately 70% of total world production. As indicated in Fig. 9.1 below, Kenya ranks fourth in terms of world production of pigeonpea after India, Myanmar and Malawi.

Fig 9.1: World Producers of Pigeonpea



9.1.2 Domestic Production versus Consumption

In Kenya, pigeonpea is mainly cultivated by smallholder farmers in the arid and semi-arid lands, primarily as a source of food and cash. The country's total national annual production over the last five years has oscillated between 80,000 and 111,000 MT, from an annual average of 184,500 hectares. Yields per hectare have oscillated between 0.4 and 0.6 MT per hectare over the same period. Total national production in 2008 was approximately 84,200 MT-valued at nearly Kshs 3.0 billion. This represented a decrease of 24% decline from the record production achieved in 2006 amounting to 110,841 MT. Between 2004 and 2008, cultivated area increased very marginally (0.1% per annum), while production declined at an estimated CGR of negative 5.5%. The decline was largely attributed to the persistent drought conditions which have faced the country in general in the last few years and more so in the main producing areas of Eastern province. However, according to the MOA and other key players such as KARI and ICRISAT, production is expected to increase at a rate of 5% per annum over the next 5 years, mainly through yield increases as a result of adoption of higher yielding and drought resistant varieties. While bearing in mind limitations in terms of accuracy of the country's agricultural data in general, official data from the Ministry of Agriculture (MOA) for the period 2004-2008 indicates that the country has been consuming an average of 106,280 MT per year. Based on national production data, the country experienced deficits in three out of five years between 2004 and 2008; with the annual deficits increasing from about 9,500 MT in 2005 to approximately 25,000 MT in 2008-representing 1.4% annual compound growth rate as shown in Table 9.1.

Table 9.1: Pigeonpea Production, Area, Values and Consumption in Kenya (2004-2008)

Year		**2004**	**2005**	**2006**	**2007**	**2008**
Area (Ha)		195,308	180,240	196,630	154,554	195,959
Production	(MT)	105,571	94,950	110,841	95,637	84,168
	90-Kg Bags	1,171,838	1,055,000	1,231,442	1,062,637	935,109

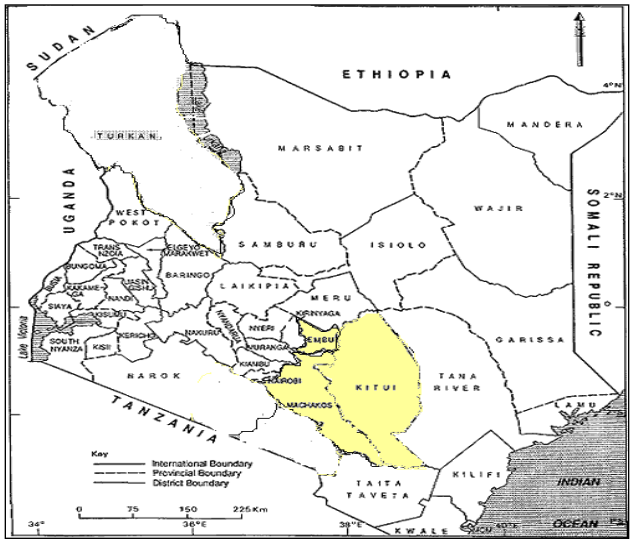
Yields (MT/Ha)		0.5	0.5	0.6	0.6	0.4
Value	(Billion Kshs)	3.52	2.95	3.33	4.97	2.99
	(Million US$)	469.3	393.3	444.0	662.7	398.7
Price (Kshs/Kg)		33.3	31.1	30.1	33.3	35.6
Consumption (MT)		103,510	104,410	106,211	108,042	109,230
Surplus/(Deficits)		2,061	(9,460)	4,630	(12,405)	(25,062)

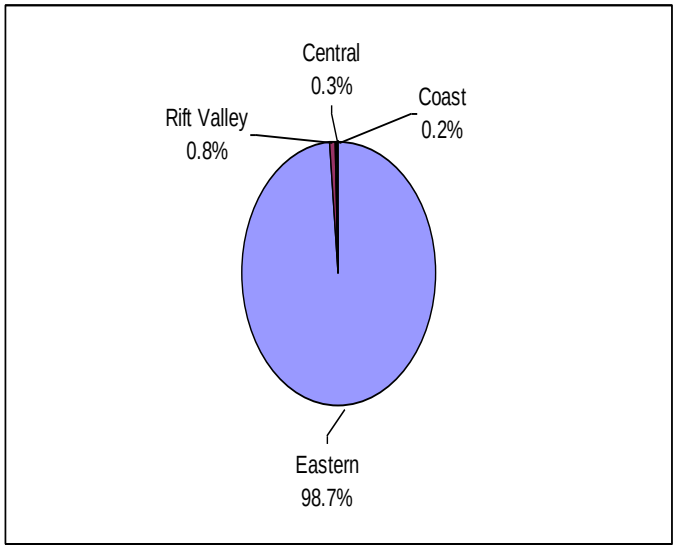
Source: Republic of Kenya; Ministry of Agriculture –MOA; Economic Review of Agriculture (2009)

9.1.3 Main Producing Areas

As indicated in Fig. 9.2 below, Eastern province is the main producing area for pigeonpea in Kenya. In 2008, the province produced approximately 83,500 MT (927,811 bags) or about 99% of total national production (MOA Economic Review of Agriculture; 2009). The main producing districts in the province are Machakos[24] accounting for about 33% of total national production; Makueni[25] (25%) and Kitui[26] (22%). Together, these three districts, accounted for about 80% of total national production in 2008. This high concentration of production in a few areas means the subsector faces very high risks in case of regional weather problems.

Fig. 9.2: Main Pigeonpea Producing Areas in Kenya





[24] *Recently sub-divided into Machakos, Athi Rriver, Kathiani, Mwala, Yatta, Masinga, Kangundo and Matungulu districts;*

[25] *Recently subdivided into Makueni, Kilungu, Mukaa, Mbooni West, Mbooni East, Nzaui, Kibwezi, Makindu and Kathonzweni districts.*

[26] *Recently sub-divided into Kitui West, Lower Yatta, Kitui Central, Nzambani, Mutitu, and Mutomo districts.*

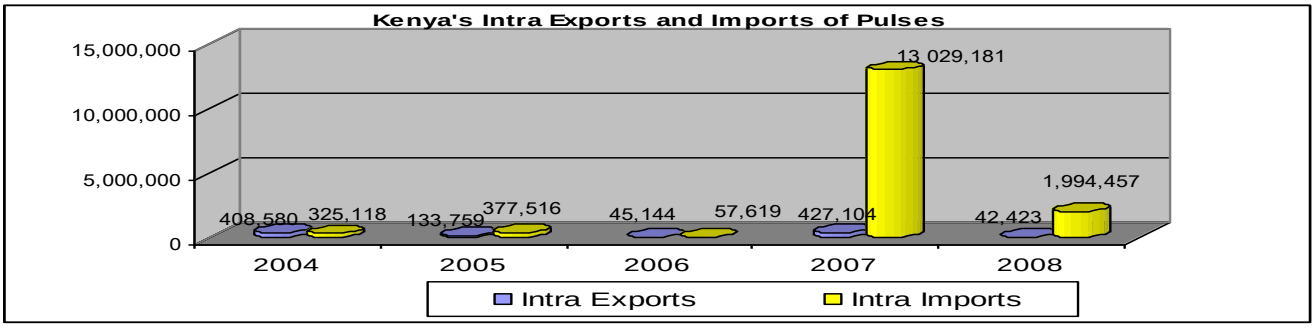
Source: Based on MOA Data (Annual Report 2008) and ICRISAT Pigeonpea Value Chain Study ; (2008)

9.1.4 Kenya's Intra-EAC/COMESA Imports and Exports of Pulses

While recognizing that EAC/COMESA staple crops data is generally not accurately recorded, the table below refers intra exports and imports of all other pulses combined other than beans which was dealt with earlier in this report. This was necessitated by the fact that it was not possible to get disaggregated data by type of pulse crop. As will be noted the country's intra imports of pulses far out-striped intra exports with total imports during the period 2004-2008 amounting to a total of US$ 15.8 million compared to exports amounting to US$ 1.06 million. According to available data, Tanzania was the main source of imports accounting 68% of total value of intra EAC/COMESA imports followed by Uganda with 29%. Sudan was the main export destination accounting for 66% of total value of intra-EAC/COMESA exports, followed by Uganda with 34% as shown in Table 9.2.

Table 9.2: INTRA-COMESA IMPORTS AND EXPORTS OF OTHER PULSES (Excluding Beans)

Flow		2004	2005	2006	2007	2008
Intra Exports	US$	408,580	133,759	45,144	427,104	42,423
	MT	N/A	N/A	N/A	N/A	1,629
Intra Imports	US$	325,118	377,516	57,619	13,029,181	1,994,457
	MT	N/A	N/A	N/A	N/A	18,807



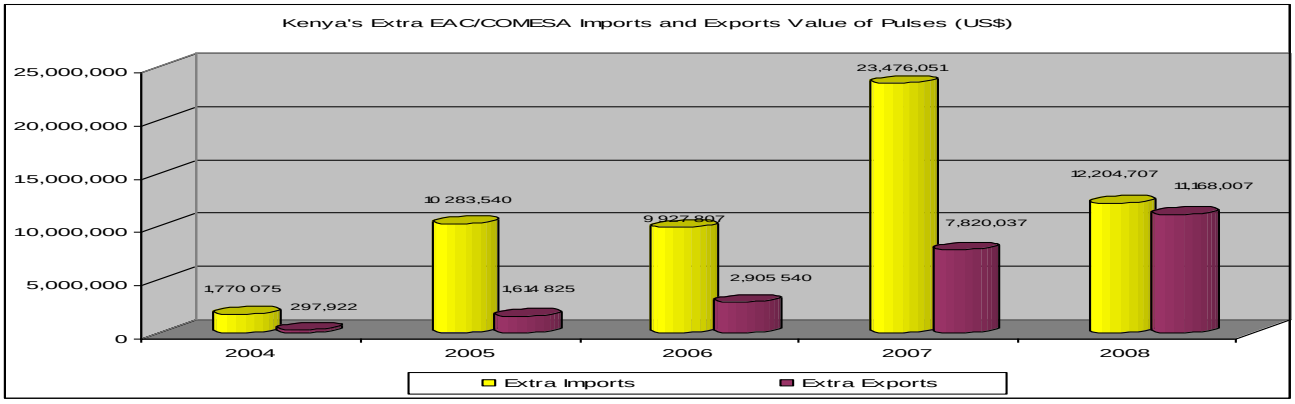
EAC/COMESA Secretariat and KRA

9.1.4 Kenya's Extra-EAC/COMESA Imports and Exports of Pulses

Based on available data, the total value of Kenya's extra EAC/COMESA imports of pulses (excluding beans) between 2004 and 2008 was estimated at US$ 57.7 million, compared with extra exports estimated at US$ 23.8 million (see table 9.3 below). This means that the country imported beans worth slightly more than double the value of exports to markets outside EAC/COMESA. Both volume data of extra EAC/COMESA beans imports and exports and the main destinations were not available.

Table 9.3: EXTRA EAC/COMESA IMPORTS AND EXPORTS OF OTHER PULSES (Excluding Beans)

Flow		2004	2005	2006	2007	2008
Extra Exports	US$	297,922	1,614,825	2,905,540	7,820,037	11,168,007
	MT	N/A	N/A	N/A	N/A	N/A
Extra Imports	US$	1,770,075	10,283,540	9,927,807	23,476,051	12,204,707
	MT	N/A	N/A	N/A	N/A	N/A



EAC/COMESA Secretariat and KRA

9.1.6 Pigeon Pea Value Chain Mapping

The main functions in the pigeonpea subsector in Kenya include research and product development, inputs supply, production, value addition/processing and marketing. The following sections briefly describe these functions, key actors and overlays.

(i) Research and Development

Pigeon pea varieties differ not only in form of seeds, colour and taste, but also in growth habit, time of flowering and susceptibility towards pests and diseases. Varieties grown in Kenya can be

broadly classified into three types depending on the length of time taken to reach maturity and its growth characteristics. (a) Short duration varieties which take 100-120 days to mature and with a determinate growth habit; (b) Medium duration varieties which take 150-200 days to mature, and has indeterminate growth characteristics; (c) Long duration varieties which takes more than 220 days to mature and has indeterminate growth habits. Most of the local varieties grown by farmers in Kenya belong to this group (Shiferaw et al. June 2008). Significant players in pigeonpea variety development in Kenya include from the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Kenya Agricultural Research Institute (KARI), University of Nairobi and Winrock International. Through collaborative efforts, these three institutions have developed and tested a number of short-medium, and long duration improved varieties resulting in the release of the following two short-duration types called ICPL 87091 (under the release name KARI Mbaazi I) and Kat 60/8; and one long-duration variety known as ICEAP 00040 (under the release name KARI Mbaazi II). Efforts by these research institutions are mainly aimed at developing high yielding varieties that are resistant to Fusarium wilt and adaptable to a broader range of ecological conditions. Varieties available in Kenya, their maturity profile, potential yields and other characteristics are shown in Table 9.4 below:

Table 9.4: Main Pigeonpea Varieties in Kenya, Yields and other Characteristics

Variety	Maturity period (days)	Potential yield (MT/acre[27]) per season	Characteristics
Kat 60/8	135-150	0.45-0.63 [28]	Grains are white with brown spots and smaller seed size than local races. Grows between 0-1800 m above sea level and performs well where temperatures are high.
Kat 81/3/32	170-185	0.54-0.99	Tolerant to wilt, pod sucking bugs and pod borers. Cream white grain with large brown patches. Adapted to medium and higher altitudes (over 900 m above sea level)
Kat 777	160-180	0.54-0.90	Oval white seeds. Adapted to medium and higher altitudes (above 900 m above sea level)
ICPL 89091	120	0.36	Is grown in the same range of altitude as KAT 60/8 but is more adapted to the more humid coastal zones. Performs best in pure stands at quite high density.

27 *Seed rate: 20-25 kg per ha (8-10 kg per acre)*

28 *Or 1.2 MT per 2 seasons;*

Scientists from ICRISAT are continuously finding ways to improve on the pigeonpea's attributes particularly suiting it for developing countries. In this regard, one of the most recent achievements has been the development of the first hybrid pigeonpea variety. This was recently launched for commercialization along with its seed production technology and public and private sector distribution of cultivars is well under way in India and China. Through ICRISAT's partnership with universities, women's groups and national programs, the Institute has shared pigeonpea germplasm and technology with farmers in Southern and Eastern Africa and other parts of Asia like the Philippines. ICRISAT has managed to develop technology to produce cytoplasmic male-sterility (CMS) based hybrid pigeonpea by crossing a wild relative of pigeonpea (Cajanus cajanifolius) with that of the cultivated variety. Through this technology, plant breeders can now produce stable hybrids for commercialization, which can almost double productivity to about 3 tons per hectare. With the new CMS-based pigeonpea hybrid technology the ICRISAT has been able to overcome some of the limitations that had been limiting pigeonpea hybrid research for many years. This technology has enabled ICRISAT to develop and test more than 200 hybrids. Three recent experimental hybrids showed near-double productivity, high stability, and no plant deformity during this year's evaluation. The promising benefits of this technology—high productivity, low labor requirement for seed production, and great drought tolerance have generated high interest among partner-institutions. In Kenya, ICRISAT has been very active in promoting pigeonpea varieties suited to specific production systems especially in Eastern province.

(ii) Inputs Supply

The main inputs in the production of Pigeonpea include labour (mainly from farm household) and seeds. The use of purchased improved seeds and agro-chemicals (e.g. fertilizers, pesticides and insecticides) is nearly non-existent among pigeonpea farmers. In some instances, a few farmers (less than 25%) use manure. There are two sources of pigeonpea seeds in Kenya; seeds retained by farm household after harvest-which accounts for about 95% of farmers' seed requirements, and certified seed mainly from ICRISAT which (according to DAO Mwingi West District) accounts for about 5% of total availability. Certified seeds are generated through contracting of selected farmers (currently about 300 in Eastern Province) by ICRISAT. MOA data indicates that the country had not imported certified seed in the last five years. According to a recent study (Imaita I; July 2009), supply has almost exclusively been from local sources. In this regard, and IFPRI study (Nagarajan L; et al; November 2008) observed that in eastern Kenya, traders in village fairs (markets) play a critical role in providing necessary genetic resources for the pigeonpea crop. Depending on the onset of the short-rains season, the major planting season for the crop, traders and farmers participate in village fairs, either to purchase or to sell seed. The study estimated that over 90% of pigeonpea seeds are accessed through village fairs. In general, most farmers do not use chemical protection against pests due to the high cost,

lack of awareness, lack of pesticide sprayers, and poor availability of effective pesticides. Most farmers therefore use cultural practices to control pests. In future, commercializing pigeonpea production will require greater use of pesticides due to the build-up of pests and diseases. This will in turn call for farmer training on pesticide safe use and removal of input marketing constraints. In this regard, ICRISAT has been promoting cost effective and eco-friendly biological control methods like use of tephrosia leaves in controlling both field and storage pests (Shiferaw et al. June 2008).

Seed companies play an insignificant role in pigeonpea seed distribution. There are two main, but inter-related factors that contribute to the apparent reluctance of seed companies to regularly distribute improved seeds through their established networks:

- The fact that pigeonpea is a self-pollinated crop where out crossing is limited. Consequently, farmers can maintain productivity of new varieties for 3-5 years while using retained seeds after each harvest period. The common use of retained seeds makes the production of improved pigeonpea seed uneconomical on the part of potential suppliers, thus undermining the incentive for private sector investments in commercial production and marketing of such seeds.
- The fact that the local market for improved seeds- and more so for minor crops in Kenya (including pigeonpea) tend to be rather thin. This limits the ability of commercial seed companies to exploit economies of scale in production and distribution.

These constraints have in the past prompted the use of a few innovative approaches towards promoting farmers' access to improved seeds. These have included:

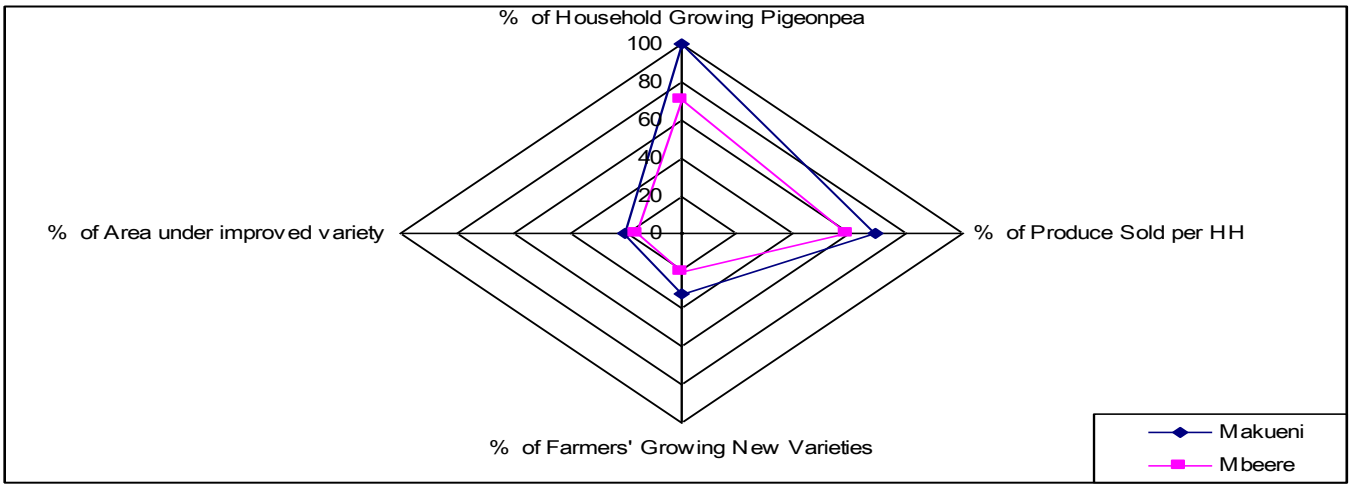
- Community-based seed production programs promoted through joint effort between KARI and Winrock;
- Producer-marketing group-based initiatives promoted by ICRISAT jointly with other partners under the small seed packs program;

(iii) Production

As mentioned earlier, Eastern province is the single most important pigeonpea producing area in the country, accounting for slightly about 99% of total national production. Most households in the region grow pigeonpea both for household consumption and for cash to meet other household requirements. Based on rural Household Surveys for 2003 and 2005 covering 400 households; about 71% and 100% of farm families in Mbeere and Makueni respectively were at least growing pigeonpea, about 60-70% of the households were selling part of their produce and about 16-20% of the household landholdings were under improved pigeonpea varieties (Shiferaw et al. June 2008). According to ICRISAT, about 20% of the farmers in Eastern Kenya have adopted

the new pigeon pea varieties, which have been developed using conventional breeding, with uptake in Makueni alone having reached 80% (statpub.com). Figure 9.3 below characterizes the pigeonpea farming in these two major producing districts.

Fig 9.3: Characterization of Pigeonpea Production in Eastern Province



Pigeonpea is commonly inter-cropped with cereals such as maize and sorghum, as well as other legumes including beans, green gram and cowpea. Production is wholly undertaken by smallholder farmers cultivating plots ranging from 0.2-1.4 hectares-with the majority of households however falling closer to the lower end. A mixture of all types of pigeonpea (short, medium and long maturing and varieties) is cultivated. The main activities in the production of pigeonpea include ploughing, planting and weeding. While ploughing and weeding are commonly done using oxen-plough and in a few instances by hoe, planting and harvestings are done by hand commonly using family labour. The crop is usually planted at the onset of the September/October short rains. Most of the short- and medium duration varieties are harvested as green/fresh vegetable, usually between February and April. The long-duration types are, on the other hand, mostly harvested as dry grain in August and September. However, some farmers also harvest the long-duration types as vegetable pigeonpea, usually during the June/July period. Farmers do not use fertilizer on the crop, although in some cases they apply manure.

(iv) Processing

The only notable form of pigeonpea processing in Kenya entails de-hulling and splitting the pigeonpea grain to make what is commonly known as dhal. This function is undertaken by processors who commonly also undertake the functions of assembling; urban wholesaling and retailing in the domestic market and also exporting of dry grain and dhal-depending on the prevailing world market prices. The total number of processors in the country is not known, but the key ones include Kenya Milers Ltd, Spice World Limited and Pisu & Company Limited. What is clear however is that the majority are located in the main urban centers, with Nairobi and

Mombasa having the highest concentration-(Shiferaw et al. June 2008). The other, albeit very basic form of value addition that is nevertheless not often carried out is in the form of cleaning the grains by removing foreign objects and spoiled grains[29] which is commonly undertaken by rural and urban wholesalers as well as exporters/processors. These actors then weigh and bulk the grain before transporting it to their buyers, who in the case of rural wholesalers are the urban wholesalers and processors/exporters; supermarkets and foreign market consumers in the case of exporters/processors.

The channels that link producers to retailers in rural and urban open-air markets and also those that link producers to rural and urban-retail shops involve purchase and sale of grain of average quality with very limited cleaning, sorting, and repackaging. Quality is verified by visual inspection and use of a weighing machine during the exchange process, which requires the physical presence of the buyer. While smallholders do not get any premium from assemblers for cleaning, grading or sorting, traders at the upper end of the chain seem to capture quality effects as product differentiation becomes more important for the end user.

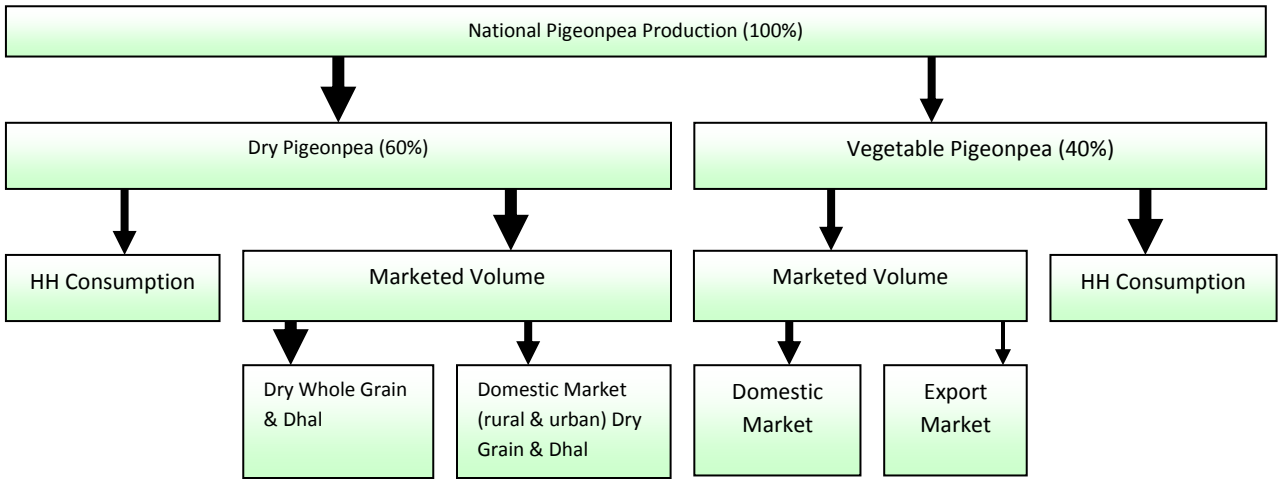
Processing of pigeonpea in Kenya has continued to perform poorly partly because of higher raw material prices offered for dry whole grain in the domestic market and partly because of the high procurement and processing costs (Freeman et al. 1999). This has reduced the competitiveness of dhal, particularly for export, limiting processing only to small quantities merely to serve the Asian population settled in the country's major urban centers, mainly Nairobi and Mombasa. In the rural areas, there is very little processing of dried grain before it is cooked because many rural households are either unaware of or cannot afford improved processing methods and equipment.

(v) Marketing

Pigeonpea in Kenya has three main uses for human consumption, namely; dry grain, dhal (split dry grain) and vegetable pigeonpea. Other minor uses include animal feeding and wood fuel. Of the total country's annual pigeonpea production which averaged around 98,000 MT between 2004 and 2008, about 60% was utilized as dry pigeonpea grain, and the balance (40%) in the form of vegetable peas. About 60% of pigeonpea growers in Kenya take their produce to pigeonpea markets, selling about two-thirds of their total production. The crop is marketed either as dry grain, processed (split) dry grain (dhal) or green (vegetable) pigeonpea. Most market participating farmers sell at the farm-gate (Shiferaw et al. June 2008). In general, the pigeonpea farmers in the semi-arid districts market about 62% of their dry grain pigeonpea harvests.

However, only less than 10% of the total fresh peas harvested are marketed primarily for two reasons. Firstly, most farmers prefer to consume pigeonpea as fresh peas because it is sweeter and cheaper than the alternatives (especially beans). Secondly, the fact that maturity/harvesting of vegetable pigeonpea very often coincides with hunger periods characterized by acute shortage of household food staples. Figure 9.4 below depicts the flow of both dry grain and vegetable pigeonpea.

Fig: 9.4: Pigeonpea Products Flow and Market Shares



The main players in marketing include farmers, rural assemblers/brokers, rural wholesalers, urban wholesalers/exporters/processors, open-air market retailers, rural and urban retailers, rural and urban shopkeepers, and supermarkets, rural and urban consumers. The bulk of trade is limited to one season with very minimal inter-seasonal trade, which is attributed to the high costs of storage because the grains are susceptible to storage pests such as bruchids. Consequently, a significant portion of pigeonpea is offered for sale immediately after harvest.

9.1.6.1 Dry Pigeonpea Grain

Dry grain pigeonpea account for about 60% of total pigeonpea produced and harvested in the country. Thus, based on the average annual national production estimated at 98,000 MT in the last 5 years, about 60,000 MT was in the form of dry grain. Of the total volume of dry grain pigeonpea harvested in the country, about 62% is marketed. The six marketing channels as identified by a recent subsector study (Shiferaw et al: 2008) are as described below.

(a) Rural open-air retail markets channel-whereby the farmer disposes his produce through five separate outlets. These include rural assemblers who comprise the most important outlet in

terms of volume; rural retail shopkeepers; others such as rural wholesaler, rural open air retailers and local household consumers including neighbouring farm-households.

(b) Rural retail shops-whereby rural retail shopkeepers) receive produce from a three sources including farmers which is the most important source; rural assemblers and rural wholesalers. They then sell to rural consumers and the process more or less ends there.

(c) Urban open-air retail markets-whereby urban open air retailers receive produce primarily from urban wholesalers, and primarily sell to urban consumers.

(d) Urban retail shops-whereby urban retail shopkeepers commonly receive produce from urban wholesalers and dispose the produce through sale to urban consumers (mainly households). Urban wholesalers deal in pigeonpea and a wide range of other grains. They own or rent warehouses from where they trade, mainly with urban retailers (including supermarkets) and, to some extent, urban processors/exporters. Urban wholesalers often get the grain delivered to their warehouses by sellers and sell in bulk from the same premises without incurring any transport costs. However, they clean the grain to some extent when the buyer demands higher quality and is willing to pay a premium for it. Their most important marketing function is the breaking down of large volumes of grain supplied to them into units affordable by the urban retailers

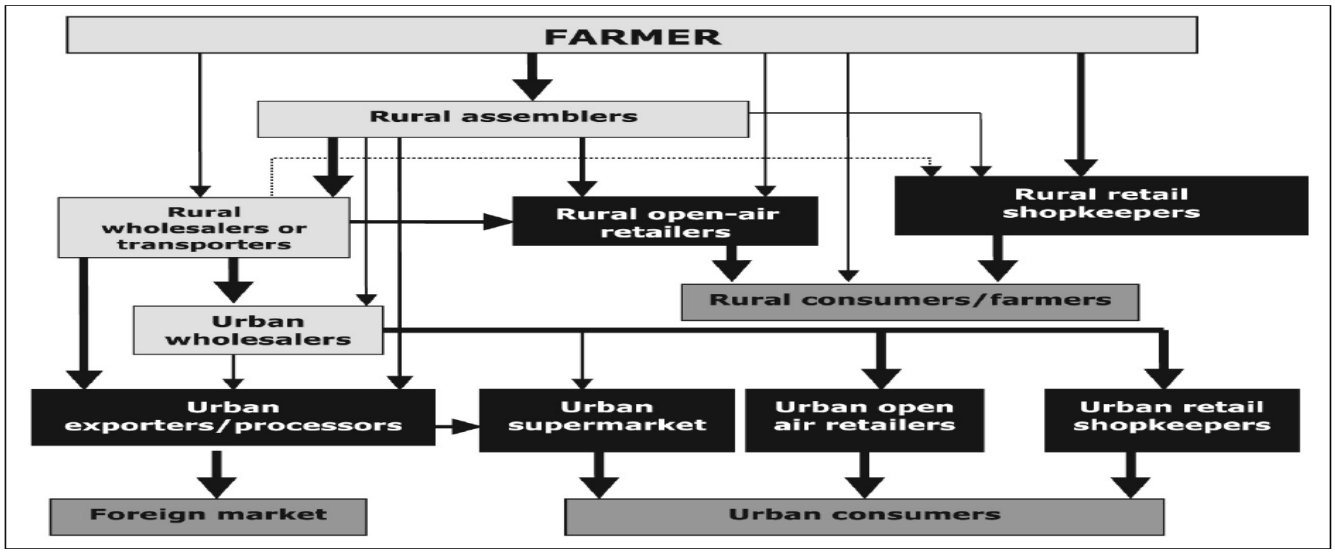
(e) Urban supermarkets-whereby local supermarkets (Nakumatt, Uchumi, Tuskys and Seven Up) receive dry grain from urban wholesalers and urban processors/exporters; and then sell to urban consumers. The channel linking producers to urban supermarkets involves the movement of dry grain pigeonpea from rural areas to major urban markets (especially supermarkets) by urban processors/exporters. Typically, the grain passing through this channel is well cleaned, sorted, and pre-packed (mainly in well-labeled 1-kg or 2-kg packets) by processors before delivery to the supermarkets. This channel is characterized by relatively large volumes, high consumer prices, high marketing costs, and use of improved technology, specialized marketing services, and higher net margins/profits (Shiferaw et al: 2008).

(f) Export markets-whereby actors (mainly exporters and processors) receive produce from rural wholesalers (the main source), rural assemblers and to a lesser extent urban wholesalers. They dispose their produce through two main outlets, export markets (the main outlet) and sale to local supermarkets. As mentioned earlier, the main export markets for dry grains are India and Europe with the former absorbing approximately 90% of total national dry grain pigeonpea exports.

The figures below are based on a recent study (Shiferaw et al: 2008): Unlocking the Potential of High-Value Legumes in the Semi-Arid Regions: Analyses of the Pigeonpea Value Chains in

Kenya by ICRISAT; Nairobi. Actual volumes at different levels of the value chain were not available.

Fig. 9.5: Dry Pigeonpea Grain Marketing Channels



Source: Shiferaw et al: (2008): Unlocking the Potential of High-Value Legumes in the Semi-Arid Regions: Analyses of the Pigeonpea Value Chains in Kenya. ICRISAT; Nairobi

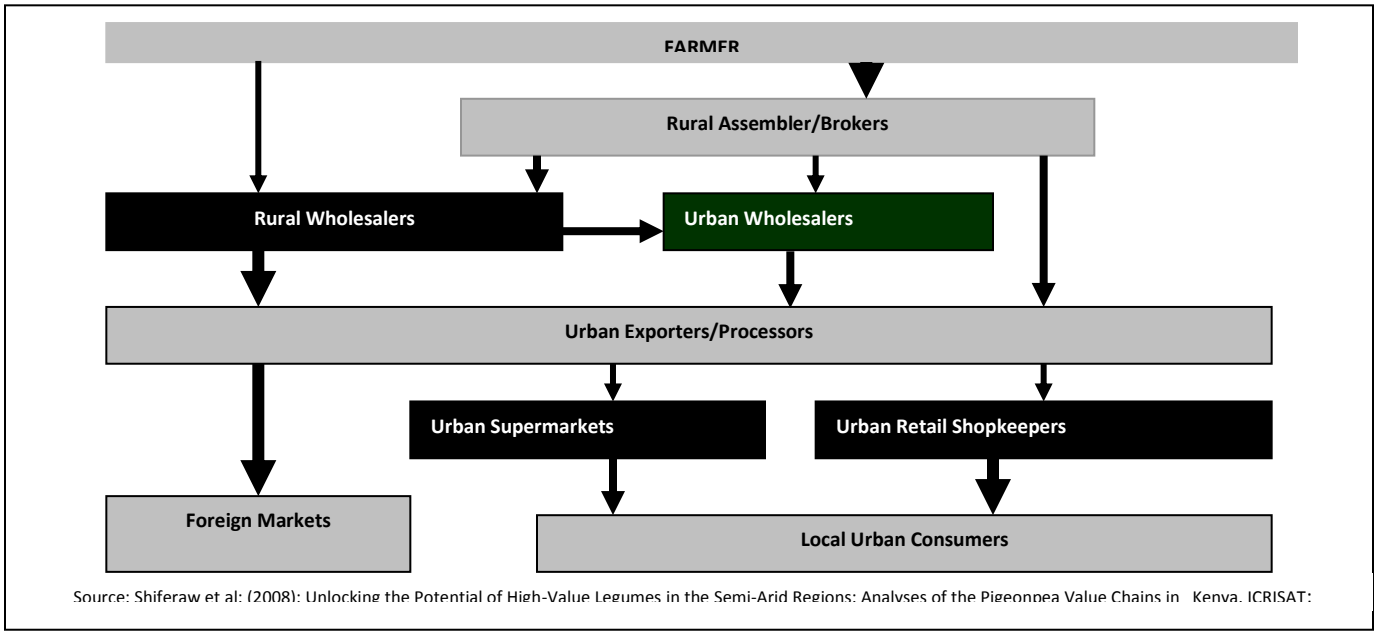
9.1.6.2 Dhal

Of the total annual national production of pigeonpea generated in the country (averaging about 98,000 MT during 2004-2008) between 15-25% is consumed in the form of Dhal, which is essentially dry pigeonpea grain that has undergone processing where such processing involves de-hulling and splitting dry pigeonpea grains using vertical decorticators. The essence of processing is to reduce cooking time, while to some consumers it improves the physical appearance, texture, and palatability (Freeman et al. 1999). The average conversion ratio (dry grain to dhal) ranges between 65% and 75% of original weight of dry grain. Approximately 80% of the dry grain bought by processors/exporters is processed into dhal while the remaining 20% is sold as whole grain. Because of the nature of its market, the dhal produced is usually of high quality and is sold both in the domestic and export markets. Marketing comprises of three main channels, urban retail shopkeeper; urban supermarket and urban exporter. Dhal marketing channels are characterized by use of modern technology, high volumes, and high net margins, especially in channels serving the domestic markets. Among the three channels, marketing costs are highest for the export channel, but total profits for the channel are highest for supermarkets, followed by the other urban retailers. This indicates that to the extent that the demand in the local markets can be expanded, the domestic channels offer greater incentives in terms of lower total costs and higher net margins. The quality of dhal traded through both the domestic channel and

export channel is usually above average, due to quality-conscious export and domestic markets. As in the dry grain market, the quality of dhal sold in the domestic markets is verified using physical inspection. Measurement in the urban retail markets (including supermarkets) is done using conventional weighing scales, usually in kilograms.

Both markets are characterized by medium to high income consumers hence are sensitive to quality. Urban processors/exporters add value to pigeonpea before exporting it commonly by either cleaning the dry grain or splitting it to make dhal. Most processors/exporters are located in the main urban centers (mainly in Nairobi and Mombasa. They export both dhal and dry whole grain pigeonpea (Freeman et al. 1999) but also sell some limited quantities of dhal to domestic supermarkets and urban retail shops. The supply chain for dhal is therefore nested within the larger dry grain pigeonpea. As indicated in figure 9.6 below, there are three dhal marketing channels in Kenya that link farmers to (i) Urban retail shops; (ii) urban supermarkets, and (iii) foreign export markets. Once the grain is processed, the trading of dhal is exclusively in urban areas, while some of the dhal may also be exported depending on prevailing prices and competitiveness of local processors/exporters. Over 70% of the processed dhal is exported, mainly to the UK and USA, while the rest is sold through large domestic urban supermarkets and a few urban retail shops. The Asian community in Kenya accounts for the bulk of the domestic market for dhal.

Fig. 9.6: Dhal Marketing Channels

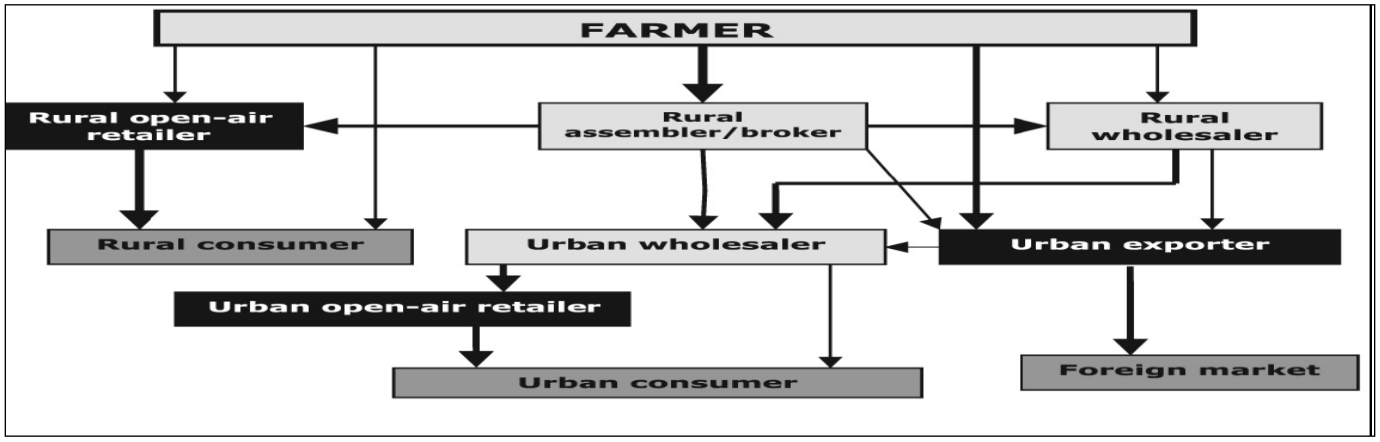


Source: Shiferaw et al; (2008); Unlocking the Potential of High-Value Legumes in the Semi-Arid Regions: Analyses of the Pigeonpea Value Chains in Kenya. ICRISAT;

9.1.6.3 Fresh or Vegetable Pigeonpea

Fresh or vegetable pigeonpea comprises about 40% of total pigeonpea production in the country (Shiferaw et al: 2008). Based on the annual average production of 98,000 MT over the last five years as provided by MOA production data, this means that about 40,000 MT comprised vegetable pigeonpea. The ICRISAT study indicates that approximately 87% or 34,000 MT of the vegetable pigeonpea is retained at the farm for household consumption while the rest (13% or about 5,000 MT) is marketed-primarily in the domestic market with exports amounting to less than 20% or about 1,000 MT of the traded volume. Vegetable pigeonpea is traded both in the local and export markets mainly through three channels as indicated in Figure 9.7 below. These include rural assemblers/brokers, rural wholesalers/local and urban exporter.

Fig 9.7: Vegetable Pigeonpea Marketing Channels:



Source: Shiferaw et al: (2008): Unlocking the Potential of High-Value Legumes in the Semi-Arid Regions: Analyses of the Pigeonpea Value Chains in Kenya. ICRISAT; Nairobi

- Rural assemblers/brokers: This the most important channel in terms of farmers' outlet. Typically, rural assemblers (also known as brokers) purchase the fresh peas (in pods) from farmers and bulk them before selling them on to the next intermediary. This could be the rural open-air retailer, rural wholesaler, urban wholesaler, or urban exporter.

- Urban-exporter: This is the second most important outlet for the farmer. Some urban exporters (especially the horticultural export companies) buy their supplies directly from farmers. Vegetable Pigeonpea for export is subject to stricter physical quality and pesticide residue standards, and are subjected to pesticide residue testing as required by the destination markets. In terms of physical attributes, the pods are required to be straight, of uniform size (usually about 5 cm in size), and spotless. In addition, the peas must be of the right stage of maturity. These physical quality attributes are verified by physical inspection and some export market buyers subject the peas to pesticide residue testing as part of the due diligence requirements of these markets. Vegetable pigeonpea destined for export is usually collected by the exporters at various designated collection points on particular days of the week depending on flight logistics. Since the peas are

perishable, picking, collection, processing, and export must be carefully synchronized. Production of fresh peas for export is therefore characterized by temporal asset specificity. This means that farmers growing pigeonpea for export market must work closely with exporters' agents to plan their harvesting, transportation (to the collection points), and sale of peas. Poor scheduling of these activities can result in losses to producers because of its perishability.

- Rural wholesalers (local traders): These actors typically sell the peas to either to urban wholesalers or urban exporters. Urban wholesalers, on the other hand, sell the peas to either to urban open-air retailers or directly to consumers. Though the rural wholesalers serve as the main source of vegetable pigeonpea for urban wholesalers, the latter also get some of their supplies from urban exporters. This occurs when exporters have fresh peas that do not meet export quality standards. Hence, most of the vegetable pigeonpea sold by exporters to urban wholesalers constitutes rejects mainly sourced from non-contracted farmers and rural wholesalers.

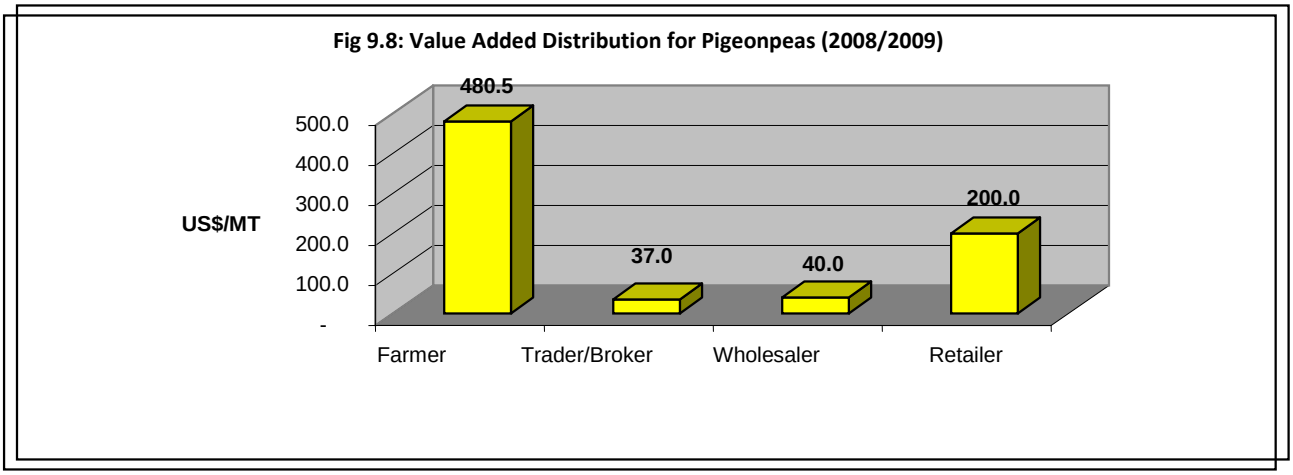
While these channels link farmers to rural open-air retailers, urban open-air retailers, and exporters, there is no channel directly linking farmers to urban supermarket retailers, probably due to the erratic and seasonal nature of vegetable pigeonpea supply and small volumes, which reduce incentives for supermarkets to directly source from farmers. In rural areas, peas are sold through rural assemblers, open-air retailers, and wholesalers. Farmers typically sell the unshelled fresh peas to rural assemblers who then sell it to rural open-air retailers, rural wholesalers, and, in some cases, to urban wholesalers. Rural wholesalers usually transport fresh peas in pods and sell it to urban wholesalers. Though the rural wholesalers serve as the main source of vegetable pigeonpea for urban wholesalers, the latter also get some of their supplies from urban exporters. This occurs when exporters have fresh peas that do not meet export quality standards. Hence, most of the vegetable pigeonpea sold by exporters to urban wholesalers constitutes rejects mainly sourced from non-contracted farmers and rural wholesalers. As indicated in the figure below, urban wholesalers mainly sell to urban open-air retailers, though in some cases they also sell to final consumers. The exporters of fresh peas consist mostly of Nairobi-based horticultural companies, who sell fresh peas in pods mainly to Europe (UK, France, and Denmark). Some of the local export companies include SuperVeg Limited; and Makindu Growers & Packers Limited among others. However, the export volumes traded are quite low and seem to be largely constrained by foreign demand and ability to produce and supply good quality vegetable peas. These exporters offer embedded services such as supply of packaging materials (corrugated 6-kg cartons) to their suppliers (farmers, rural assemblers, and rural wholesalers) and hence receive the crop from farmers in well labeled and traceable cartons. Most of the contracted farmers are located in Yatta division of Machakos district and Kibwezi division of Makueni district. Most exporters also formally contract pigeonpea farmers to produce other export crops, especially Asian vegetables such as okra, karela, and ravaya.

Vegetable pigeonpea sold in the domestic market is either shelled manually before selling to consumers in small volumes or sold in- shell depending on the target retail market. Quality requirements in the domestic vegetable pigeonpea markets are limited to physical attributes only and are less stringent than the export market requirements. As in the exported vegetable peas, quality is assessed through physical inspection in the domestic vegetable pigeonpea market channels.

9.1.7 Pigeonpea-Value Added and Distribution

9.1.7.1 Dry Grain

Due to general food shortage in the country during 2008, the price of Pigeonpea (like the rest of the staples) went from around Kshs 2,200 per bag in the previous season to around Kshs 5,000 per bag during 2008/2009. The farmer seems to have been the biggest beneficiary, followed by the retailer.

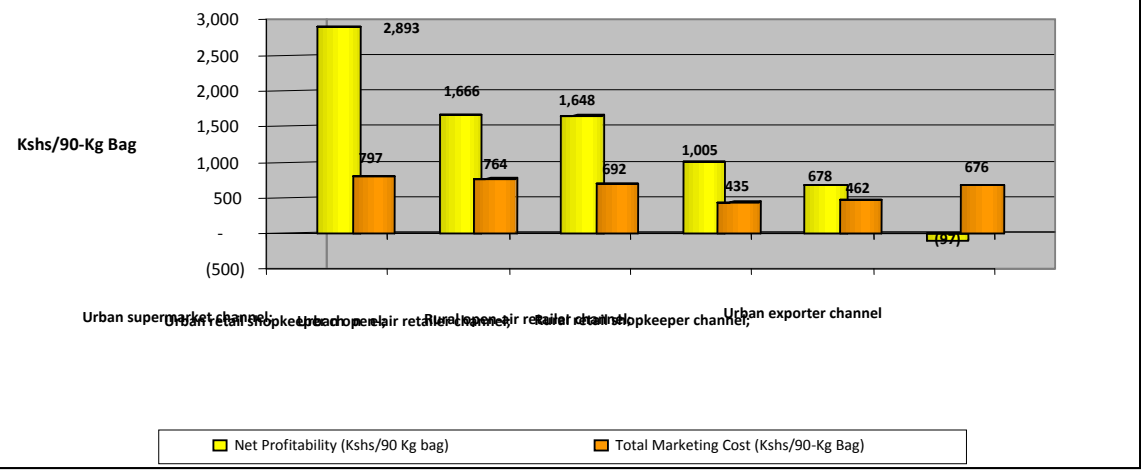


The following sections assess profitability by product and by marketing channels for dry Pigeonpea grain based on a recent value chain study (Shiferaw et al: 2008). As indicated in the table below, net marketing margins (profitability) for dry grain is highest for the supermarket channel followed by urban retail shops, with the rural retailers' channel recording the lowest. Total marketing costs also follow a similar pattern; marketing costs for the urban supermarket channel is Kshs 797 per 90-bag as compared to Kshs 435 per 90-bag for the rural open-air channel. The figure below depicts comparative net marketing costs and net profit margins by marketing channel.

Table 9.5: Dry pigeonpea selling prices in different marketing channels (Kshs/90 kg bag)

Actor	Channel 1: Rural open-air retailer	Channel 2: Rural retail shopkeeper	Channel 3: Urban open-air retailer	Channel 4: Urban retail shopkeeper	Channel 5: Urban supermarket	Channel 6: Urban exporte
Farmer	2250	2070	1710	1710	1710	1710
Rural assembler	2610	2610	2070	2070	2070	2070
Rural wholesaler	3510	3060	2520	2520	2340	2340
Rural open-air retailer	3690	-	-	-	-	-
Rural retail shopkeeper	-	3240	-	-	-	-
Urban wholesaler	-	-	3150	2970	-	-
Urban open-air retailer	-	-	4050	-	-	-
Urban retail shopkeeper	-	-	-	4140	-	-
Urban exporter/processor	-	-	-	-	5040	2289
Urban supermarket	-	-	-	-	5400	-
Farmers' share in final price (%)	61	64	42	41	32	75
Total marketing costs	435	462	692	764	797	676
Marketing costs as share of final price (%)	12	15	17	18	15	30
Total profits (Net marketing margins)	1005	678	1648	1666	2893	-97[a]

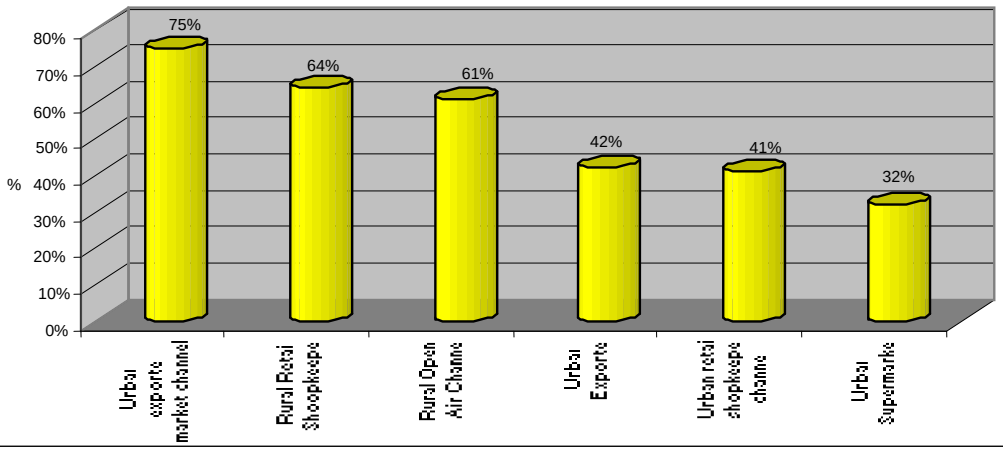
Fig 9.9: Net Profitability and Total Marketing Cost by Marketing Channel



Source: Shiferaw et al: (2008): Unlocking the Potential of High-Value Legumes in the Semi-Arid Regions: Analyses of the Pigeonpea Value Chains in Kenya. ICRISAT; Nairobi. The study data was based on Market Survey 2006;; a/ These was not based on actual profits in this channel because there were no exports in 2006 due to very low prices in the international market compared with the domestic market. The ICRISAT study used the figure as indicative value having computed it using the CIF import price in India, while exporter marketing costs were based on Muricho (2002)

As depicted in figure 9.10 below, the producer price as a percent of the final consumer price is highest for the urban exporter channels and lowest for the supermarket channel (32%), which shows the level of transaction costs involved and also the value-adding activities as the product flows from the producer to the different end users. This suggests that producers would earn better prices if institutional innovations that link them more directly with the high-value channels can be developed.

Fig. 9.10: Farmers' Share in Final Price for Dry Grain Pigeonpea (%)

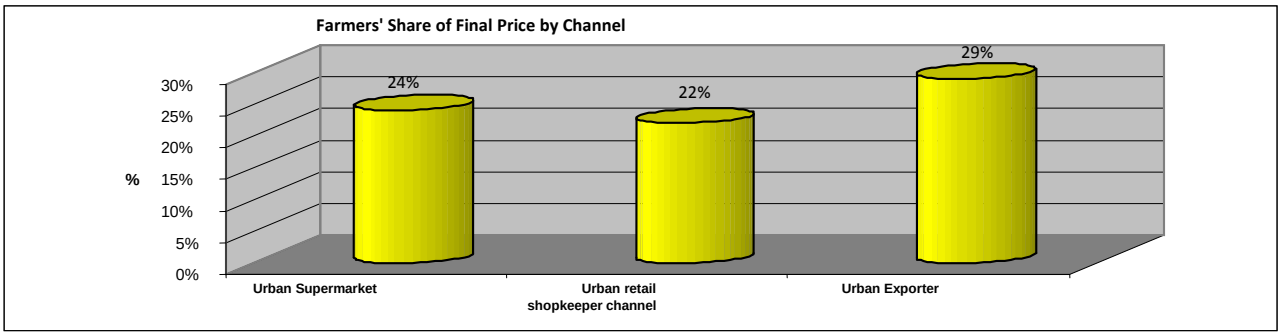


9.1.7.2 Dhal

It was not possible to get data on value added by actor in this channel, but as indicated in the table below, marketing cost (Kshs 2,153 per 90 Kg bag) for Dhal as a percent of final price (37%) is highest in the urban exporter channel, followed by urban retail shopkeeper, followed by urban supermarket. On the other hand, farmers' share in the final price is highest in the urban exporter channel (29%), followed by urban retail shopkeeper channel, followed by urban supermarket channel (Shiferaw et al: 2008).

***Dhal* selling prices by Channel and Framers' Share (KShs/90 kg bag).**

Actor	**Channel 1**: Urban retail shopkeeper	**Channel 2**: Urban supermarket	**Channel 3**: Urban exporter
Farmer	1710	1710	1710
Rural assembler	2070	2070	2070
Rural wholesaler	2340	2340	2340
Urban exporter/processor	6660	6660	5850
Urban retail shopkeeper	7200	-	-
Urban supermarket	-	7650	-
Farmers' share in final price (%)	24	22	29
Total marketing costs	1502	1502	2153
Marketing costs as share of final price (%)	21	20	37
Total profits (Net marketing margins)	3988	4438	1987



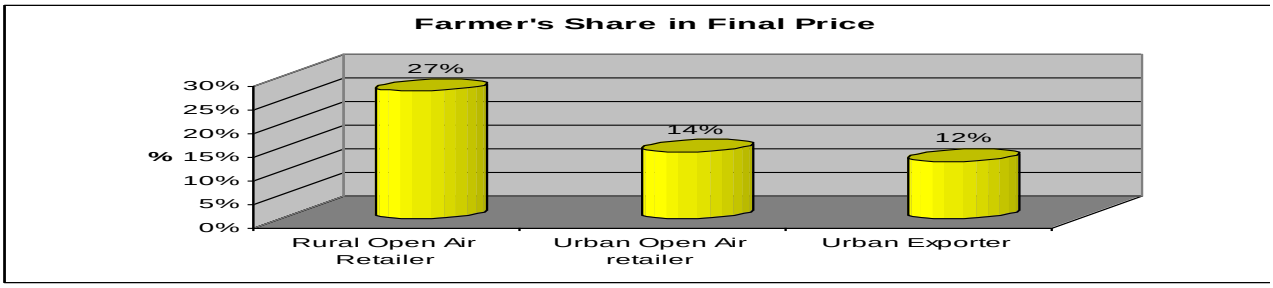
Source: Shiferaw et al: (2008):

9.1.7.3 Fresh or Vegetable Pigeonpea

In the case of fresh/vegetable Pigeonpea, the farmers' share in the final product price is highest in the rural open-air retail channel (27%) and lowest in the urban export channel (12%). With regard to marketing costs, the overall cost is highest for the export channel amounting to nearly 80% of final price. This is largely because the product is refrigerated during exportation. This compares to just 4% for rural retailers and 12% for urban retail shops. However, profits are not high in this channel although this is based only on exporters who directly procure from contracted farmers. The urban retail channels seem to offer highest net margins although the farmers receive only 14% of the final price. Overall, the share of consumers' price earned by farmers is much lower in all the vegetable pigeonpea market channels than in the dry grain market channels. This may be due to, among other factors, the nature of the product and the sensitivity of the market to quality. Indeed, the share of final price earned by farmers decreases as one moves from primary to tertiary markets and then to export markets. Vegetable pigeonpea is perishable, hence subject to greater losses than dry grain pigeonpea. The urban open-air retail channel earns the highest total profits from vegetable pigeonpea trade while the urban export channel earns the lowest. The relatively low total profit earned in the export channel is likely to be due to the high marketing costs, especially the costs of monitoring and enforcing quality standards and high freight costs.

Table 9.6: Vegetable Pigeonpea selling prices by Channel and Farmers' Share (Kshs/90 Kg Bag)

Player	Channel 1: Rural open-air retailer	Channel 2: Urban open-air retailer	Channel 3: Urban exporter
Farmer	900	900	2880
Rural assembler	1620	1620	-
Rural open-air retailer	3330	-	-
Rural wholesaler	-	2250	-
Urban wholesaler	-	3330	-
Urban open-air retailer	-	6210	-
Urban exporter	-	-	23288
Farmers' share in final price (%)	27	14	12
Total marketing costs	137	722	18346
Marketing costs as share of final price (%)	4	12	79
Total profits (Net marketing margins)	2293	3958	2062



Source: Shiferaw et al: (2008):

9.1.8 Pigeonpea Summary of Actors and Functions

The following table provides a summary of the key subsector functions and actors:

Functions	**Participants/Actors**						**Support Markets**
	Domestic/Export-Import Market Channels						
	Input suppliers	Farmers	Traders	Processors	Wholesalers	Retailers	**Support services-**Technical support to farmers provided through general research and extensions services (KARI, MOA, ICRISAT, Universities); **Policy and Regulation-** MOA has a general food policy but not one specific to pigeonpea and other minor staple crops **Financial Services-** Most actors finance themselves as few financial service providers, if any, offer support. This is with the exception of fresh. Vegetable Pigeonpea exporters who offer packaging. **SPS/Standards Certification** etc. No SPS or product standardization is offered except at the import/export levels of the value chain.
Retailing							
Wholesaling							
Exporting							
Importing							
Processing							
Trading							
Collecting,							
Bulking,							
Storage							
Production							
Input Supply							

9.1.9 Pigeon pea – Analysis of Constraints and Opportunities

The main constraints in them pigeonpea subsector includes:

- Poor access to high quality seeds and susceptibility of some pigeonpea varieties to field pests-constraining utilization of improved varieties.
- Lack of farmer and trader organization which increases the unit cost of doing business;
- Poor infrastructure (e.g., roads, communication systems, electricity, etc) in rural areas and geographical dispersion of farmers and farms which tend to increase assembling and transport costs and consequently reducing the propensity to exploit the export markets, particularly for dhal.
- High competition by low cost exports from Myanmar-a major exporter of whole-grain pigeonpea to India accounting for over 90% of the country's imports. In addition several countries including USA, Canada, and France have identified the opportunity to export other pulses to India at much lower costs.
- Lack of subsector-specific and visionary policy framework;

9.1.9.1 End-Market Analysis

According to recent studies and in particular the ICRISAT study ("Unlocking the Potential of High-Value Legumes in the Semi Arid Regions-Analysis of Pigeonpea Value Chain in Kenya; November 2007), there are good domestic, regional and export trade opportunities for pigeonpea. However, the domestic market for dry pigeonpea is thin and volatile and regional trade serves to stabilize the variability in local production. Unlike other legumes that are mainly traded locally, pigeonpea can be exported to India and other overseas markets including the USA, Canada, Europe, the Middle East and South Africa. The Indian market has been attractive to East African exporters because of its large size in terms of volumes demanded, low expectations on product quality, and low import duty. On the other hand, export to other markets is driven by the higher and relatively stable prices compared to the traditional Indian export market. Kenya's export of frozen fresh peas to high-value European markets has great potential for expansion in the pigeonpea subsector. Nonetheless, it is constrained by inconsistent supply, limited investments in post-harvest handling and packaging to ensure strict quality standards, and insufficient market research to identify consumer preferences in the niche markets.

For Kenya's pigeonpea subsector to become competitive and expand, a number of actions will be necessary:

- Productivity will need to be increased, production timed, marketing costs reduced, and quality standards established and strictly complied with. Introducing simple, easily administered quality standards that are based on end user needs will enable farmers,

traders, and exporters to exploit quality-conscious niche markets in Europe and North America.

- Expansion of domestic production will also require targeting international markets, particularly India, where demand is not only high but also growing rapidly. However, these markets are highly competitive and require careful timing in terms of planting, harvesting, and marketing. For instance, the Indian market is open to Kenya only during a short period in August/September and closes in October/November when the crop in India is harvested and increased supplies lead to falling prices. Targeting of the Indian market should therefore aim at Kenyan pigeonpea reaching India during the off-season period when import prices are relatively high-which calls for the planting of early-maturing varieties.

- Institutional innovations that link producers more directly with exporters and processors or shorten the extended supply chain are needed in order to reduce transaction costs and thereby increase competitiveness of Kenyan produce locally and internationally. This is because high domestic prices are fuelled by underdeveloped, fragmented, and extended marketing channels which drive up transaction costs and wholesale prices to processors and exporters. Such innovation may include formation of farmer organizations which can facilitate farmers' access to improved technologies and create opportunities for forward contracting which has the potential for offering exporters and processors access to larger and reliable supplies.

- There is a strong synergy between the input and output markets. Increasing productivity and output market competitiveness will require a regular supply of improved seed. Pilot marketing of small seed packs in the eastern and southern African regions has borne positive results, encouraging farmers to purchase small quantities of seed at prices higher than grain price. Farmer organizations, community seed production and marketing units, and rural agro-dealers play an important role in the functioning of the seed distribution system in rural areas. Consequently, building their capacity can greatly improve smallholder farmers' access to improved seed. Furthermore, this would also stimulate private sector investment in seed systems development and increase demand for improved seed

- Policy support will be needed to strengthen efforts for up scaling available high yielding varieties, reviewing variety testing and approval systems to reduce delays in accessing new germplasm; developing systems that allow for marketing of affordable certified seeds, and promoting of contract farming and group marketing strategies to ensure consistent supply and strengthen market power of small producers.

9.1.9.2 Vertical and Horizontal Linkages

Other than informal and short-lived business relationships between farmers, traders and processors, the subsector is characterized by lack of formal vertical and horizontal business linkages. Fostering of group marketing activities will require public and/or private sector investment in strengthening rural institutions for mobilizing farmers into groups/associations, enhancing their agribusiness skills, and developing forward (output) and backward (input) market linkages. Farmers will especially take advantage of collective action to improve their bargaining power. Government support is needed in establishing the institutional infrastructure and enabling policies to strengthen farmer organizations.

9.1.9.3 Subsector Opportunities and Challenges

Previous studies (Freeman et al. 1999; Muricho 2002; Murage 2003 and Shiferaw et a 2008) observe that there exists vibrant domestic, regional and export markets for dry grain and dhal, and that there is an emerging market for vegetable pigeonpea. There are good subsector opportunities given the following:

- Opportunity to increase yields from the current average of 0.4 MT per hectare to over 0.7 MT per hectare representing a 75% increase. This is supported by ICRISAT's finding in 2004 that some farmers in Mbeere district had managed to achieve 0.70 MT per hectare with the adoption of improved varieties (Shiferaw et al 2008)
- Large and growing domestic and international market for pigeonpea whole grain, dhal and vegetables-against increasing deficits from about 12,500 MT in 2007 to about 25,000 MT in 2008.
- Local market opportunities for dry pigeonpea grain, dhal and vegetables given trend in demand estimated at 1.3% per annum over the last 5 years. The domestic market for Dhal is driven by increasing demand from the Asian communities in the major urban centers especially Nairobi and Mombasa, while the market for whole dry grain is driven by its popularity among communities in Eastern Coast and Central provinces.
- India offers a large and growing market for pigeonpea while other export destinations with good market opportunities include the USA, Canada, Europe, the Middle East and South Africa. The Indian market is particularly an attractive market attractive because of its large size in terms of volumes demanded, low expectations on product quality, and low import duty. The export market size is not precisely known. However, given the large and growing Indian population, demand is bound to increase. Estimates of Eastern Africa trade with Europe is in the order of 3,000-5,000 MT per year. The demand in North America is estimated to be of the same magnitude. Several factors underlie the growing pigeonpea export trade between Kenya and India:

- Absence of export bans in Kenya because the crop is not considered critical in terms of national food security;
- Harvesting in Kenya takes place slightly before the Indian harvest thereby providing a window for Kenyan exports;
- India's pigeonpea productivity and area expansion has not, and is unlikely to keep pace with domestic demand;
- India imposes very low import duties on pigeonpea (5-10%) and sometimes even zero; (v) availability of ship traffic at relatively low freight charges.

The challenge for Kenya's pigeonpea subsector lies in the following:

- Increasing competition from Myanmar-a major producer and exporter to India having the advantage of proximity to India compared with Kenya;
- Increasing competition from emerging high-value markets such as USA, Canada, Europe, Middle East and South Africa-all of which have identified the opportunity to export other pulses to India at much lower costs
- High domestic prices and procurement costs in Kenya which reduce the chances for effective exploitation of the export market, particularly for Dhal.

9.2 COWPEAS

Cowpea {Vigna unguiculata (L.) Walp} is an important food and fodder legume crop in the semi-arid tropics covering Asia, Africa, Southern Europe, Southern United States, Central and South America. Nigeria is the single world's largest producer and consumer of cowpeas with an estimated 5 million hectares and annual production amounting to 2.4 million MT. This is followed by Niger, Brazil and USA. Other smaller producers include Mali, Burkina Faso, Senegal, Ghana, Togo, Benin, Cameroon, and Chad in Central and West Africa; Sudan, Somalia, Kenya, Malawi, Uganda, Tanzania, Zambia, Zimbabwe, Botswana, South Africa and Mozambique in East and Southern Africa; Bangladesh, China, India, Indonesia, Korea, Myanmar, Nepal, Philippines, Sri Lanka and Thailand in Asia; and Brazil, Cuba, Haiti, USA, and the West Indies in Central and South America. Reliable statistics are not available but based on the FAO data, the estimated worldwide area under cowpea is over 14 million hectares with production estimated at 4.5 million MT annually.

9.2.1 Production versus Consumption

Compared to other food crops produced in Kenya, cowpeas are not an important crop both in terms of the volume of production and consumption. As table 9.7 below indicates, production over the last five years has oscillated between 29,000 MT in 2004 to about 87,000 MT in 2006.

Due to poor climatic conditions, annual production declined from about 83,000 MT in 2007 to about 48,000 MT in 2008-despite increase in area planted from around 130,000 in 2007 to about 148,000 hectares over the same period. The average value of annual production in the last five years has been around Kshs 2.2 billion or approximately US$ 30 million. Data on national consumption is not available but officials of the Ministry of Agriculture and NCPB estimate that production in recent years only meets 60-75%f national consumption (not requirement which is not known).

Table 9.7: Cowpeas Production, Area, Values and Consumption in Kenya (2004-2008)

Year		2004	2005	2006	2007	2008
Area Planted	(Ha)	125,189	72,654	161,971	130,163	148,157
Production	(MT)	29,321	36,242	87,808	83,251	47,958
	90-Kg Bags	325,463	402,684	975,551	925,015	532,810
Yields	(MT/Ha)	0.23	0.50	0.54	0.64	0.32
Estimated Value	Billion Kshs	1.46	1.45	4.25	2.3	1.65
	Million US$	0.02	0.02	0.06	0.03	0.02
Price	(Kshs/Kg)	50.0	22.2	28.3	32.2	34.4
Consumption	(MT)	45,109	54,093	117,077	134,276	65,696
Surplus/(Deficits)	(MT)	(15,788)	(17,851)	(29,269)	(51,025)	(17,738)

Source: Republic of Kenya; Ministry of Agriculture –MOA; Economic Review of Agriculture (2009)

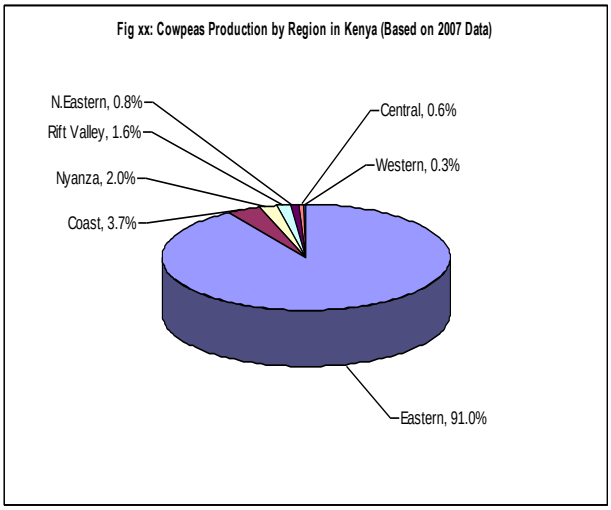
According to traders at Nyamakima in Nairobi, Somalia has been the main source of cowpeas over last two years. However, neither the total volume of imports nor the import prices are well known because most of the trade was informal with Kenyan traders actually exchanging other types of goods with cowpeas which they then supply to Nairobi and other urban centers.

9.2.2 Main Producing Areas

Cowpeas do well in dry areas and as indicated below, Eastern province is the main cowpea producing area in Kenya accounting for over 90% of total national production and approximately

89% of total planted area. The main producing districts in the province include Mwingi, Makueni, Kitui, Mbeere and Tharaka. Other producing areas (albeit comparatively small producers) include Coast province (3.7%), Nyanza (2%), Rift Valley (1.6%), North Eastern (0.8%), Central (0.6%) and Western (0.3%) as shown in Figure 9.11.

Figure 9.11: Cowpea Main Producing Areas



Source: Compiled by Study Team	Source: Compiled based on MOA data (Annual Report 2007)

9.2.3 Cowpea-Value Chain Mapping

Compared with other food crops such as maize and common beans, cowpea is a relatively minor crop in Kenya. This is perhaps part of the reason why MOA does not normally include the crop in the national food balance sheet or even maintain significant subsector data and information. While observing that this is more or less the same situation in most countries a recent report by the International Institute of Tropical Agriculture-IITA stated as follows:…….”It is rather difficult to obtain reliable statistics in cowpeas area and production because most countries do not maintain separate records on cowpea- which probably prompted FAO to suspend formal publication of cowpea production data several years ago…….”

The main functions in the cowpeas subsector include seeds supply, production and marketing. Unlike in the more important staple crops like maize, beans and rice there are limited activities in the area of research other than by KARI-Katumani (and not ICRISAT because the crop does not fall in its mandate). Processing is a very limited activity occurring only in urban centers in involving processing into flour and mixing with other forms of flour for the preparation of composite flour mainly for use as porridge for the infirmary (HIV/AIDs and young children).

9.2.3.1 Inputs Supply

The main inputs applied to cowpeas production are labour and seeds. The crop is largely cultivated for subsistence and the use of fertilizers is limited to less than 15% of the farmers. The bulk of the seed is (75%) generated from the farm household (retention) from crop harvest or purchased from other local households. According to DAO Mwingi West district about 75-85% of the farmers use own or locally purchased seeds which is currently selling at Kshs 100 per Kg. The rest 15-25% buy certified seeds from local stockists who are normally supplied by the Kenya Seed Company Ltd. The low utilization of certified seed is attributed to cost which retails between Kshs 170 and Kshs 250 per Kg depending on availability which is about 70-150% more expensive than locally supplied seeds. In addition to purchased certified seeds, there are also intermittent supplies through occasional Government and NGOs famine relief programs as is currently happening. MOA data indicates that the country produced 102 MT in 2006 and 145 MT in 2008 and none in 2004, 2005 and 2007. There were no cowpea seed imports during the period. Most farmers (over 85%) use manure instead of fertilizer-primarily due to what they consider as high cost (the current price is around Kshs 2,300 but was as high as Kshs 4,000-5,000 late 2008 and early 2009.

9.2.3.2 Production

The majority of cowpea growers are women who grow the crop primarily for household food, but also for sale-an increasing phenomenon in recent years. The typical woman cowpea grower has a small plot, 0.25 to 1 hectare often intercropped with other cereals such as sorghum, millet and maize (Network for Genetic Improvement of Cowpea for Africa-NGICA). Once produced, the crop is sold either to local/traders and brokers. Cowpea suffers heavily from insects, both in the field as well as when the grain is stored after harvest. Graphic proof of this comes from comparing yields with and without insecticide treatments. Like in most of the other producing countries, yields in Kenya have averaged around 450 Kgs per hectares which is largely attributed to a series of insect pests and diseases, the most devastating being maruca vitrata which attacks the flowers and bores through the pods. Yet, research has shown that with the use of effective insecticides can increase yields significantly. For example, application of Carbaryl at the rate of 1.12 Kgs per hectare can raise yields to 1,382 Kg per hectare (over 200% increase), while application of Endosulfan at the rate of 0.43 Kgs per hectare can raise yields to about 1,674 Kgs per hectare (over 270% increase). Insects continue to damage cowpeas after harvest. The major pest is the cowpea weevil. A single cowpea weevil female can reproduce herself 20-fold every 3-4 weeks. Cowpea grain that has a very light infestation - which starts in the field before it is stored - will have a heavy infestation within two or three months. Foods prepared with this grain have an unpleasant flavor and if taken to market, the price of this grain is discounted.

9.2.3.3 Marketing

Cowpea is a dual-purpose crop grown for both grain and vegetable that may be consumed as green or dried leaves, green pods, green peas, grain and fodder. While the bulk of the green leaves, pods and peas are consumed at home or within the producing areas, the bulk of dried grain is marketed. Once the dried cowpea grain is harvested and about 30% retained for home consumption. The farmer sells the rest (70%) through the following channels: (i) Rural assemblers/brokers at the farm gate or at the local market centers; (ii) Rural consumers; (iii) Rural-open-air retailers in local market centers; and, (iv) Rural retail shop-keepers. These channels, actors and their transactional relationships are shown in the map below:

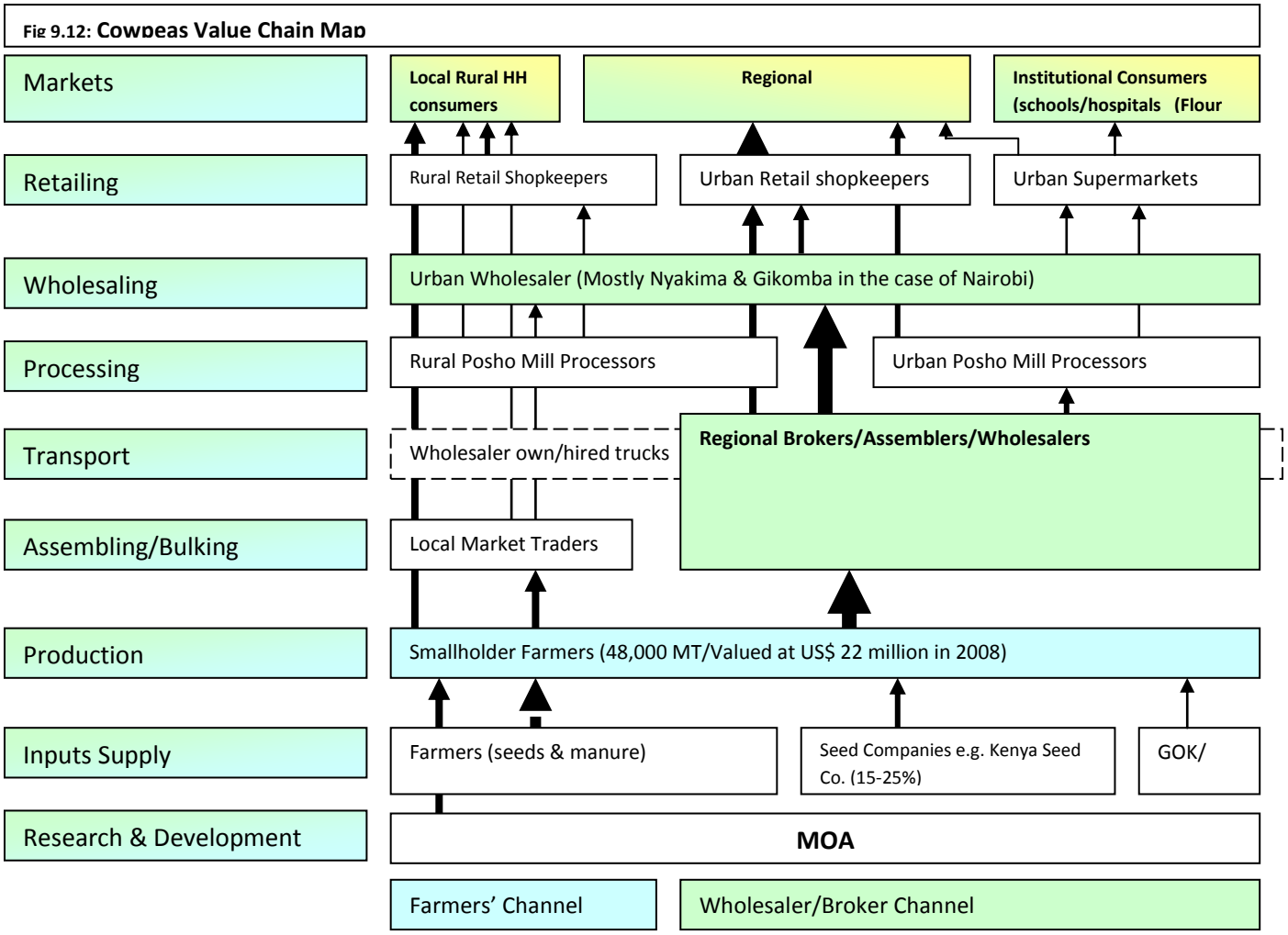
9.2.4 Cowpea-Value Chain Functions Matrix and Mapping

The following table provides a summary of cowpea subsector functions and actors. As will be noticed, farmers play multiple functions including generating their own seeds, providing manure, and retailing at the local level consumers and shopkeepers. Traders/brokers undertake bulking, storage, and trading, while wholesalers perform multiple functions including storage, collection, transportation, wholesaling (combine with retailing), and occasional regional imports and exports.

Functions	**Participants/Actors**						**Support Markets**
	Input suppliers	Farmers	Traders/ Brokers	Processors	Wholesalers	Retailers	
Retailing							• Research and development is not as elaborate as in the rest of the major staple crops e.g. maize, rice though KARI-Katumani is a significant actor. • Extension services only from MOA but weak; • Inputs supply comprises mainly seeds by farmers from harvest household retention; • There is limited or no financial services as the crop is produced as a subsistence crop by smallholder farmers; • There is no specific subsector policy and any relevant policy framework is nested on the general national food
Wholesaling							
Exporting							
Importing							
Processing							
Trading							
Collecting,							
Bulking,							
Storage							
Production							
Input Supply							

							policy. • Market information limited and passed to from farmer to farmer informally

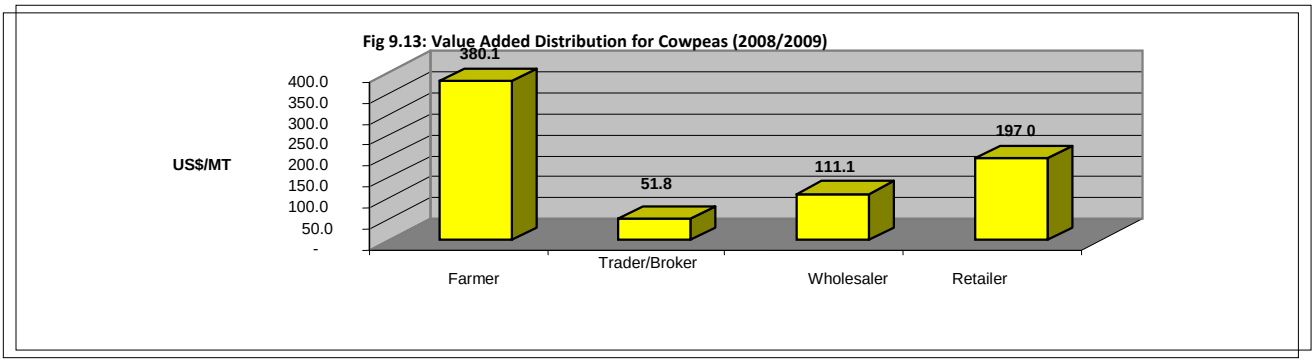
Figure 9.12 below depicts cowpeas value chain map, key actors, their transactional relationships and estimated overlays (volume and value) where possible.



Source: Compiled by Study team

9.2.5 Value Added and Distribution

Figure 9.13 below depicts value addition distribution for cowpea grain for the crop year 2008/2009. It indicates that the farmer was the highest beneficiary having received about US$ 380 per MT, followed by the retailer who received approximately US$ 197 per MT.



9.2.6 Constraints and Opportunities

The main constraints facing the cowpea subsector include:

- Inadequate availability of high quality seed as breeders are reluctant to invest in this area because of the high risks associated with the characteristics of self-pollination and therefore farmers pre-disposition towards using own-seed;
- Low yields associated with poor quality of seed and low utilization of chemicals against pests infestation;
- Limited availability of diversified product value addition;
- Lack of organized marketing among farmers resulting in low producer price offers by assemblers/traders;
- Lack of market information including prices;
- Lack proper storage facilities-without proper storage a pest called the cowpea weevil can consume nearly all the cowpeas stored on farms. Because of the storage problems, farmers are often forced to sell their cowpeas at harvest, when prices are at their lowest levels. This could be overcome by using the hermetic storage method which involves triple bagging of the cowpeas in plastic and sealing them tight. The method is simple and not a new idea, but most producers in Kenya do not know about it or have not used the method properly. Not only is the process low-cost - basically the cost of the plastic bags – It is also safer than current practices of either no protection or treating cowpeas with insecticides. "The chemicals add to the expense of storage and create health and environmental hazards.

9.2.7 End Market Analysis

Cowpea generates five products for end-market use. These include green leaves, green pods, green peas, grain-all for human consumption and fodder for animal feed. Dried grain is by far the most important, accounting for over 80% of total annual production. Reliable data on the proportionate market shares and national requirements by each of these end products is not

available and the table below is based on estimations by traders who were a few respondents contacted during the study.

The form of the product at the end market	Users	Volume of National Requirement in (MT/Year)	End Market Price (July 2009) (US$/MT)	Source of the product		
				Domestic Market	Imports	
					Intra regional (i.e from EAC/COMESA) percentage (%)	Extra regional (i.e outside EAC/COMESA)
Green Leaves	Producer HH & other local consumers	N/A	N/A	N/A	0%	0%
Green Pods	Producer HH & other local consumers	N/A	N/A	N/A	0%	0%
Green Peas	Producer HH & other local consumers	N/A	N/A	N/A	N/A	0%
Dry Grain	Producer HH & other local consumers	65,700	76,445	48,000	85%	15%
Fodder	Local livestock industry	N/A	N/A	N/A	N/A	N/A

9.3 CHICKPEAS

9.3.1 Global Perspective

Chickpea (Cicer arietinum L) is a highly nutritious pulse and ranks third in the list of important food legumes that are cultivated throughout the world. It contains 25% proteins, which is the maximum provided by any pulse and 60% carbohydrates. The crop is cultivated in over 40 countries globally including countries in Asia, Africa, Europe and America. Developing countries account for over 95% of the area, production and consumption globally. The crop is mainly grown by small-scale as both a food and a cash crop. It is eaten either as whole seed, dehulled, or as flour though it is also eaten as immature shoots and seed as vegetables. The two main varieties produced include the small-seeded type known as desi variety which account for about 85% of world chickpea production, and mainly grown in the Indian subcontinent, Ethiopia, Australia, Mexico, Afghanistan, and Iran; and the large-seeded type known as kabuli variety and the large-seeded kabuli type which is commonly grown by some farmers in the Mediterranean region, Mexico and India.

Recent national and global data on chickpeas production and trade are difficult to come-by and much of the information is several years old[30]. The latest available information and data indicates that global chickpea production during 2002-2004 was about 8 million MT from an area of 10 million hectares giving an average productivity of 786 Kgs per hectare. Over the period 1985-2004 global chickpea planted area increased by 7%, yield by 24% and production by 33%. The largest world producers of desi chickpea included India, Pakistan, Myanmar; Australia and Bangladesh, while the main producers of kabuli chickpeas include Turkey, Iran, Spain, Canada, Syria, USA, Ethiopia, Tanzania, Tunisia, Sudan, Malawi and Portugal. India is the largest producer of chickpeas (70%) followed by Pakistan, Turkey and Iran.

USDA Foreign Agricultural Service figures indicate that 19,700 MT of dried chickpeas were exported in 2008. Spain was the largest importer of followed by Canada and Japan. Imports of dried chickpeas increased in 2008, jumping 25% to reach 17,860 MT with Mexico and Canada being some of the largest suppliers of dried chickpeas.

9.3.2 Domestic Production versus Consumption

Chickpea is a relatively less important food crop in Kenya and the Ministry of Agriculture does not normally have subsector information on production and consumption among other types of data. Contacts with the Ministry officials both at the headquarters and some district agricultural officers just indicated that there is no value chain data and information. What was however established is that the crop is mainly grown in the same regions in Kenya as cowpea and pigeonpea (i.e. Eastern province). For all intents and purposes, the subsector also faces the same production and marketing constraints as pigeonpea and cowpea.

Chickpea is among ICRISAT's mandated crops in Kenya. The organization has developed sixty-six cultivars based on improved germplasm but only one such cultivar has seriously been introduced tried in Kenya. The introduction of new large-seeded kabuli cultivars in Eastern Africa, particularly Ethiopia, has opened new opportunities for farmers for earning extra income through export of these high-valued chickpeas.

30 e.g. The World Chickpea and Pigeonpea Economies; Facts, Trends, and Outlook; P K Joshi, P Parthasarathy Rao, C L L Gowda, R B Jones, S N Silim, K B Saxena, and Jagdish Kumar (2001).

10.0 CASSAVA

10.1 Production

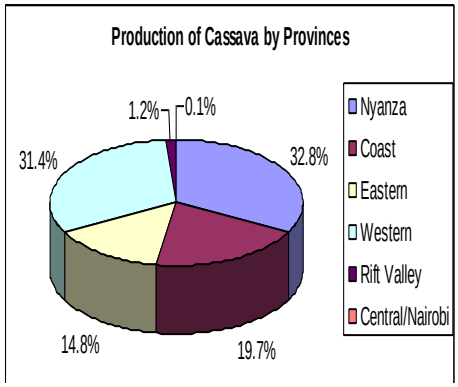
Cassava (Manihot esculenta) is mostly grown at the Coast, Western and Nyanza provinces with smaller amounts in Eastern, Central and Rift Valley. Due to its tolerance to drought, it is an invaluable famine reserve. It does best in elevations below 1500 masl in temperatures ranging from 25°- 29°C and in the rainfall range of 1000 – 1500 mm/year. It grows well in light sandy soils. Cassava is grown from stem cuttings at the rate of 10,000 cuttings/ha and can be grown as a rotation crop with cereals. Early maturing varieties are ready for harvesting at 7 months while late maturing varieties take from 9 – 20 months. Average yields are between 7.5 – 10MT/ha but can be as high as 25MT/ha with proper management.

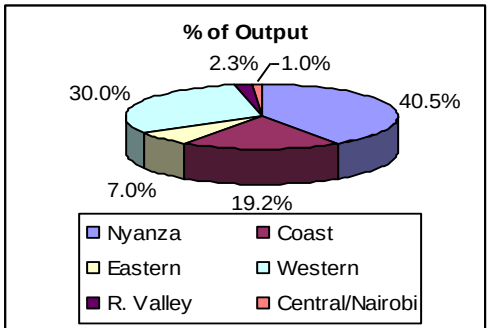
10.1.1 Production Areas

In 2008, about 54,673 ha were planted with cassava in all areas of Kenya except North Eastern Province. Nyanza province was the main producer accounting for 32.9%, followed by Western at 31.4%, Coast accounting for 19.7% and Eastern accounting for 14.8%. Other minor growers were Rift Valley and Central/Nairobi accounting for 1.2% of the total area as shown in table 10.1.

Table 10.1: Production of Cassava by Provinces, 2007

Year	Nyanza	Coast	Eastern	Western	R. Valley	Central/Nairobi	TOTAL
Area (ha)	18,010	10,745	8,101	17,144	662	11	54,673
Production (MT)	339,214	143,614	57,555	194,646	15,740	195	750,164
Yields (MT/Ha	19	13	7	11	24	18	15.3
% of Area	32.8	19.7	14.8	31.4	1.2	0.1	100
% of Output	45.2	19.1	7.6	30	2.1	0.02	100





Source: MOA Annual Report, 2007

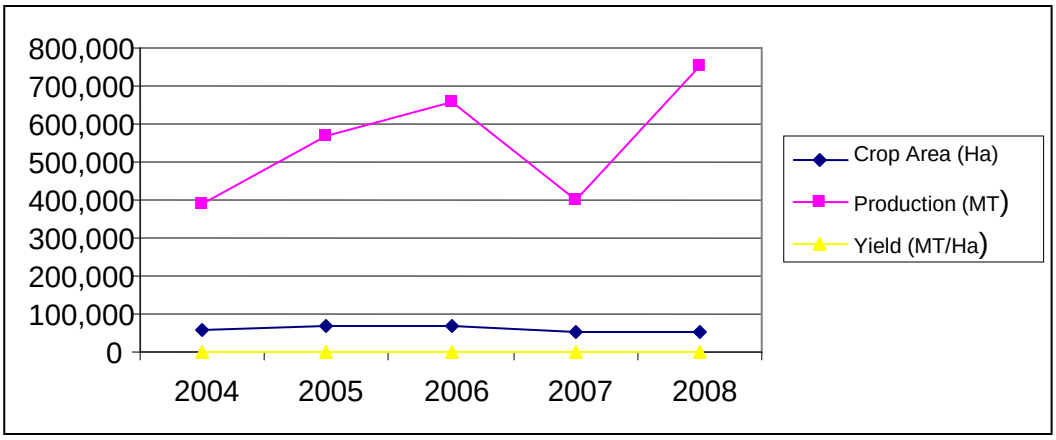
Yields averaged at 15.3MT/ha. Nyanza, Coast and Western provinces produced 94.3% of all production of 750,164MT in 2007. The map of the producing areas is shown in figure 10.1.

Figure 10.1: Map of Cassava Production Areas

10.1.2: Production Trends

Cassava production has risen from 388,713MT in 2004 to an estimated 750,964MT in 2008, an increase of 93%. The area under cassava has averaged at 60,223ha but overall yields have been on the increase from about 7MT/ha in 2004 to an estimated 15.3MT/ha in 2008, possibly due to release of new varieties. The trend is shown in figure 10.2.

Fig. 10.2: Area and Production Trends, 2004 – 2008

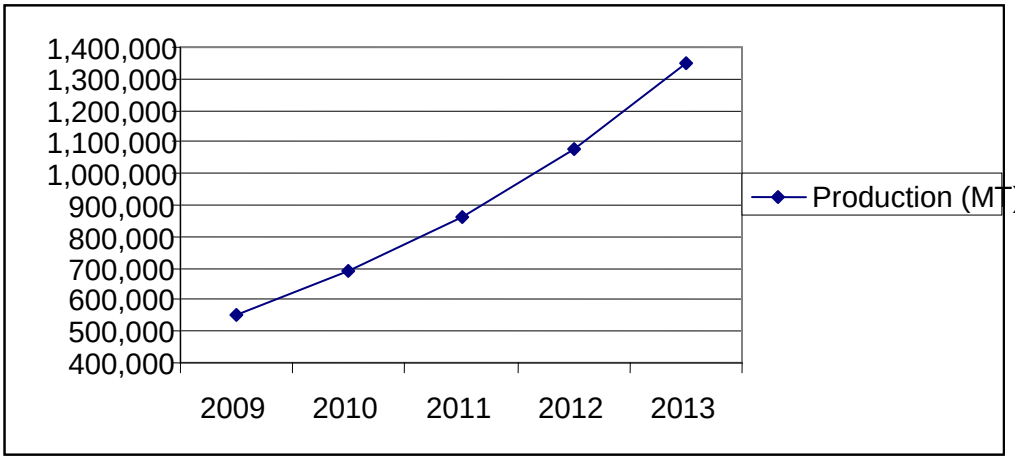


Source: MOA-ERA (2009)

10.1.3: Projections of Cassava Production

With increasing impacts of climate change and frequent droughts, cassava, due to its tolerance to drought, is becoming an invaluable famine reserve. Production is therefore expected to increase. In the period 2004 to 2008, growth in production averaged at 28% while production averaged at 552,083MT. The projections to 2013 are based on the assumptions that the 2009 production will be equivalent to average of the previous five years and that thereafter, the annual growth rate will be 25% p.a. The projections are shown in figure 10.3.

Fig. 10.3: Projections of Cassava Production, 2009 – 2013



Source: MOA-ERA (2009)

Projections show that output will increase to 1.35mi MT by 2013 which is about the 2008 estimates of 0.75mi MT.

10.2: Consumption of Cassava

10.2.1: Domestic Consumption

Almost all cassava produced in Kenya is consumed locally and some small amount is made into starch. Using the production figures, the consumption trend is as given in table 10.2.

Table 10.2: Cassava Consumption, 2004 – 2008

	2004	**2005**	**2006**	**2007**	**2008**
Production (MT)	388,713	566,400	656,633	397,705	750,964
Population (mi)	34.2	35.1	36.1	37.2	38.3
Per capita consumption (Kg/ca)	11.4	16.1	18.2	10.7	19.6

Source: MOA-ERA (2009), KNBS – Economic Survey, 2009

It is noted that per capita consumption ranged from 11kg/ca to 20kg/ca and averaged at 15kg/ca. Consumption is expected to increase. Kenya is self-sufficient in cassava.

10.2.2: Intra and Extra EAC/COMESA Export and Import Trends

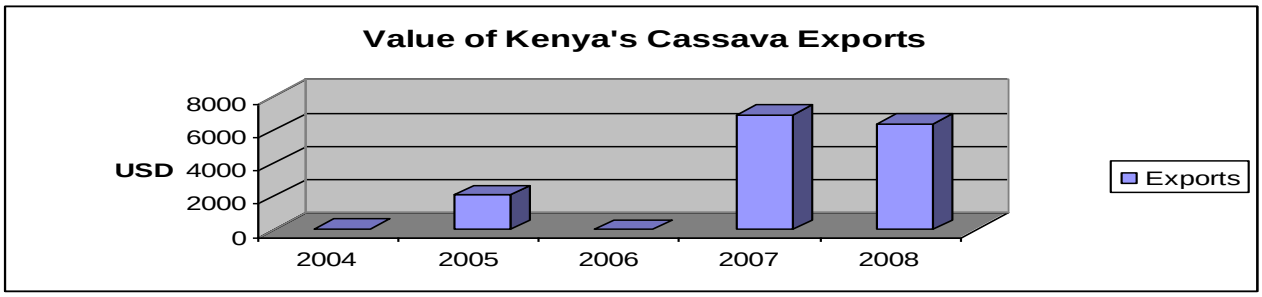
Trade in cassava and its products is minimal. In the period 2000 – 2006, only 46MT of imported dried cassava was recorded while only 6MT was exported (FAOSTAT 2009). On the other hand, trade in cassava starch is significant. Imports increased from 160MT in 2000 to a peak of 2,408MT in 2005 but declined in 2006. The average imports for the period was 594MT. Exports of starch were minimal increasing from 3MT in 2001 to a peak of 18MT in 2006 and averaging at 10MT per year during the period.

10.2.2.1: Extra-EAC/COMESA Exports

Considerable cross-border trade takes place between EAC and both imports and exports occur but some might not be recorded. Considerable amounts of dried cassava come from Tanzania. The figures for exports were minimal totaling USD15,524 in 2004 to 2008 as shown in table 10.3 but import figures as given by FAO for 2004 to 2006 totaled USD 426,000 and averaged at USD 142,000 per year.

Table 10.3: Extra COMESA Cassava Exports (USD)

	2004	2005	2006	2007	2008
Exports	37.76	2,084	8.91	6,967.67	6,425

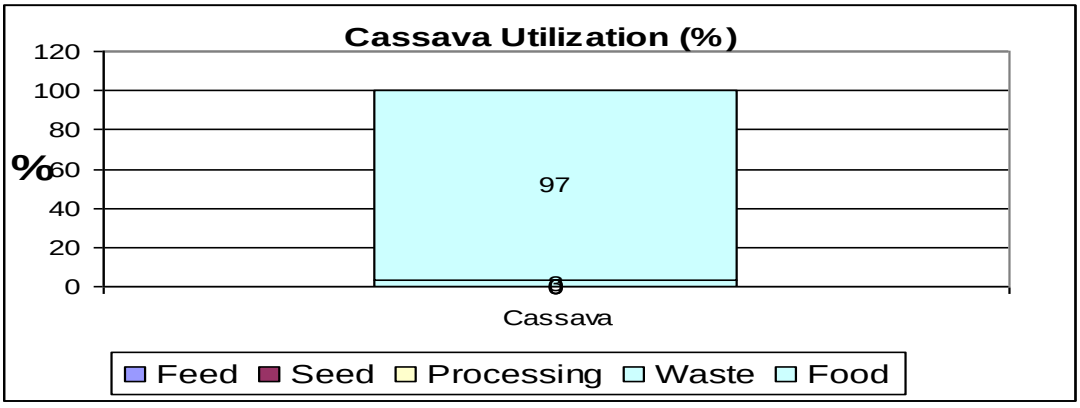


Import prices declined from USD 325/MT in 2000 to a low of USD 65/MT in 2005 when the country imported its peak of 2,408 MT. Import prices averaged at USD 250/MT during the period. Export prices have been on the increase and averaged at USD 444/MT during the period.

10.3: Value Chain Mapping

10.3.1: Commodity Utilization Analysis

Domestic supply is based on local production of 643,000MT (Econ. Survey 2007). Out of this supply, 3% (19,000MT) goes to waste and 97% (624,00MT) is used as food either fresh or dried/milled into flour. There is minimal processing to products like starch which is mostly imported. The utilization is given below:



Source: Econ Survey 2007 – FBS 2005

The per capita utilization is 18kg/ha for a population of 34.5mi.

10.3.2: Actors in the Value Chain

10.3.2.1: Research and Multiplication

Supply of planting materials especially improved varieties is by KARI (Katumani, Mtwapa, Kitale). As indicated, KARI has three varieties for Coast (Kaleso, Guso and 5543/156), three for Central/Eastern region (KME, KME 61 and Mucericeri) and seven for Western Kenya (1 2200, Tereka Serere, Adhiambo tera, CKI, TM5 60142 and BAO). Foundation seed is supplied by KARI to seed multipliers who in the past have been promoted by KARI-ATIRI Project. The available varieties and recommended areas are as shown in Table 10.4

Table 10.4: Cassava varieties by Region

1. Coast Region

a) Local types:

- Kibanda Meno – Very sweet
- Katsunga – Leaves taste like wild lettuce when cooked

b) Improved types

- Kaleso (46106/27) – High yielding, for human consumption.
- Guso - Better yielder than Kaleso. Also for human consumption.
- 5543/156: - It is a high yielding variety for livestock. It is bitter.

2. Central Region – Katumani

- KME - Sweet, less fibrous and has low cyanide content
  - Tolerant to cassava mosaic virus and scales.
- KME 61 - Bitter and more fibrous than KME
  - Tolerant to cassava virus and scales
- Mucericeri - Sweet
  - Tolerant to cassava mosaic virus and scales.

3. Western Kenya

- 1 2200
- Tereka
- Serere

- Adhiambo Iera
- CKI
- TMS 60142
- BAO

10.3.2.2: Farmers

It is estimated that 83,000 farmers produce cassava with an average of 0.65 ha/HH. However, in Western/Nyanza, the sizes vary from 1.2 – 1.8 hectares. Many farmers do not use improved seedlings and fertilizer and only a few use organic manure, hence the low yields. Household consumption is on average 20kg/ca for a household of 6 persons and the producers consume about 10,000MT and the rest is sold in nearby markets.

10.3.2.3: On-Farm Drying

Some farmers dry cassava chips and sell to traders in the market who sell to long distance markets, urban kiosks and if they produce high quality chips in adequate volumes, they can sell to industrial producers of animal feeds and starch.

10.3.2.4: Middlemen

Farmers deliver cassava to local markets possibly 20/district and from there, middlemen purchase for long distance markets. Non-producers purchase for domestic consumption.

10.3.2.5: Industrial Processing

As mentioned earlier, cassava has potential in value addition in animal feeds and food products. Currently, there is very little value addition. Kenya has over 40 animal feed manufacturing units with a capacity of over 800,000MT and these can use cassava products. Kenya has over 160 milling units which can also use cassava. Imports of cassava starch were valued at USD 426,000 between 2004 and 2006 averaging at USD 142,000 p.a. This is an additional area for value addition.

10.3.2.6: Retail Level Stakeholders

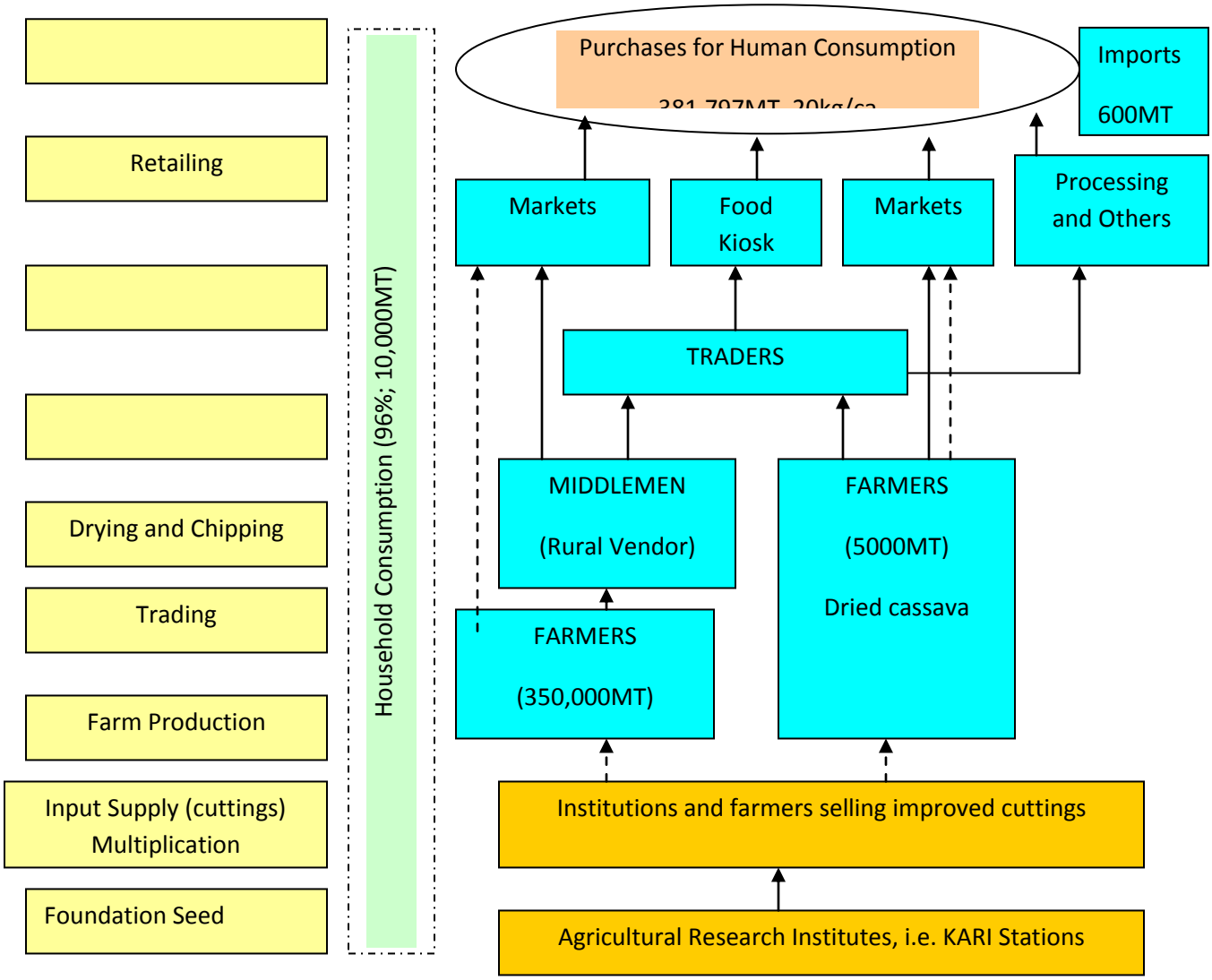
The main retail level stakeholder for fresh cassava is the local and urban markets while for cassava chips/flour, the outlet can be through any of over 3,600 retail outlets in the country. However in Nairobi, cassava (dry and flour) is concentrated in Gikomba and Nyamakima.

10.3.3: Cassava Value Chain

10.3.3.1: Value Chain Map

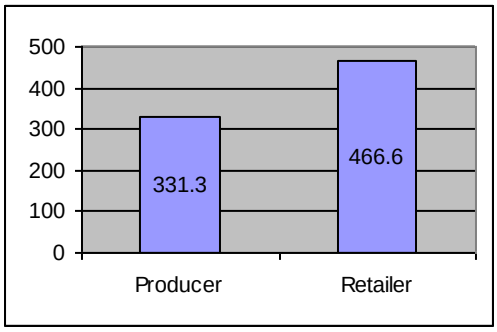
The value chain for cassava is dominated by on-farm/fresh cassava consumption and using the 2007 production of 397,705MT and a consumption of 96%, this would give a consumption of 381,797MT, waste 11,931MT and other uses (chips/industry) at 3,977MT. Of the 381,797MT, possibly 10,000 is consumed at home (20kg/ca) and the rest is sold. At an average acreage of 0.65ha/HH countrywide, the total number of producers is estimated at 83,000 producers. The simplified value chain is shown in figure 10.4.

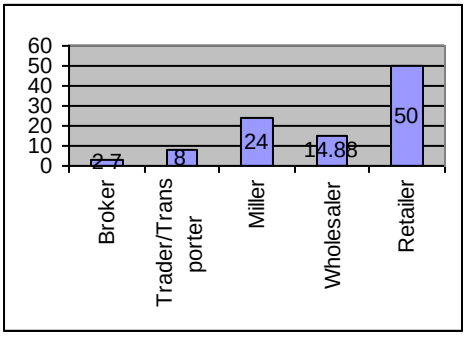
Fig. 10.4: Cassava Sub-Sector Map (2007)



10.3.3.2: Value Addition

Cassava producer price was USD 313.3/MT and retail price of cassava flour was at USD 466.6/MT giving a difference of USD 135.4/MT. Margins for various stakeholders were brokers USD 2.7/MT, traders USD 8.3/MT, miller USD 24/MT and retailer USD 50/MT. The remaining USD 50.3/MT covers marketing costs and aspects of conversion from fresh to dried flour





10.4: Constraints and Opportunities

10.4.1: End Market Analysis

10.4.1.1: End Market Users of Cassava

Cassava is utilized as fresh cassava for roasting and roasting mostly in rural areas. Marketing of fresh cassava to urban areas is constrained by bulkiness, perishability and consumer fears of toxic cassava varieties. The bulk of cassava trade is in dried cassava which is milled to cassava flour. Estimates of per capita cassava consumption (FAOSTAT 2009) range from 13kg to 21kg/ca, averaging at 19.6kg/ca. The end use of cassava is as shown below:

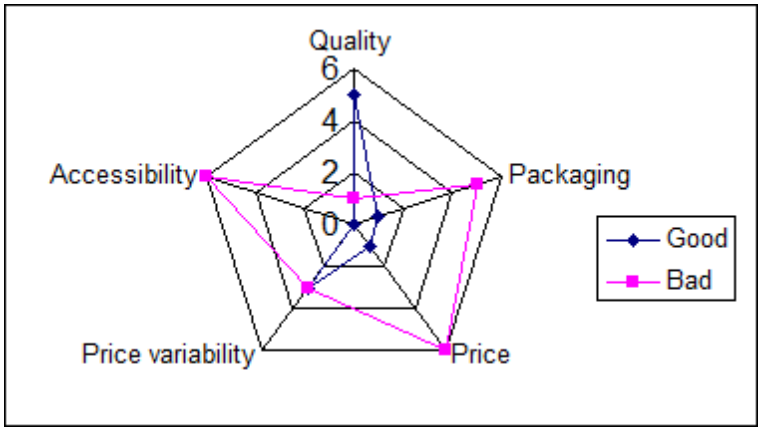
End Market Use and Users of the Product - Cassava

The form of the product at the end market	Users (e.g. millers, households)	Volume of National Requirement in Metric Tons per year	End Market Price in July 2009 in US$ per Metric Ton	Source of the Product		
				Domestic Market	**Imports**	
					Intra regional (i.e. from EAC/COMESA)%	Extra regional (i.e. outside EAC/COMESA)
Flour		31,200	USD 466	96%	4%	-
Fresh		750,964	USD 333	100%		

11.4.1.2: Consumer Preferences

Consumers concerns include price/price variability and packaging while quality and packaging were considered reasonable.

The end market consumer preference for cassava flour is as shown in the spider diagram below:



10.4.1.3: Current and Potential Market Opportunities

The Government has published a Cassava Policy Paper (MOA, 2007) to promote cassava production and there are increased stakeholder consultations. This is prompted by the crop capability to withstand drought and its potential in ASAL areas. There is also considerable interest to grow it for bio-fuels. It has potential for starch production with imports in 2006 at 540MT. Dried cassava imports are minimal from Tanzania.

10.4.2 Vertical Integration

As in the case of sorghum and millet, the value chain is not well linked from producer to consumer. Of the seven traders selling sorghum, millet and cassava flour, the following was observed:

- 28.5% were wholesalers only
- 43% had vertical linkages as wholesalers and retailers
- 28.5% were retailers.

It was also observed that the wholesalers/wholesalers – retailers (71%) also owned hammer mills and were linked as wholesaler – miller (28.5%) or wholesaler – miller – retailer (43%).

10.4.3: Horizontal Linkages

Cassava trading from production to retail is undertaken by individuals who are not organized into any groups. There were some indications that traders at Nyamakima and Gikomba would like to

be organized into a group which would lobby for their rights especially with the Nairobi City Council.

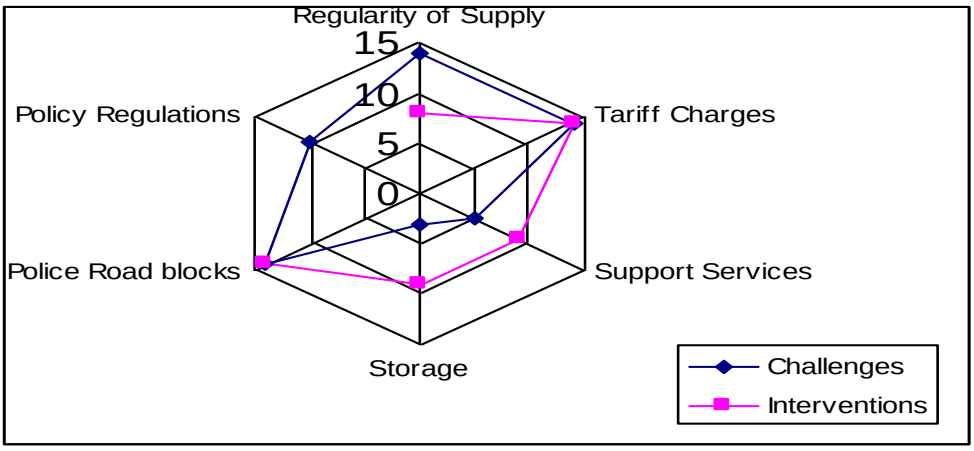
10.4.4: Support Market and Services

The traders in both markets indicated the following:

- The market infrastructure (storage, sales area, loading/unloading facilities) are inadequate and there is need for a larger staple foods market.
- They do not receive information from any source although some were aware that MOA and KACE collect information.
- There is no organized access to trading credit and individual access credit through their own means (personal savings and banks).

10.4.5: Overall Constraints and Interventions

The main challenges were police road blocks, cess and regularity of supply. Interventions were required to address non-tariff barriers (bribes, storage, and regularity of supply and support services).



11.0 GROUNDNUTS

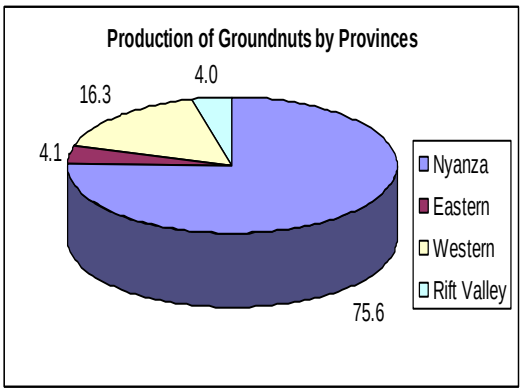
11.1 Groundnuts Production

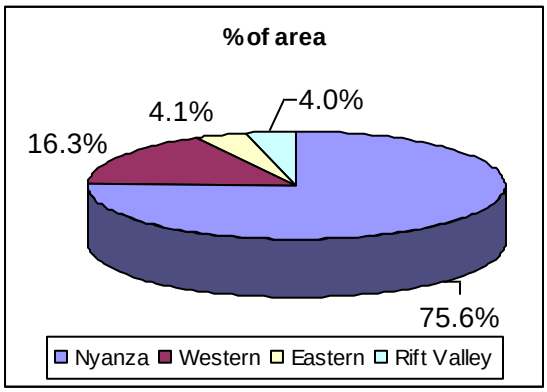
11.1.1 Production Areas

Groundnuts production is important in Nyanza and Western provinces although other provinces like Eastern and Rift Valley provinces grow some small quantities. Of the 25,098 hectares planted in 2008, Nyanza accounted for 75.6%, Western for 16.3%, Eastern for 4.1% and Rift Valley for 4% of the total area as shown in table 11.1.

Table 11.1: Production of Groundnuts by Provinces, 2008

	Nyanza	Western	Eastern	Rift Valley	Total
Crop Area (ha)	18,976	4,092	1,026	1,004	25,098
- Production- Tons	8,627	3,441	579	901	13,548
Yield (MT/ha)	0.4	0.8	0.5	0.8	0.54
% of area	75.6	16.3	4.1	4	100
% of Production	63.6	25.4	4.3	6.7	100





Source: ERA, 2009

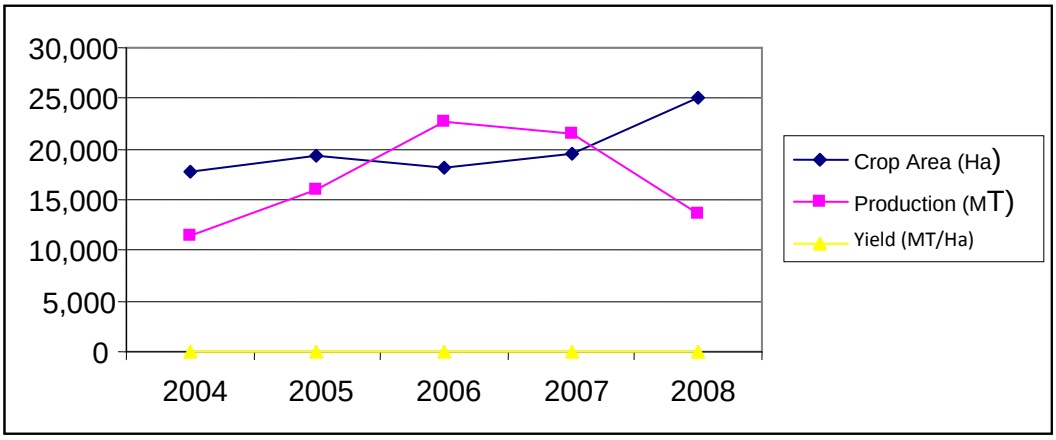
In terms of output, Nyanza and Western account for 89% of output and the rest for 11% of output. Yields range from 400kg/ha in Nyanza to 800kg/ha in Western and averaging at 500kg/ha. These low yields reflect poor husbandry at farm level and use of unimproved varieties. Available improved varieties give yields ranging from 770kg/ha (Homa Bay variety) to 2,720kg/ha (Makuru Red variety) and averaging at 1,560kg/ha. There is as much great potential to increase output by at least three times to reach average levels of improved varieties. The map of production areas is shown as figure 11.1.

Figure 11.1: Map of Groundnuts Production Areas

11.1.2 Production Trend

Analysis of data from the 1970's shows that groundnuts production has reached a peak of 42,053 ha and a production of 38,052 MT in 1976/77 (KIPPRA 2007). Production also swings from year to year and shows no particular trend. Data on groundnuts production is scarce and is not reported in the main publication of MOA. Using various sources, the production trend is as shown in figure 11.2.

Fig. 11.2: Groundnuts Production Trends



Source: FAOSTAT (2009), MOA-ERA (2009), KIPPRA (2007)

It is shown that production has no specific trend due to change in weather and other factors like use of improved and local seedlings.

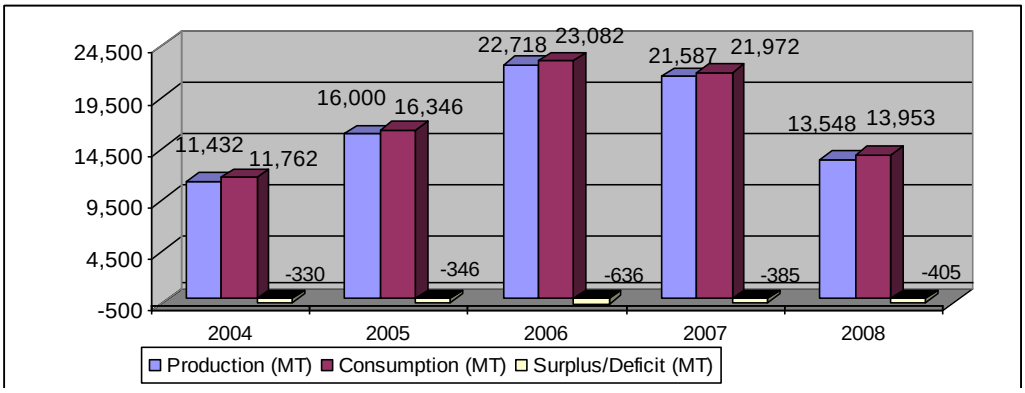
11.2: Consumption of Groundnuts

11.2.1: Domestic Consumption and Surpluses/Deficits

All groundnuts produced in the country are consumed locally. Consumption is augmented by about 330MT of shelled and unshelled groundnuts. The per capita consumption is as shown in table 11.2.

Table 11.2: Consumption of Groundnuts

	2004	2005	2006	2007	2008
Production (MT)	11,432	16,000	22,718	21,587	13,548
Imports (average MT)	330	346	364	385	405
Consumption (MT)	11,762	16,346	23,082	21,972	13,953
Population	34.2	35.1	36.1	37.2	38.3
Per capita (Kg/ca)	0.3	0.5	0.6	0.6	0.4
Surplus/Deficit (MT)	(330)	(346)	(636)	(385)	(405)



It is noted that consumption per capita ranges from 0.3kg/ca to 0.6kg/ca averaging at 0.5kg/ca. Deficits average at 420MT.

11.2.2: EAC/COMESA Export and Import Trade in Groundnuts

Groundnuts are traded as groundnuts with shell, groundnuts shelled, groundnut oil and cake of groundnuts. Export data on the four products (FAOSTAT 2009) show that between 2000 and

2006, Kenya exported on average 87MT of groundnuts shelled annually, an average of 15MT of groundnuts with shell, 5MT of groundnuts oil and 9MT of cake of groundnuts annually.

In the import trade, cakes of groundnuts were not imported but other products were traded. Imports of shelled groundnuts ranged from 21MT to 851MT and averaged at 288MT during the period 2002 to 2008. Unshelled groundnuts were also imported in six years during the period with imports ranging from 80MT to 818MT and averaging at 319MT annually. Groundnut oil was imported in small quantities ranging from 2MT to 7MT and averaging at about 5MT in the six years of imports.

11.2.2.1: Intra EAC/COMESA Exports and Imports

Kenya's intra-EAC/COMESA exports were valued at USD 56,096 between 2004 and 2008. The major export countries were DRC (36%), Sudan (49%), with Rwanda and Uganda accounting for the rest. During the same period, the intra-EAC/COMESA imports totaled USD 4.8mi with Uganda accounting for 80%, Malawi and Zambia accounting for the rest as shown in table 11.3

Table 11.3: Intra EAC/COMESA Groundnuts Exports and Imports (USD)

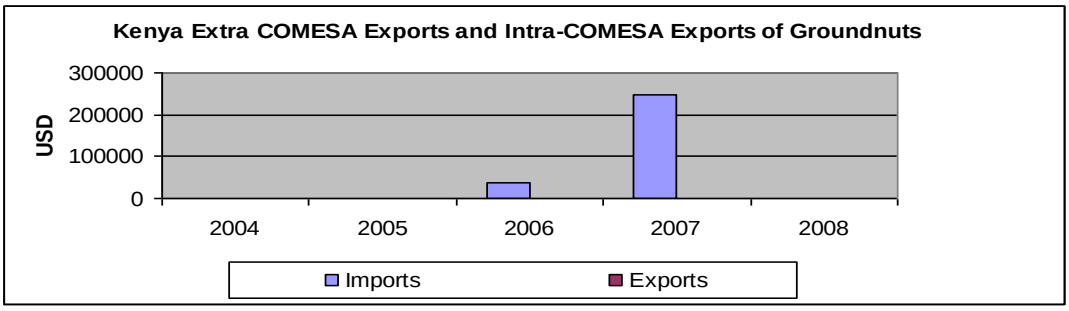
Destination	2004	2005	2006	2007	2008	Total
Congo DR	20,127					20,127
Rwanda				1,966		1,966
Sudan	14,548	3,807	2,941		6,169	27,465
Uganda			3,458.70		3,079.71	6,538
Total	**34,676**	**3,807**	**6,399**	**1,966**	**9,249**	**56,096**
Intra COMESA Imports						
Source	**2004**	**2005**	**2006**	**2007**	**2008**	**Total**
Ethiopia	7,254	900	747			8,902
Malawi		1,405	5,870	792,323	161,019	960,617
Uganda				2,859,161	959,128	3,818,289
Zambia	1,520					1,520
Total	**8,775**	**2,305**	**6,617**	**3,651,484**	**1,120,146**	**4,789,327**
Total Intra COMESA Exports and Imports						
Flow	**2004**	**2005**	**2006**	**2007**	**2008**	**Total**

11.2.2.2: Extra-EAC/COMESA Groundnuts Exports and Imports

Exports were only done in 2004 and 2008 totalling USD 33.82 while imports were done in 2006 and 2007 totalling USD 285,755. These figures show that Kenya is not heavily involved in groundnuts trade outside EAC/COMESA. The situation is shown in table 11.4

Table 11.4: Extra/EAC/COMESA Groundnuts Exports and Imports (USD)

	2004	2005	2006	2007	2008
Imports			38289	247466	
Exports	13.4				20.42



12.2.2.3: Intra EAC/COMESA Exports and Imports

Kenya imports groundnuts as roasted or otherwise cooked in shells or whether shelled not broken. It also exports groundnuts to Uganda and Sudan as shown in table 11.5.

Table 11.5: Intra EAC/COMESA Imports and Exports of Groundnuts

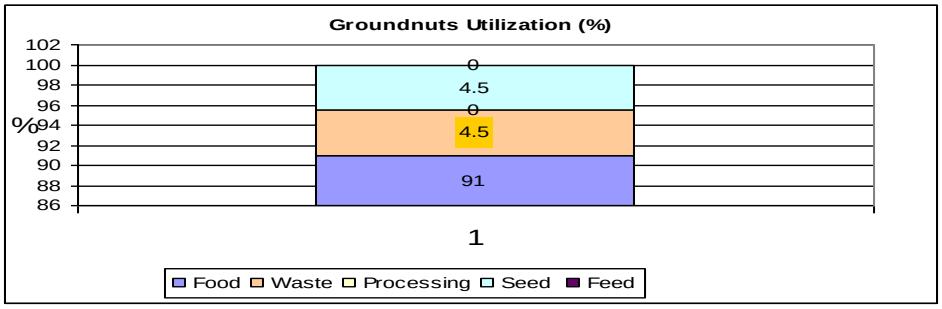
Imports (MT)		**Exports (MT)**	
Source	**MT**	**Destination**	**MT**
Tanzania	2,759	Sudan	2.06
Uganda	2,090	Uganda	50
Malawi	840		
Total	**5,689**		**52.06**

Imports totalled at 5,689MT with Tanzania accounting for 48.5%, Uganda for 36.7% and Malawi for 14.8%. Exports to Uganda accounted for almost all of the exports (96%) with Sudan accounting for 4%.

11.3: Groundnuts Value Chain

11.3.1: Commodity Utilization

Domestic supply was estimated at 22,000MT, of which 1,000MT was imported (Econ. Survey, 2007). Out of this, 4.5% was used as seed (1,000MT) while wastage accounted for a similar 4.5% (1,000MT). The balance of 91% (20,000MT) was used as food. Due to inadequacy of supply, no groundnuts were used for oil processing, except for small amounts crushed at homestead level. The utilization is shown below:



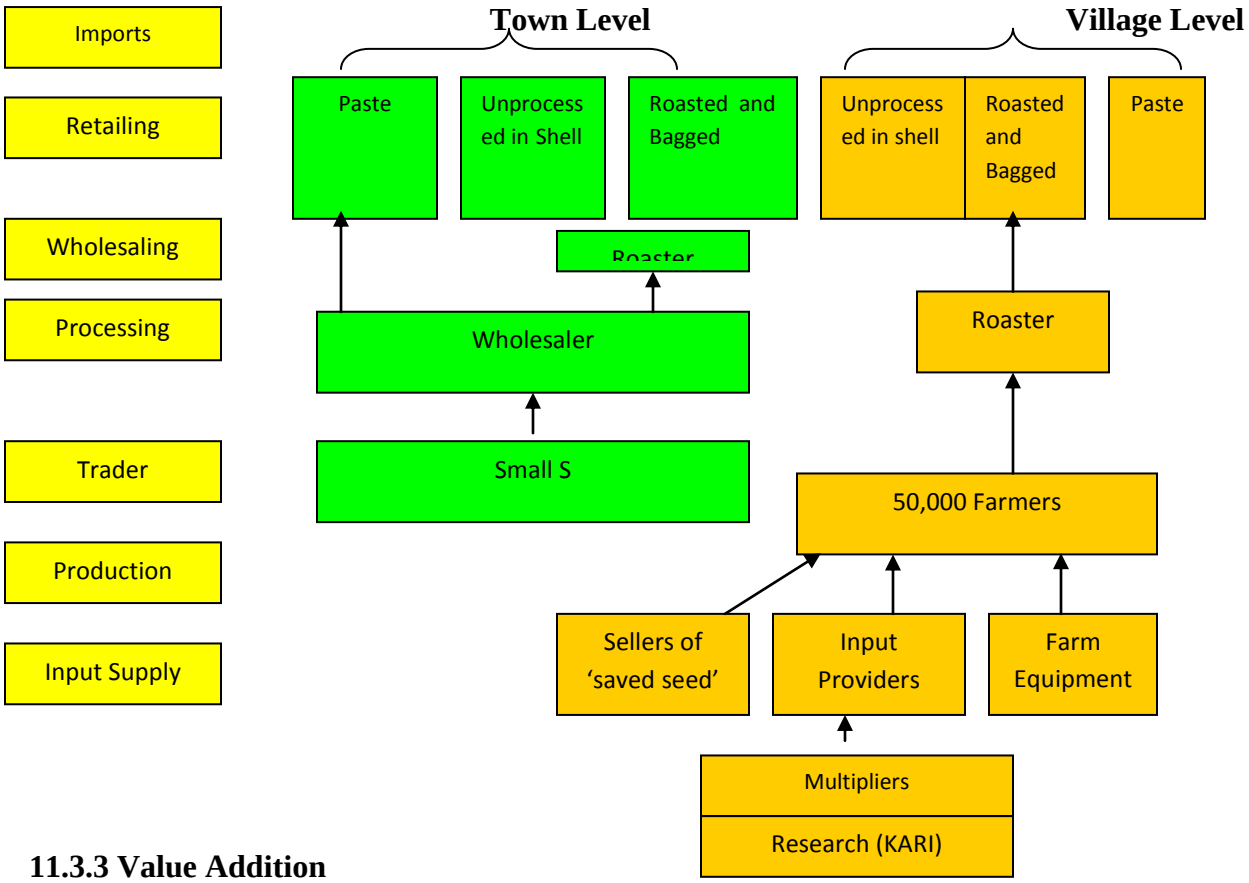
Source: Econ Survey, 2007 – FBS 2005

The per capita consumption was estimated at 0.6kg/ca for a population of 34.5mi.

11.3.2: Value Chain Map

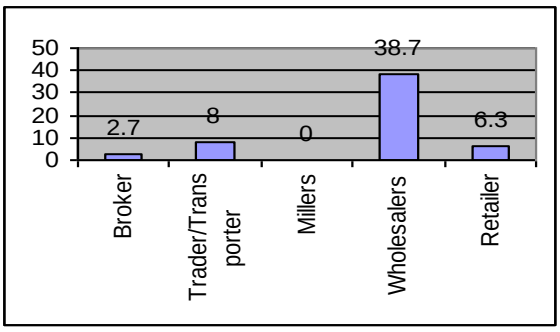
The groundnuts value chain consists of research – KARI supplying improved varieties for multiplication, sellers of 'saved seeds'/improved seeds sellers and farm equipment suppliers. At trading level, there are traders who purchase from farmers and local markets and bulk for wholesalers who can sell to oil firms/paste makers and to retailers who sell to roasters and to customers. At the village level, farmers sell unprocessed in shell, roast through roasters or directly and as paste as shown in figure 11.1.

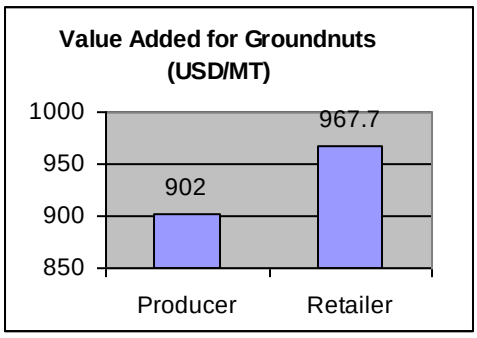
Fig. 11.3: Groundnuts Value Chain Map



11.3.3 Value Addition

Groundnuts are an expensive commodity with producer price at USD 902/MT and retail price at USD 967.7/MT. Groundnuts can be traded at any level of the chain as there is little value addition. The margin distribution among various stakeholders is producer 902/MT, broker USD 2.7/MT, trader USD 8/MT, wholesaler USD 38.7/MT and retailer 6.2/MT as shown below:





11.4: Stakeholders and Functional Matrix

11.4.1: Research and Seed Multiplication

The KARI-Regional Research Centre at Kakamega plays a critical role in improving varieties in relation to productivity and disease resistance. Eight varieties (Red Valencia, Severe 116, Texas peanut, Bukene, Manipitar, Makulu Red, Altika and Homa Bay) of both bunch and runner types have been released. The yields average from 770kg/ha – 2,720kg/ha implying that farmers can improve their yields from the current production levels of 450 – 700kg/ha by using improved varieties. The varieties available are shown in table 11.6

Table 11.6: Varieties and Yields

Variety	Mean Kernel (Grain) Yield)KG/ha)
Red Valencia	1500
Severe 116 (white)	1250
Texas Peanut	1360
Bukene	1530
Manipintar	2450
Makulu Red	2720
Altika	900
Homa Bay	770

11.4.2: Seed Supply and other Inputs

Most farmers use 'saved seeds' from the previous season while others purchase packaged seeds from seed stores. Other stakeholders include farming input suppliers.

11.4.3: Village Level Value Chain

Farmers, possibly 50,000 (0.3ha/hh) sell at the village level. They can sell unshelled groundnuts, paste and roast groundnuts either directly or through roasters. Domestic consumption is about 300MT while roasting takes 500MT. Seeds account for 1000MT while waste accounts for 1,000MT.

11.4.4: Long Distance Trade

This chain starts with small traders who bulk groundnuts at the farm or village market levels and then transport to wholesalers in urban centres. These wholesalers sell to urban retailers or roasters. They can also sell to processors (if adequate quantities are available) for oil processing or confectionery trade.

11.4.5: Functional Matrix

Functions	Participants/Actors	Support Markets
	Domestic/Export – Import Market Channels	

	Input Suppliers	Farmers	Traders	Processors	Wholesalers	Support Services: Financial Services, SPS/Standards Certification, etc.
Wholesale, Retail, Exporting, Importing						
Processing						
Trading						
Collecting, Bulking, Storage						
Production						
Input Supply						

The only processing is roasting done by a roaster

11.5: Constraints and Opportunities

11.5.1: End Market Analysis of Groundnuts Marketing

11.5.1.1: End Users of Groundnuts Products

Two types of groundnuts are available. The red groundnuts which are oily and are crushed for oil and butter in the rural areas, and the white groundnuts used for roasting and confectionery. Kenya's consumption between 2004 and 2007 averaged at 17,423`MT with an estimated per capita consumption of 0.5kg/ca. The end use for groundnuts is shown below:

End Market Use and Users of the Product - Groundnuts

The form of the product at the end market	Users (e.g. millers, households)	Volume of National Requirement in Metric Tons per year	End Market Price in July 2009 in US$ per Metric Ton	Source of the Product		
				Domestic Market	**Imports**	
					Intra regional (i.e. from EAC/COMESA)%	Extra regional (i.e. outside EAC/COMESA)
Shelled		17,423	USD 939	57%	43%	-

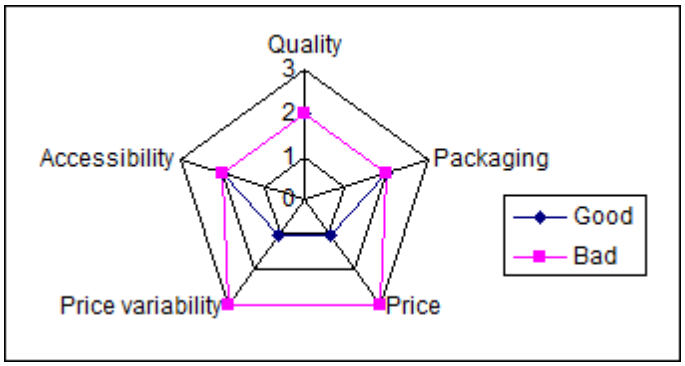
11.5.1.2: Consumer Preferences and Concerns

Price and price variability are of concern for both imported and local groundnuts. Quality of local groundnuts is considered inferior while accessibility and packaging are considered reasonable.

The preferences by consumers in relation to groundnuts are shown in the spider diagram below:

GROUNDNUTS CONCERNS

	Good	Bad
Quality	2	2
Packaging	2	2
Price	1	3
Price variability	1	3
Accessibility	2	2



11.5.1.3: Current and Potential Market Opportunities

Kenya is not self-sufficient in groundnuts for both household and groundnuts oil production. Of the total production, 40% is consumed at household level (Muthee 2007) and the rest enters the marketing chain. Domestic production is augmented by imports from Malawi and Tanzania. Due to low production, prices are high and this is of concern as consumers are purchasing less. However, the high prices should improve production so the future potential is high.

11.5.2 Vertical Integration

There was no identifiable vertical linkage among the four traders interviewed. Two were wholesalers, one was a wholesaler – retailer and one was a retailer. The likely future vertical linkages are towards wholesaler – retailers.

11.5.3: Horizontal Linkages

Groundnuts trading-from production to retail- is undertaken by individuals who are not organized into any groups. There were some indications that traders at Nyamakima and Gikomba would like to be organized into a group which would lobby for their rights especially with City Council.

11.5.4: Support Market and Services

The traders in both markets indicated the following:

- The market infrastructure (storage, sales area, loading/unloading facilities) are inadequate and there is need for a larger staple foods market.

- They do not receive information from any source although some were aware that MOA and KACE collect information.
- There is no organized access to trading credit and individual access credit through their own means (personal savings and banks).

PART THREE: BUSINESS ENABLING ENVIRONMENT FOR TRADE IN AGRICULTURAL COMMODITIES

12.0 THE POLICY ENVIRONMENT

12.1 Pricing and Marketing Policies

Prior to December 1993, pricing and marketing of the main staple crops, namely; maize, wheat and rice, were controlled by the Government through NCPB at all levels of the value chain on the strength of constitutional powers bestowed to the Board under NCPB ACT Cap 338 of the laws of Kenya. This included the setting of annual producer farm gate prices, into and ex-mill prices as well as wholesale and retail prices for maize, wheat and rice. In addition the Government also set an upper limit of the number of 90-Kg bags of maize (not other staple crops) that anyone would move from one place to another. Prices and marketing of for the other staple crops namely; sorghum, millet, beans, peas, cassava and groundnuts were not controlled.

12.1.1 Role of Government in Pricing and Marketing of Staple Foods

Commodity	(i) Is the Government, through the marketing Agent involved in setting buying prices at harvest (Yes/No)	(ii) If Yes, give the specific stature and Article(s) on which this role is based	(iii) If the Government is involved in purchase, give the official capacity and actual purchases in 2008		(iv) If the actual purchase is lower than the official capacity, give reason for the shortfall	(v) Government installed versus utilization storage capacity	
			Official Capacity (in MT)	Actual Purchase in 2008 (in MT)		Installed storage capacity in 2008	Utilized storage capacity in 2008
Maize	**NO** (but indirectly through occasional announcement of NCPB into-depot prices thereby influencing the market price being a major	NCPB (CAP 338)	180,000	186,625	Actual purchases were higher than official capacity due to the need to replenish strategic reserves and support famine relief needs.	1.89 million MT (100%)	1.23 million MT (65%)

Commodity	(i) Is the Government, through the marketing Agent involved in setting buying prices at harvest (Yes/No)	(ii) If Yes, give the specific stature and Article(s) on which this role is based	(iii) If the Government is involved in purchase, give the official capacity and actual purchases in 2008		(iv) If the actual purchase is lower than the official capacity, give reason for the shortfall	(v) Government installed versus utilization storage capacity	
			Official Capacity (in MT)	Actual Purchase in 2008 (in MT)		Installed storage capacity in 2008	Utilized storage capacity in 2008
	player.						
Wheat/Rice Sorghum /Millet Beans/ Pulses (Pigeon Pea, Cow pea and Chick pea) Cassava Groundnuts	NO	N/A	N/A	N/A	N/A	N/A	N/A
Source: NCPB: N/A-Not Applicable							

12.1.2 Impact of Government Involvement in Pricing and Marketing of Maize

(a) Cost effectiveness

Our assessment of cost-effectiveness is based on comparisons of resources used in purchasing maize locally against the cost that would have been incurred if market determined price was to be applied[31]. However, an important point to note is that NCPB's into-depot prices and open market prices (including imports) varied widely during 2008 in response to the supply-demand situation. According to NCPB, into-depot prices started at Kshs 1,300 per 90-kg at the beginning of the year and moved upwards severally to reach Kshs 2,300 per 90-kg bag by the end of the year. Thus, we have used the average of Kshs 1,800 per bag as into-depot price. Import parity prices varied from US$ 320 per MT or US$ 28.8 per 90-Kg bag to US 450 per MT or 40.5 per

[31] *Import parity price (Nairobi) has been used as proxy for market determined price.*

90-Kg bag. Thus we have used the average of US$ 385 per MT or US$ 34.7 per bag. Having bought local maize at an average of Kshs 1,800 per bag (Kshs 19,998 per MT)-equivalent to US$ 24 per bag or US$ 267 per MT, NCPB spent a total of Kshs 540 million or US$ 7.2 million. Had the maize been bought at market-determined prices (import parity-Nairobi) which averaged Kshs 2,602 per bag (28,875 per MT)-equivalent to US$ 34.7 per bag or US$ 385 per MT, the Board would have spent Kshs 780.6 million or US$ 10.4 million. This means that the Government saved resources by buying locally.

Table 12.1 Cost Effectiveness in Maize Procurement

Source of Supplies	Unit	Volume Purchased	Average NCPB Into-depot Price		Total Cost (Million)	
			Kshs	US$	Kshs	US$
Local Purchases (NCPB)	90-kg bag	2,073,403	1,800	24.0	3,732	49.7
	MT	186,625	19,998	267.0	3,732	49.7
	Import Parity					
Import Parity (Nairobi)	90-Kg bag	300,000	2,602	34.7	780.6	10.4
	MT	27,000	28,875	385	780.6	10.4

It was not possible to get the amount of maize that was offered locally to NCPB and therefore not able to estimate effectiveness through comparing resources that would otherwise have been used to clear what farmers were willing to sell to the board.

12.1.3 Role of the Private Sector in Marketing of Staple Foods

Information on the number of firms and or associations trading with each of the study commodities and their respective storage capacities is scarce and information in this regard is very limited information indeed. Table 12.2 below provides a summary of what is far known.

Table 12.2: Inventory of Private Sector Firms involved in Trading by Commodity

Commodity	Approximate Number of Farmers	Approximate Number of Traders (wholesaler/retailers)	Millers (micro/small/medium(	Lobby Association
Maize	3,000,000	N/A	Over 10,000	East Africa Grain Council Cereal Growers Association Cereal Millers Association United Grain Millers and Farmers Association
Wheat	2,020	N/A	Over 20	
Rice	300,000	N/A	0ver 357	Mwea Farmers' Multi-

	(of which about 9,000 are in irrigation)		(of which 7 are large)	purpose Cooperative Society
Sorghum, millet, groundnuts, cassava, beans and pulses	N/A	N/A	N/A	N/A

12.2 Tariffs and Non-Tariff Charges

12.2.1 Tariffs

The following are the applicable tariffs for the various staple crops covered by this study.

Product		Import duty applicable on imports from:			
		EAC Countries	COMESA Countries	SADC Countries	Rest of the World (EAC CET)
Maize (excl. seed)		0%	0%	0% (since October 2008 when import duty was waived was announced -but otherwise normally 50% of CIF value)	0% (since October 2008 when import duty was waived was announced -but otherwise normally 50% of CIF value)
Wheat	Hard wheat	0%	0%	35%	35%
	Durum	0%	0%	0%	0%
Rice		0%	0%	75% or $200/MT whichever is higher	75% or $200/MT whichever is higher 35% for Pakistan rice imports
Sorghum		0%	0%	25%	25%
Millet		0%	0%	25%	25%
Beans		0%	0%	25%	25%
Pulses (Pigeon, Cow & Chick peas)		0%	0%	25%	25%
Cassava		0%	0%	25%	25%
Groundnuts		0%	0%	25%	25%
Worked/processed cereals (grain & pulses)		0%	25%	25%	25%
Source: Kenya Revenue Authority (KRA)					

12.2.2 Non-Tariff Charges

(a) On Imports

Non Tariff Items	Charges (Kshs)	Estimated Charges (US $)
SPS Inspection Fees	Kshs 1,000 per consignment-paid by exporter	US$ 13
Standards Inspection Fees,	Kshs 6,000-10,000 per 20 foot container	US$ 80-140
Health Inspection Fees,	Kshs 1500 per container 20 foot container	US$ 20
Fumigation	Kshs 1,500 per 20 foot container	US$ 20
Clearing Agents Fees,	Kshs 5,000 per 20 foot container	US$ 70
Port Handling	Kshs 8,000 per 20 foot container	US$ 105

(b) On in-country movement of products

Non Tariff Item	Description	Charges	Estimated Cost per 1 MT (US $)
Local Authority Cess	Local authorities' cess charged on fresh produce-several times from source to destination. Two Traders said this happens 2-3 times on average.	Kshs 40 (Kshs/90-Bag) per check-point	12-18
Bribes (Police Road Blocks)	Police road blocks where traders are harassed even if their vehicles have no defects and the driver has his or her valid license. Four transporters reported that they are stopped 5-10 times for an average distance, say from Kitale to Nairobi.	About Kshs 200-250 per 7 MT truck per police road block.	2-5

(c) Traders' & Regulatory Authorities' Opinion on Effects of the Non-tariff Charges and Recommendations

Both traders and regulatory authorities (City Council of Nairobi, KEPHIS and KEBs) are unanimous in their views regarding the effects of non-tariff barriers; namely; they cost both time and money. One trader indicated that he losses 2 hours on average for a journey from Busia or Kitale to Nairobi and incurs costs amounting to Kshs 300-600 per truck of 7 MT. A major dealer in staple trader locally and regionally (Export Trading Company) indicated that they were incurring about Kshs 10 per bag through bribes and local authorities cess for maize coming from Kitale, Eldoret or Busia to Nairobi. Traders consider this situation to be unsustainable given the already over-squeezed margins due to stiff market competition. A few wholesale traders interviewed at Nyamakima in Nairobi indicated that this has been forcing them to do either one or both of the following:

- Offer lower prices to rural assemblers or farmers–which have the backrush effect of discouraging production as it results in reduced margins to producers. Two traders at Nyamakima indicated that they normally offer about 2-5% less producer/rural assembler price than they would otherwise be offering if there were no NTBs such as bribes to police and multiple county council cess charges.
- Hike selling or consumer prices-thereby reducing consumer welfare;

Traders Nyamakima and Gikomba in Nairobi recommend the following:

- Produce cess currently set at Kshs 40 per bag be reduced to Kshs 20 and be charged once and not severally between the point of produce source and destination;
- Reduction of police road blocks and complete elimination of corrupt practices in the police force by taking stern action on bribe seekers.
- City/Municipal and county councils to improve market facilities which are currently in deplorable conditions and provide ample space for business;
- City/Municipal and county councils to offer uniforms to inspectorate personnel and stop them harassing traders under the pretext of unclean trading spaces.

12.3 REGIONAL STRUCTURED TRADING SYSTEMS PLATFORM

12.3.1 Food Balance Sheet

(i) Commodity Coverage and Report Contents

Kenya's food balance sheet normally covers maize, wheat, rice, beans, livestock products (milk and meat) as well as fish in some instances. Other staple crops covered in this report, namely; pigeon peas, cow peas, chick peas, sorghum, millet, groundnuts and cassava are normally not and have not been included in the past. The food balance sheet reports, which are based on crop/financial year, normally include analyzes of the following: (i) Recent past sector (maize, beans, wheat and rice) production performance; (ii) Projected imports and exports; (iii) Projected harvests for both short and long rains seasons; (iv) Projected post harvest losses; (v) Projected non-human consumption uses (e.g. seeds, animal feed and industrial uses); (vi) National requirements based on population estimates (based on annual per capita consumption of 90 Kgs and sometimes 98 Kgs); and (vii) estimated surplus and deficits for each crop.

(ii) Food Balance Sheet (2008)

The table below provides Kenya's food balance sheet for the period August 2007-July 2008. Of the commodities being covered by this study, the balance sheet covered included only maize, beans and rice.

National Food Balance Sheet (August 2007-July 2008)			
Commodity	Source		90-Kg Bags
Maize	Opening stocks- (August 2007)	On-Farm Stocks	8,662,337
		Traders	3,210,388
		Millers	1,415,000
		NCPB	5,498,081
	Sub-total		**18,785,806**
	Projected Imports (Aug-Nov 2007)	Uganda	620,500
		Tanzania	900,500
	Projected Imports (Dec-July 2007)	Uganda & Tanzania	800,500
	Sub-total		**2,321,500**
	Long Rains Harvest 2007-2008	Long rains harvest	28,500,200
	Short Rains Harvest 2007-2008	Short Rains Harvest	3,150,000
	National Cumulative Supply (Less new stocks =8,550,000)		**44,075,506**
	Post harvest loses (10% of availability)		4,075,550
	Other Uses	Seeds	400,000
		Animal Feed	1,200,000
		Industrial Uses	**250,000**
	Sub-total		**5,925,550**

	Export to Tanzania & Southern Sudan (Oct-July 2007)		500,000
	National Consumption Based on 33 million people at 90 Kgs/per person/year (Aug-July 2008)		**34,850,000**
	(Aug-July 2008)	**Supply**	**39,167,956**
		Demand	**34,850,000**
		Surplus/(Deficit)	**4,327,956**
90-Kg Bags			
Beans	Aug 2007	On-Farm Stocks	2,227,763
		Traders	738,050
		NCPB	92,422
	Sub-total		3,058,235
	(Aug-July 2008)	Imports (Aug-Nov 2007) – Uganda	700,580
		Imports (Aug-Nov 2007) – Tanzania	52,783
		Projected imports Uganda &Tanzania (Dec 2007-July 2008)	120,465
	Sub-Total		**873,828**
	August 2007-Sep 2007	Long Rains harvest	3,088,095
	Feb –March 2008	Projected Short Rains	2,048,664
	National Cumulative Supply		6,010,587
	Post harvest loses (5% of availability)		300,529
	Other Uses	Seeds	500,000
	Export to Tanzania		450,000
	National Consumption Based on 33 million people at 15 Kgs/per person/year (Aug-July 2008)		5,500,000
	National Cumulative Demand		5,800,000
	(Aug-July 2008)	**Supply**	**5,260,058**
		Demand	**6,000,000**
		Surplus/(Deficit)	**(739,942)**
90-Kg Bags			
Wheat	Opening Stocks		162,000
	Opening stocks-(Aug.2007-July 2008)	Imports (Argentina, Canada, USA, Tanzania)	4,504,500
	Aug 2007-Dec 2007	Long Rains Harvest	3,499,650
	National Cumulative Supply (Aug 2007-July 2008)		**8,166,150**
	Post Harvest Losses (5% of availability)		174,983

	Other Uses (animal feed & industrial)		333,300
	Oct. 2007-July 2008	Flour Exports to neighbouring countries	270,600
	Aug 2007-July 2008	National Consumption based on 33 million people and 23 Kgs per person per year)	8,433,333
	August 2007-July 2008	National Cumulative requirements	8,766,633
		Supply	7,710,567
		Demand	8,766,633
		Surplus/(Deficit)	(1,056,066)
			MT
Rice	(August 2007)	Opening stocks	2,500
	(Aug-July 2008)	Imports (Pakistan, Thailand, Tanzania etc)	167,382
		Projected imports (Jan 2007-June 2008)	53,618
	Sub-Total		**223,500**
	Aug 2007-Dec 2007	Long rains harvest	26,676
	Feb –March 2008	Projected short rains	91,170
	National Cumulative Supply		341,346
	Post harvest loses (5% of availability)		5,892
	Other uses (seed, animal feed and industrial use		30,000
	National Consumption Based on 33 million people at 8.5 Kgs/per person/year (Aug-July 2008)		**280,500**
	(Aug-July 2008)	**Supply**	**334,454**
		Demand	**310,500**
		Surplus/(Deficit)	**24,954**
Source: Food Monitoring Unit; MOA			

(iii) Food Balance Sheet Formulation Process/Procedures and the Role of Private Sector

The process towards the construction of the country's food balance sheet is normally initiated and coordinated by the Food Monitoring Unit (FMU)/Food Security Branch of the Ministry of Agriculture. In principle the preparation of the national food balance sheet is supposed to be a regular activity undertaken quarterly (July-September, October-December, January-March and April-June) every crop year. However, the frequency tends to depend on the food situation with the activity being undertaken more frequently (one or more times per monthly) when the country is faced with shortages. From discussions with key observers, the activity tends to be

irregular taking even up to six months during periods of food surpluses. In other words, the activity is normally intensified when the food situation is considered bad.

The procedure for construction of the food balance sheet involves the collection of data on stocks held by all actors and projected production (estimates) by the district level staff of the Ministry of Agriculture. According to the FMU/Food Security Branch of the Ministry of Agriculture, between 800 and 1,000 key respondents including small and large farmers, wholesale and retail traders are normally consulted. The data is then sent to FMU for collation and analysis and benchmarking with national requirements. In principle, FMU/Food Security Branch is supposed to consult other key sources, including Ministry of Finance, Office of the President (Special Programmes), NCPB-Strategic Grain Reserves Trustees, FAO, EAGC, FEWSNET and World Food Programme among others. The results of the final analyses are then supposed to be discussed by the Food Security Steering Committee (which should comprise key players including MOA, NCPB, WFP, USAID, FAO, EAGC, CMA, CGA and others) before being forwarded to the Cabinet Food Security Sub-Committee-currently chaired by the Prime Minister. According to some key players such as CMA, CGA and EAGC, they are not sometimes consulted. In fact FMU accepted that they have not consistently consulted some of the stakeholders e.g. the Kenya Maize Development Programme (KMDP) due to time constraints and lack of resources (especially during periods of looming shortages). There is clear evidence that private sector staple food enterprises are not adequately consulted. In this regard, two major cereals traders (at Nyamakima in Nairobi) who were consulted during the study indicated that they were vaguely aware of the process, and that they did not bother even to get the resultant data/information because they do not consider it accurate and normally rely on their own judgment and their colleagues for planning their cereals-related businesses. According to these actors, the main users of the information are probably donors and NGOs.

(iv) Use of the Food Balance Sheet as Planning Tool

The food balance sheet is potentially an important tool for Government policy formulation and planning and well as for and relevant private sector business actors in that it can provide vital information for short, medium and long term strategy formulation and decision-making. In the Kenyan case, there is absolutely no evidence of the tool being used for medium or long term planning. Its use is more oriented to determination short term strategies and specifically towards decisions to or not to import. According to key subsector observers, the main problems associated with the Kenyan Food Balance Sheet include:

- Limited product coverage;
- Irregularity of food situation analyses with the activity being intensified only when shortages are anticipated-sometimes too late as happed in 2009 despite warning from key private sector food sector observers including millers;

- Sometimes limited and haphazardly conducted stakeholders' consultations;
- Unreliability of data and information making it of limited use to private sector business community;
- Limited dissemination and not in a format that provides a clear picture of the food situation-information often not put in the local press, TVs or radios-hence limited access and therefore little use by a wide range of would-be interested players. Dissemination if often to key institutional players including Government ministries, donor agencies and NGOs;
- Limited use of the balance sheet as a tool for medium to long term sector planning (e.g. strategies for increased and sustainable production for the country).
- High politicization of the process and the results of the analysis;

(v) Private Sector Views regarding Regional Food Balance Sheet

Kenya depends on both domestic production and imports. Private sector actors, being the main players in domestic and external trade for staple crops feel that a nationally-based food balance sheet is of limited value. This is because they need to know about the supply and demand situation not just nationally but also regionally (especially EAC and COMESA) where they can export or import from. In addition, private sector actors (especially traders) pointed out problems associated with timeliness of the food balance sheet, poor dissemination mechanisms (accessible only to a few institutions), and inaccuracy in some instances-with one well informed trader indicating that the margin of error is probably in the range of 30-40%. The Ministry of Agriculture also accepts that inaccuracies (albeit not that high) are brought about by the uncertainty on the key parameters such as population figures, farmer/trader stocks and per consumption among others. With regard to the question of a regionally-based food balance sheet, relevant Government agencies from the three East African countries met in Arusha-Tanzania in September 2009 to try and have a harmonized food balance sheet for EAC region-given that they cover the same commodities with the exception of Uganda which also covers bananas. On the issue of the mechanisms for assembling information for a regional food balance sheet, private sector players would like to see their input being transmitted through organizations national farmer, traders and millers organizations such as KENFAP, EAGC, CGA, CMA and others. In this regard, they would like representation at the national committee levels. The private sector feel that the food balance sheet has been least used as tool for Government sector planning and development as well as for informing them towards their own business planning.

12.3.2 Warehouse Receipting Systems

The lack of access to credit is a severe constraint for many smallholder farmers in developing countries. Warehouse Receipting Systems (WRS) are an important and effective tool for creating liquidity and easing access to credit. Warehouse receipts, sometimes known as

warrants, when backed by legal provisions that guarantee quality, provide a secure system whereby stored agricultural commodities can serve as collateral, be sold, traded or used for delivery against financial instruments including futures contracts. These receipts are documents that state the ownership of a specific quantity of products with specific characteristics and stored in a specific warehouse. Such a warehouse receipts system has the benefits of:

- Mobilizing credit to agriculture by creating secure collateral for the farmer, processor, and trader;
- Smoothing market prices by facilitating sales throughout the year rather than just after harvests;
- Reducing risk in the agricultural markets, improving food security and credit access in rural areas;
- Increasing market power of small-holders by enabling them to chose at what point in the price cycle to sell their crops;
- Helping to upgrade the standards and transparency of the storage industry since it requires better regulation and inspection;
- Helping to create commodity markets which enhance competition, market information and international trade;
- Providing a way to gradually reduce the role of government in agricultural commercialization;
- Contributing to lower post harvest losses due to better storage conditions (i.e. induces farmers to store in more appropriate warehouses);
- Lowering transaction costs by guaranteeing quantity and quality;
- Increasing quality awareness-assuring the quality deposited is the same as the quality withdrawn[32].

(i) Inventory of the WRS in Kenya, Commodity Coverage and Volume of Business

There has been significant progress towards piloting WRS in countries such as Tanzania and Madagascar. In Kenya there is only one such system which is at the nascent stage. The Kenyan WRS is operated by a private company by the name of Lesiolo Ltd in Nakuru. The warehouse which is operated by this company was started in only dealing with maize only. Lesiolo WRS is still at the development stages and the company transacted a mere 5 MT in 2008, with growth partly being constrained by lack of maize. This is despite having total storage capacity for both wheat and maize estimated at 80,000 MT comprising own-warehouse and NCPB-leased stores

[32] ***Daniele Giovannucci;*** *Warehouse Receipts: Facilitating Credit and Commodity Markets- World Bank Agribusiness and Markets Thematic Group;* ***Panos Varangis and Don Larson;*** *World Bank Development Research Group,*

(EAGC said 50,000 MT). The setting of into-depot maize producer prices by NCPB at Kshs 1,950 per bag that was announced in 2008 was the main factor that discouraged potential produce owners (farmers and traders) from depositing their produce because it meant that they were not going to benefit from possible price intra-seasonal price increase.

(ii) Main Challenges Facing WRS Operation and Recommendations

Preconditions for a well-functioning WRS include the following among others: (1) Consistency in general price increase between the harvesting period and the next season which will make it possible gain from delayed sale after having covered for additional costs of storage; (2) Availability of reliable market information, especially on prices and crop forecast-which is essential for decision-making in a speculative activity which is inherent in WRS; (3) Presence of an appropriate legal framework defining the rights, liabilities, and duties of each party to a warehouse receipt (e.g. producers, bank, warehouse etc) and other operational aspects; (4) Presence of an appropriate certification and licensing systems to ensure that the warehouse is financially viable and administratively reliable among other things; technically able to maintain quality standards during storage; and capable of storing according to grades and standards so as to create market segmentation; (5) Availability of appropriate storage facilities, with good spatial distribution; (6) Adequate system for grading and specifying quality standards; (7) Ability for the warehouses to offer reliable performance guarantees or insurance bonds; and (8) adequate trust of the system on the part of financial service providers.

While EAGC is currently undertaking the annual-based system of certification and licensing, the running of Kenya's WRS still faces the following challenges:

- Lack of an appropriate legislative framework- forcing the system to use the general "Common Law framework"
- Occasional market interferences by Government/NCPB through announcing into-NCPB depot prices (as happened during 2008/2009 season-thereby discouraging potential produce depositors;
- Lack of reliable market information especially on production and price forecast;
- Lack of suitable and well distributed storage facilities-with the most appropriate currently owned by NCPB but available for lease in some areas. While existing private sector-owned storage facilities are generally inappropriate, potential leasees of exiting NCPB facilities tend to shy away for fear possibilities of political interferences-especially during periods of food shortages.
- Poor condition of rural feeder roads making it difficult and costly to transport produce from the farm to the only existing Lesiolo-Warehouse;
- Liquidity problems on the part of smallholder farmers necessitating EAGC to advance money to facilitate transportation of produce to warehouse;

- Inability to operate group-based WRS trading system where deemed appropriate from the economies of scale point of view, primarily due to mistrust of the system on the part of farmers;
- Mistrust of the system by banks mainly due to lack of a legislative framework-currently only Equity Bank has risked to be engaged in the business.
- Lack of harmonized standards in the case of wheat which comprise of many varieties;
- Lack of mutual links between WRS and CE-which need to be recognized and actively pursued. That is, WRS initiatives should be complemented with the development of exchange trading systems and existing CEs should develop credible WRS which will help to ensure delivery of traded commodities as well as eased liquidation of collaterised stocks, thereby encouraging uptake for trading and financing purposes.
- Weak technical and financial capacity of WRS operating organizations

While the stakeholders recommend that all the above problems be addressed, the following three issues are accorded high priority:

- Enactment of an appropriate WRS legislative framework (WRS Act) to govern the operations of WRS through consultations between relevant private sector and Government stakeholders-with support from development partners;
- Prevailing upon Government to stop interfering with the system through announcing into-NCPB depot prices-through collaborative effort between relevant private sector stakeholders and government institutions[33]. This is critical for purposes of minimizing uncertainties in the market through ad hoc price setting, import and export bans as well as movement of commodities-all of which distort the market and discourage private sector from holding stocks.
- Promotion of reliable market information systems (by improving quality of data on product availability/price forecast, analysis and dissemination);
- Training and capacity building of key stakeholders including warehouse operators (to ensure compliance), depositors and buyers as well as financiers[34].
- Promotion and support of WRS and CEs development through involving them in the context of public sector procurement as recently demonstrated by WFP.

[33] For the option of delayed sale to be attractive, there must be a general price increase after the harvest season which will make it possible to cover the additional costs of storage. This will usually not be the case if the market is protected through governmental interventions to maintain a stable and seasonally subsidized price. Governments interested in developing efficient markets by using warehouse receipt systems must be committed to not intervening in the market in such a way as to crowd out private markets for storage. At the same time, government interventions may be well motivated, and alternative market-consistent instruments must be found.

[34] *"Improving the Functioning of Commodity Markets in Eastern and Southern Africa through Warehouse Receipt Systems and Market-based Interventions" Proceedings of Warehouse Receipting and Commodity Exchange Workshop-Conclusion and Recommendations; Stakeholders Workshop, 30th Sep-2nd October 2009, Lusaka Zambia*

- Harmonization of standards for collateral management (which requires supporting EAGC to play a leading role in this respect as well as promoting best practice through the formulation and implementation of rules and standards for warehousing, issuance or use of receipts).

12.3.3 Commodity Exchange

A Commodity Exchange (CE) is a market in which multiple buyers and sellers trade commodity-linked contracts on the basis of rules and procedures laid down by the Exchange. In developed countries, such exchanges typically act as a platform for trade in futures contract, or standardized contracts for future delivery. In the developing world, a commodity exchange may act in a broader range of ways to stimulate trade in the commodity sector. This may be through the use of instruments other than futures, such as the cash or "spot" trade for immediate delivery, forward contracts on the basis of warehouse receipting or the trade of farmers' repurchase agreements, or "repos". Alternatively, it may be through focusing on facilitative activities rather than on trade itself as is the case for Turkey where exchanges have served as a centre for registering transactions for tax purposes[35].

(i) Inventory of the Commodity Exchanges in Kenya, Product Coverage and Value of Business

For the staple crops subsector, there is only one Commodity Exchange (CE) System in Kenya, namely; the Kenya Commodity Exchange (KACE). The other two commodity exchange type of systems in the country includes the Coffee Exchange and the Tea Auction. KACE-a private sector firm which was launched in 1997, focuses on a wide range of agricultural crops, livestock, fisheries and inputs. It focuses on market information including prices, business linkages (connecting interested buyers and sellers) and disseminating the same through various platforms including Kenya Broadcasting Corporation (KBC) and FM radios, SMS, internet, and market kiosks. As of 2008, KACE was covering a total of 42 commodities country-wide including the following among others:

- Cereals including maize (dry and green maize), rice, sorghum, millet;
- Pulses including beans, groundnuts, pigeonpeas, green grams, soybeans;
- Tubers including Irish and sweet potatoes;
- Vegetables including cabbages, onions, carrots, tomatoes, kales and chillies;
- Fruits including cooking and ripening bananas, mangoes, passion, oranges, and avocados;

[35] (UNCTAD Secretariat-United Nations Conference on Trade and Development; Overview of the World's Commodity Exchanges-2007)

- Livestock products including milk (unprocessed); beef, sheep and goat meat, chicken meat, life local chicken and broilers and eggs;
- Fish (Tilapia and Omena);
- Agricultural inputs mainly fertilizer.

KACE does not record data in volume terms, but instead records on value terms. In 2008, the organization handled commodity bids worth approximately Kshs 1,037 517,970 equivalent to about US$ 13.8 million through a total of 561 offers and 218 bids. Of this total value, staples crops accounted for about 30% with maize accounting for three-fourths of total value of staples.

(ii) Main Challenges

- Lack of enabling environment due to price influence through minimum price setting by Government through NCPB in the case of maize;
- Lack of a legislative framework in support of commodity exchange systems;
- Weak and underdeveloped warehouse receipting systems and commodity exchange and poor integration between them (i.e CE and WRS);
- Poor infrastructural facilities mainly rural roads, storage facilities and telecommunication network;

Stakeholders recommend the following priority actions:

- Putting in place an appropriate CE legislative framework (CE Act) to govern the operations of Commodity Exchange systems through consultations between relevant private sector and Government stakeholders-with support from development partners;
- Prevailing upon Government to stop interfering with the functioning of CE systems through minimum price setting, import and export bans among other things (through collaborative effort by stakeholders with support from development partners);
- Promoting infrastructural development-mainly storage in strategic areas and roads network;
- Supporting the integration of Commodity Exchange and Warehouse Receipting systems which is mutually beneficial.

12.4: REGULATORY FRAMEWORK

12.4.1: Customs Documentation and Clearing Procedures

(b) Customs Documents and Clearance Procedures and Release Time

Commodities	**Documents Required to clear imports of staple foods**	**Procedure for Customs Clearance**			
		Location where the documents	Fee for accessing the	Procedure for lodging the	Traders concerns with fees and procedures

		are obtained from	documents	documents for customs clearance	
All staples crops (maize, wheat, rice, beans, pulses, groundnuts & cassava)	Commercial invoice (final)	Importer	None		• Getting te Phytosanitary Certificate takes 24 hours on average and should be shortened (though this does not appear to be a big concern); • Getting the IDF takes 2-3 days compared to 4-5 days in the past- but this should be shortened to same day; • Clearance now easier than before because all services are available at the point of clearance (Port) • Big and regular importers should be given goods clearance priority at the Port by according them the "green channel" facility as is the case in India and China (i.e. releasing their goods immediately from ship straight to Bonded Warehouses to await inspection there but subject to compliance with import procedures and regulations). This will help reduce demurrage charges which are currently US$ 25 per container per day which is applicable from the seventh day from the date of arrival on-wards.
	Packing list	Exporter/Shipper	None		
	Bill of Lading or Airway Bill Manifests	Exporter/Shipper	None		
	Import Declaration Form (IDF)	Port (KRA/CBK-online)	2.25% of CIF		
	Form C.52 (Declaration of Customs Value)	Port (KRA/CBK-online)	None		
	Certificate of Origin (COI)	Exporter/Shipper	None		
	Phytosanitary Certificate	Exporter/Shipper [36]	None		
	Certificate of Conformity (COC)	Chamber of commerce	0.475% of FOB[37]		
	Quality Certificate	Exporter/Shipper	None		
	Exemption/Remission authority where applicable	KRA/Central Bank-online			
	GMO-Free Certificate (**Maize only)**	Exporter/Shipper	None		

[36] *If a Kenyan exporter the certificate is sourced from KEPHIS*

[37] *Inspection fees by accredited ISPs e.g. SGS, Bureau Veritas etc.*

Source: KRA and Traders

According to a survey of NTBs in Kenya (Ihiga 2007), the required export and import documents are as tabulated below:

Export Documents	Import Documents
• Certificate of origin • Commercial invoice • Bill of landing • Customs export declaration form • Export permit • Packing list • Shipping note • Preferential certificate • Technical standards • Phytosanitary certificate • Export licence	• Import declaration form • Shipping manifesto • Single entry document (C63) • Bill of landing • Certificate of origin • Customs bonds • Pre-shipment Inspection Certificate **As many of these require other supporting documents, the number of documents may be as high as 52 depending on type of import and trade transactions.**
Source: Ihiga 2007	

The Study argues that Kenya's export documentation which stands at 11 days is not competitive compared to Tanzania (3 days), Mauritius (5 days) and South Africa (5 days). It takes 25 days to obtain all import documents compared to Mauritius (16 days) and Denmark (5 days). Clearing of imports takes 45 days compared to Mauritius (16 days), Tanzania (19 days), China (22 days), Egypt (25 days) and South Africa (34 days).

The traders interviewed did not indicate any problems with cross-border trade and the Kshs.50/bag import duty (USD 0.67/bag) was not mentioned as a problem as they were importing from neighbouring countries. However for large consignments, a number of documents as described above are required.

12.4.2: Standards

(I) Standard specifications for staple crops

The following standards specifications are both applicable nationally and mutually recognized regionally (EAC, COMESA and SADC)

General Requirements for staple crops imports and exports

- Phytosanitary concerns should be addressed in the Phytosanitary Certificates (PC).
- For all grains the generic PC should fulfill the item of KEPHIS permit that the material was inspected according to appropriate procedures and is considered to be free from quarantine pests and disease.
- Grain must be fumigated using appropriate fumigant before dispatch and this must be indicated on the PC as treatment.
- All imports and exports of plant must come under plant import permit.

Crop Specific Requirements

(a) Wheat Grain for Consumption

- Tilletia indica and Corynebacterium michiganensis pv tritici (Clavibacter tritici) are not known to occur in the area of production
- Urocystis Agropyrii (U. tritici) (flag smut) is not known to occur in the area of production.
- Grain was fumigated using appropriate fumigant before dispatch
- Separate certification is required for moisture content which should not exceed 13.5%.

(b) Wheat Flour/Bulgur Wheat

- This is processed or semi processed product and KEPHIS does not require certifying or issuing permits.
- Separate certification for bulgur wheat requiring the material to have been fumigated using appropriate fumigant before dispatch.

(c) Corn/Maize Including Pop Corn for Consumption

- The additional declaration "Sclerospora graminicola (Sacc) Schroet., S. sacchari and Erwinia stewartii are not known to occur in the area of production" to be replaced with "The material was inspected according to appropriate procedures and is considered to be free from quarantine pests and diseases".
- Grain was fumigated using appropriate fumigant before dispatch
- Separate certification requiring that moisture content does not exceed 13.5% and that genetic modification status is provided. (To come from a competent authority/official agent)

(d) Maize Meal

- This is processed or semi processed product and KEPHIS does not require certifying or issuing permits.
- Separate certification requiring that the material was fumigated using appropriate fumigant before dispatch.

(e) Corn/Soy Bean Meal/Milled Grain

This is processed or semi processed product and KEPHIS does not require certifying or issuing permits.

- Separate certification requiring that genetic modification status has been declared on an appropriate certificate of analysis (To come from a competent authority/official agent).
- The material was fumigated using appropriate fumigant before dispatch

(f) Sorghum/ Millet Grain

- Grain was fumigated using appropriate fumigant before dispatch
- The material was inspected according to appropriate procedures and is considered to be free from quarantine pests and diseases
- Separate certification requiring that moisture content does not exceed 13.5%

(g) Peas/Dried Peas (Pisum Sp.)

- Grain was fumigated using appropriate fumigant before dispatch
- Grain was inspected according to appropriate procedure and is considered to be free from quarantine pests.
- Moisture should not exceed 13.5%
- Split peas must be confirmed to be non-viable.

(h) Beans (Phaseolus Sp.) Grain

- Corynebacterium flaccumfasciens (Curtobacterium flaccumfasciens) is not known to occur in the area of production
- Grain was fumigated using appropriate fumigant before dispatch
- Moisture should not exceed 13.5%

(i) Rice Grain for Consumption

- Grain was fumigated using appropriate fumigant before dispatch
- The material was inspected according to appropriate procedures and is considered to be free from quarantine pests and disease
- Moisture content should not exceed 13.5%.

(II) Application of the standards – for imports

- According to KEPHIS, before any importation is undertaken, the importer is obliged to acquire a Plant Import Permit (PIP) from any KEPHIS office. The permit stipulates conditions that must be complied with and the consignment must be accompanied by a Phytosanitary certificate issued by a competent authority from the country of export.

- KEPHIS-the Competent Authority has 12 inspection points country wide (Jomo Kenyatta International Airport, Moi International Airport- Eldoret, The Sea port of Mombasa, Lungalunga, Taveta, Loitokitok, Namanga, Isebania, Busia, Malaba, Swamu, Moyale)
- Standard inspection service available in all points of entry.
- If No, available the Competent Authority collaborates with other Government agencies in organizing for inspection.
- The national organization/authority have mutual recognition with standards bureau in the region (EAC, COMESA and SADC)

(III) Application of the standards – for Exports

The exporter must familiarize themselves with import conditions of destination countries. They must ensure that they are free from pests of concern to the importing country. They must obtain a phytosanitary certificate from KEPHIS. Where the area of production need to be certified free of specific diseases and pests the importer must consult KEPHIS before commencing production.

- Standard inspection service available in all points of entry.
- If No, available the Competent Authority collaborates with other Government agencies in organizing for inspection.
- The national organization/authority have mutual recognition with standards bureau in the region (EAC, COMESA and SADC)

(IV) Challenges Facing National Bureau of Standards/Authority face in facilitating cross border trade in staple foods and what should be done to address these challenges

Challenge faced by Bureaus of Standards in facilitating cross border trade of staple foods	**Proposed solutions**

• Undeclared agricultural commodities which might carry harmful organisms to either of the recipient countries if not cleared through the right phytosanitary procedures. • Traders view the charges for phytosanitary services as a levy that burdens their business.	• Enhance sensitization of cross border traders on the need to comply with plant health standards and regulations. • Need for enhanced sensitization

(V) Challenges Faced by traders of staple foods face in meeting quality standards requirement for cross border trading and what should be done to address the challenges

Challenge faced by traders in meeting standards requirements for cross border trade of staple foods	**Proposed solutions**
• Most traders are not familiar with phytosanitary regulations of importing countries • Differential levels of implementing phytosanitary regulations amongst the trading partners.	• Enhanced sensitization of traders • Harmonizing sanitary and phytosanitary procedures amongst trading partners.

12.4.3 SANITARY AND PHYTO-SANITARY REQUIREMENTS

Sanitary and Phytosanitary Requirements

a) SPS specification

Commodity	Summary of Required SPS Measures
Maize	• The Grains must be accompanied by a phytosanitary certificate declaring that the consignment was inspected and found to be free from insects and other storage pests. 2. The Grains have been tested and found to be fit for human–consumption, 3. Moisture content should not exceed 13.5% • Verification inspection will be necessary
Wheat	• A phytosanitary certificate declaring that: Urocystis (tritici) agropyrii and Tilletia indica,W Corynebacterium (Clavibacter) tritici and (ear cork) Anguina tritici are not known to occur in the area of production. • Grain should be free from weed seeds and foreign matter • All pests have been killed before dispatch by fumigation (Details to be stated on

	phytosanitary certificate) • Moisture content should not exceed 13.5% (To be indicated on appropriate, Document addressed by relevant competent authorities)
Rice	• A Phytosanitary certificate declaring that: the rice was inspected according to appropriate procedures and is considered to be free from quarantine pests. • All pests have been killed before dispatch by fumigation (Details to be stated on phytosanitary certificate). • Moisture content should not exceed 13.5%
Sorghum	• A Phytosanitary certificate declaring that: Sorghum was inspected according to appropriate procedures and considered to be free from quarantine pests. • Moisture content should not exceed 13.5% • Sorghum was fumigated using an appropriate fumigant before dispatch.
Millet	• A Phytosanitary certificate declaring that: millet was inspected according to appropriate procedures and considered to be free from quarantine pests. • Moisture content should not exceed 13.5% • Millet was fumigated using an appropriate fumigant before dispatch
Beans	• A Phytosanitary certificate declaring that: Corynebacterium flaccumfaciens (Hedges) Dowson is not known to occur in the country of origin. (Bacterial wilt-Also called Curtobacterium flaccumfaciens) • The importer must undertake in writing to guarantee to use the entire consignment of material imported irrespective of the quantities involved.
Pulses (Pigeon Pea, Cow pea and Chick pea)	• A Phytosanitary certificate declaring that: Quadraspidictus pernicious (comst)-San Jose Scale is not known to occur in the country of origin (• All insects have been killed by chemical treatment before dispatch.
Cassava	• A Phytosanitary certificate declaring that: the place of origin is not known to harbour nematodes, bacterial, fungal and viral diseases of plants.
Groundnuts	• A Phytosanitary certificate declaring that: the consignment is free from caryedon gonagra F. • Or consignment to be treated on arrival

Challenges faced by traders of staple foods face in meeting quality standards requirement for cross border trading and what should be done to address them.

Challenge faced by traders in meeting standards requirements for cross border trade of staple foods	**Proposed solutions**

• Most traders are not familiar with phytosanitary regulations of importing countries • Differential levels of implementing phytosanitary regulations amongst the trading	• Enhanced sensitization of traders • Harmonizing sanitary and phytosanitary procedures amongst trading partners.

b) Application of the SPS measure – for imports

In all cases, a plant import permit is necessary to stipulate import conditions. An imported consignment must be accompanied by a phytosanitary certificate from a competent authority in the country of export.

- SPS inspection services are available in all points of entry.
- If not, available the Competent Authority collaborates with other Government agencies in organizing for inspection.
- The national organization/authority have mutual recognition with standards bureau in the region (EAC, COMESA and SADC)

c) **Application of the SPS – for Exports**

In all cases, a plant export permit is necessary to stipulate export conditions. A consignment for export must be accompanied by a phytosanitary certificate from a competent authority in the country of origin

- SPS inspection services are available in all points of entry.
- If not, available the Competent Authority collaborates with other Government agencies in organizing for inspection.
- The national organization/authority have mutual recognition with standards bureau in the region (EAC, COMESA and SADC)

Challenges faced by SPS Authority faced in facilitating cross border trade in staple foods and what should be done to address them.

Challenge faced by Bureaus of Standards in facilitating cross border trade of staple foods	Proposed solutions
• Undeclared agricultural commodities which might carry harmful organisms to either of the recipient countries if not cleared through the right phytosanitary procedures. • Traders view the charges for	• Enhance sensitization of cross border traders on the need to comply with plant health standards and regulations. • Need for enhanced sensitization

phytosanitary services as a levy that burdens their business.	

12.4.4 Trade (Import and Exports) Restrictions

a) Seasonal Export restriction

Trade restrictions are of two types; import restrictions which are put in place to protect domestic producers and export restrictions to benefit consumers. Among the staple foods, restrictions have been applied on maize due to food security considerations as a result of drought. The export restriction on maize was first applied in September 2008 under NCPB (Exportation of maize) Regulations 2008 as legal notice No. 23. This prohibited export of any quantity of maize, but did not include other maize products. Due to this loophole, a legal notice No. 166 of December 2008 was published as NCPB (Exportation of maize products) regulations 2008. This prohibited export of any part of maize, whether or not it has been ground or sifted into flour.

Commodity	(i) Is there legal provision in the country's statutes for export restriction (ban) in place (Indicate by inserting Yes/No as appropriate)	(ii) If yes, cite the specific statute(s) and Article(s) and the responsible Ministry (ies) /Institution(s)	(iii) Give the trigger condition as provided in the law/statute for imposing export restriction/ban	(iv) Give dates when export restriction/ban was instituted in the last 5 years (in each give date when imposed and date when removed, citing the official legal/gazette notice)	(v) Describe the mechanism (if it exists) for involvement of the private sector before the export ban is introduced. If the mechanism does not exist just indicate in this column that such a mechanism is not in place)
Maize	Yes	Special Issue; Kenya Gazette Supplement 30th December 2008, Legal Notice No. 166; National Cereals and Produce	None (normally adhoc political decision based	3rd October 2008 banning exportation of maize ; 30th December banning of maize and maize	No mechanisms exist for private sector consultation- yet they indicated great desire for their

Commodity	(i) Is there legal provision in the country's statutes for export restriction (ban) in place (Indicate by inserting Yes/No as appropriate)	(ii) If yes, cite the specific statute(s) and Article(s) and the responsible Ministry (ies) /Institution(s)	(iii) Give the trigger condition as provided in the law/statute for imposing export restriction/ban	(iv) Give dates when export restriction/ban was instituted in the last 5 years (in each give date when imposed and date when removed, citing the official legal/gazette notice)	(v) Describe the mechanism (if it exists) for involvement of the private sector before the export ban is introduced. If the mechanism does not exist just indicate in this column that such a mechanism is not in place)
		Board (CAP 338). MOA/NCPB	on perceived food situation	products.	involvement.
Wheat/Rice Sorghum/Millet Beans Pulses (Pigeon Pea, Cowpea and Chick pea) Cassava	NO	N/A	N/A	N/A	N/A

Only maize export is currently banned in Kenya. EAGC border at Namanga, Busia and Isebania were contacted over the issue of unrecorded cross border export levels for maize. They reported that they could estimate unrecorded exports. The Isebania border monitor stated that no maize

has been going through to Tanzania since the export ban on 30th December 2008. According to respondents (farmers, traders and processors), the impact export ban includes:

- Despite such bans some products still find their way to export markets if the prices are significantly higher. This may happen either through official border points of the unofficial crossing points (panya route). The ultimate impacts include:

    - Increases costs to traders because of the bribes involved (often higher than normal);
    - Reduces price offers by traders to farmers to cover the increased marketing costs (bribes);
    - Disrupts cross border trade (e.g. an exporter could already be having a business arrangement with an foreign buyer-and a ban just disrupts such business arrangements);
    - Halts possible price increase by millers and ultimate price payable by consumers;
    - Suppresses producer price increase with the potential effect of reducing incentives to invest in production;
    - Potential to increase the cost of storage;

12.4.5 Non Tariff Barriers

The EAC/COMESA Partner States define NTBs as "quantitative restrictions and specific limitations that act as obstacles to trade", and which appear in the form of rules, regulations and laws that have a negative impact to trade. According past relevant studies and surveys[38], most of the NTBs that businesses operators have been experiencing in the course of their trade activities in the EAC/COMESA region can be categorized under the following broad clusters: (i) Customs and administrative documentation procedures (ii) Immigration procedures (iii) Cumbersome inspection requirements (iv) Police road blocks (v) Varying trade regulations among the three EAC countries (vi) Varying, cumbersome and costly transiting procedures in the three EAC countries (vii) Duplicated functions of agencies involved in verifying quality, quantity and dutiable value of imports and export cargo, and (viii) Business registration and licensing. Non-Tariff Barriers (NTBs) Monitoring Mechanisms were developed as a joint initiative of the East African Business Council (EABC) and the East African Community Secretariats with the objective of facilitating the process of identifying, reporting and monitoring the elimination of current and future NTBs within the EAC/COMESA Partner States, so as to consolidate the

[38] *These includes the study on "Proposed Mechanisms for Elimination of Non-Tariff Barriers in EAC by Simon Ngatia with technical support of ICON Institute"; and "A Survey of Non-Tariff Barriers that Affect Kenyan Imports and Exports within EAC and COMESA Countries (2007) by Simon Ihiga)*

economic integration process in the region. According to the above referenced reports, reporting and monitoring framework operates as follows: A business person should report to the relevant national business association of chamber of commerce; who then should report to relevant line ministry or agency responsible for taking action on an NTB (Ministry of Trade and Ministry for EA and Regional Cooperation in the case of Kenya); who then should report to the National Monitoring Committee; who then should report to the EAC Secretariat; who then should report to EAC Sectoral Committee on Trade, Industry and Investment; who then should report to EABC; and then should report to EAC Council of Ministers EAC Trade Remedies Committee. The feedback flow follows the same route.

Discussions with staple food traders in Gikomba and Nyamakima – the main cereals markets – indicated two major non-tariff barriers namely; police road blocks and multiple payments of council fees. For example, transporters/traders from Busia to Nairobi are stopped at five roadblocks and have to pay Kshs 200/stop (USD 2.7/stop) which adds to Kshs 1,000 (USD 13.3) in term of cost. Kenya has the highest number of road impediments with 47 roadblocks from Mombasa to Busia while Uganda has only 5 roadblocks from Busia to Kampala. In the case of cess, traders have to pay Kshs 40 per bag (USD 0.53/bag) in the originating district, and a similar amount in the wholesale market plus an additional Kshs.40 in retail market, even for retailers purchasing from Nyamakima and retailing at Gikomba. This amounts to a total of Kshs.120/bag (USD 1.6/kg) equivalent to the transport cost/bag from borders.

12.4.6 Traders Awareness of EAC/COMESA NTB Monitoring Mechanisms

During this study, the consultants talked to traders at Busia and Namanga (2 each), EAGC border monitors (Namanga, Busia and Isebania border points); traders at Nyamakima (4) and the one large staple export trading company. Interestingly, all the respondents were completely unaware of the existence of an NTB reporting and monitoring framework or mechanism leave alone designated reporting channels. In fact one respondent said they recently had their groundnut imported from Tanzania impounded and the truck driver arrested by the City Council of Nairobi over payment of cess (yet the groundnuts were clearly designated for re-export). The importer reported to the Ministry of East African Community but nothing was done. Despite presenting all the necessary documents to show that the commodity was for re-export, the importer, even having hired a lawyer to deal with the matter-but had still to pay the cess. The respondent indicated that as result, they ended up making losses because they were operating on a very narrow margin.

12.4.7 Traders Recommendations

Those interviewed were of the view that there was lack of political good will to deal with either cross border or domestic trade NTBs and that this is perhaps a major reason why such protocols have not been disseminated. They recommended the following in order of sequence of action:

- The need for Partner states within EAC and COMESA, and relevant national institutions to first demonstrate their political goodwill to implement actions towards total elimination of NTBs affecting both cross border and internal trade. For this to happen, respondents recommended that severe punitive measures should be imposed on corrupt officials.

- The need for all relevant regional and national organizations to collaboratively undertake vigorous campaigns against malpractices relating to NTBs and also disseminate information on mechanisms for reporting such activities as widely as possible (ensuring easy access to reporting points/systems). The campaigns and channels for information dissemination should be through all public media channels including radio, newspapers and internet systems.

PART FOUR: CONCLUSIONS, POLICY IMPLICATIONS AND RECOMMENDATIONS

1.0 Main Conclusions

The main conclusions arising from this study are as follows:

- With the exception of maize, wheat and rice, specific-subsector secondary information is very limited at all levels of the value chains. In fact MOA does not adequately cover commodities such as chick peas, cassava and groundnuts.

- Kenya's staple food sector has been fully liberalized, with the exception of maize whose prices (NCPB-into depot) are occasionally set thereby influencing free market forces primarily because NCPB is major player-the impact is felt much more when prices are increased during shortages. Additionally, there is lack of political commitment on full and uninterrupted liberalization-as demonstrated by the recent export ban on maize by the Governments of Kenya and Tanzania.

- The demand for most of the staple crops is on the rise against declining production resulting in increasing annual deficits thereby necessitating increased imports;

- Growth of both production and trade of staple food crops has generally been on the decline in the last five years primarily due the following cross-cutting constraints:

    - Persistent drought conditions-against limited use of irrigation systems;
    - High cost of inputs including fertilizer, seeds and fuel (e.g. the price of 50-Kg bag of CAN fertilizer rose from Kshs 1,250 in 2004 to Kshs 3,675 in 2008; while the price of DAP rose from Kshs 1,500 to 2,246 per bag). This has resulted in low utilization of inputs especially among smallholder farmers and hence low yield achievements as well as reduced competitiveness of Kenya products.
    - Weak extension services to the staple food sector-public and private;
    - Weak research-extension linkages-resulting in low adoption of already developed varieties-which are numerous for many of the staple crops
    - Subdivision of land to uneconomical units;
    - High post harvest losses occasioned by several factors such poor storage/pest infestation, poor conditions of rural roads;
    - Limited access to credit-because financial providers are often reluctant to offer credit towards production of staple crops with the exception large scale maize and wheat.
    - Lack of proper market facilities for dry staple food crops;

- Horizontal linkages at the producer and marketing levels are generally very weak -there are no notable national associations except for CGA which has limited commodity coverage and limited membership. However, CMA is fairly strong horizontal linkage type of associations. The equivalent of CMA at the small-scale millers level (UGMFA) is rather weak.
- Vertical linkage at all levels of the value chains are extremely weak-with the exception large scale of wheat and maize production where some farmers have business relationships with millers;
- The staple food sector are characterized by very limited and narrow-based value-addition with the exception of wheat (e.g. the country continues to import starch whereas local cassava industry could support and the same for groundnuts which could be a source of supply of edible oil)
- There is lack of structured trading systems (i.e. absence of contract farming, underdeveloped Commodity Exchange and Warehouse Receipting systems);
- There is inadequate market information at all levels of the staple foods value chains (nationally and regionally);
- While tariff-related issues have significantly been resolved and may be fully eliminated with the recent signing of the EAC Customs Union, non-tariff barriers continue to hamper trade domestically and regionally-with police road blocks and multiple council cess and levies being the most constraining factors;
- There is very limited awareness of import and export standards especially with regard to SPS as well as NTB reporting mechanisms and monitoring systems among small-medium scale traders.
- Standards (weights and packaging) are yet fully harmonized in EAC/COMESA regions resulting trade inefficiencies;
- There is limited private sector-based storage facilities-which has partly been discouraged by NCPB/Government involvement in storage, marketing and pricing;

2.0 Key Policy Implications

- The need to enhance productivity of staple crops to meet increasing demand mainly through promoting increased use and adoption of modern inputs (mainly certified seed and fertilizers), improved research-extension linkages, and promotion of irrigated farming;

- The need to have appropriate land use policy to hedge against continued subdivision of agricultural land to uneconomical units;

- The need for full Government commitment to free domestic and regional trade;

- The need to establish structured trading for staple crops by promoting relevant systems (e.g. WRS and CE) and strengthening farmers and traders organizations for more effective and efficient vertical and horizontal linkages as well as linking these two broad initiatives to appropriate credit systems;

- The need to develop appropriate information gathering and dissemination systems for the staple foods sector (including food balance)-to feed into stakeholders in business planning especially among farmers and traders;

- The need to develop staple crops marketing and storage infrastructure-village level and terminal markets;

- The need to review and remove non-tariff barriers impeding on efficient staple food trade-domestically and regional with special emphasis police road blocks, county cess and levies.

- The need for enhanced sensitization and involvement of private sector stakeholders in NTB monitoring and reporting systems;

- The need to sensitize farmers and traders on standards with special focus on the SPS;

3.0 Recommendations

- Support initiatives towards enhancing productivity of staple crops through increased multiplication of already released high-yielding varieties, promotion of adoption especially among smallholder farmers, and appropriate inputs use supported by soil tests to determine specific nutrients needs;

- Initiate consultative fora between private sector staple food stakeholders and Government to elicit formal and full commitment to non-interference with free market/trade-in particular in relation to the "Stop-Go" policy on imports and export (that is restrictions/ban of imports and exports) as recently happened with maize in Kenya and Tanzania.

- Support sensitization among policy-makers on the need to maintain free trade of food crops and its benefits towards long term national food security-with special focus on Parliamentary Agricultural Committee;

- Support the formulation of relevant policies towards the development of Commodity Exchange and Warehouse Receipting Systems and enact the necessary legislative framework;

- Review local Government agricultural produce taxation systems and procedures with a view to harmonization, reduction and abolition of multiple taxation. Traders seemed not to have problems with payment of county cess and levies, the problem lies in the amount (Kshs 40 per bag equivalent for all products which they recommend to be reduced to Kshs 20) and multiple charges.

- Introduce the "green channel" concept to facilitate faster flows of imported staple crops focusing on large and regular imports (this has been done in China and India).

- Formulate markets/marketing policy and implementation strategy for the development of appropriate marketing facilities-with special emphasis on major terminal markets.

- Support public/private sector partnership-based initiatives towards strengthening data collection, storage, analysis and dissemination including but not limited to national and regional production and consumption; intra and extra EAC/COMESA trade flows (volumes and values) as well as in developing regular food balance sheets and institutionalizing them sector planning.

APPENDICES

Appendix table M1: Medium-Large Maize Millers (CMA Members)						
Name of Company		Location	Contact Address	Installed Milling Capacity		Brands
				(MT/24 hours)	Bags of Maize Flour per day	
1	Mombasa Maize Millers	Mombasa	Mwangeka Road, Kingorani. P.O. Box 87074 80100 Mombasa; +254-41-2491656/ mobile: +254-722273388	610	6,778	Taifa
2.	Unga Limited	Nairobi	Ngano House, Commercial Street. P.O. Box 30096-00100, Nairobi	450	5,000	
3.	Mbsa Grain Milling Co.	Mombasa	Mombasa	330	3,667	Tembo
4	Pembe Flour Mills	Nairobi	Lungalunga Road. Industrial Area. P.O. Box 17955 00500 Nairobi	270	3,000	Pembe
5	Mbsa Maize Millers	Nairobi	Runyenjes Rd, Off Nanyuki Rd. Industrial Area. P.O. Box 17630 00500 Nbi	255	2,833	
6	Capwell Industries	Thika	Off Garissa Road, Block 5/551. P.O. Box 746-01000 Thika	240	2,667	Soko
7	Kitui Millers	Mombasa	Mariambai Lane, Off Lumumba Rd. P.O. Box 42160 80100 Mombasa	240	2,667	Dola
8	Eldoret Grains Ltd	Eldoret	Iten Road. Near Kipchoge Stadium. P.O. Box 6284 30100 Eldoret	225	2,500	Dola, Jahazi & Maisha
9	Maize Milling Co.	Eldoret	Sirikwa Street. P.O. Box 8216, Eldoret	200	2,222	
10	Unga Ltd-Eldoret	Eldoret	-	180	2,000	Jembe
11	Uzuri Ltd	Nairobi	Off Mogadishu Rd. Industrial Area. P.O. Box 53366-00200 Nairobi	180	2,000	Golden
12	TSS Group	Mombasa	Dare salaam Road. Shimanzi. P.O. Box 85039 Mombasa	150	1,667	TSS
13	Chania Mills	Thika	Thika	144	1,600	Chania Flour
14	United Millers-Kisumu	Kisumu	Obote Road, Industrial Area, Kisumu. P.O. Box 620 40100 Kisumu	135	1,500	Jambo
15	Kitale Industries	Kitale	Kitale	130	1,444	Bahari
16	Nairobi Flour Mills	Nairobi	Homabay Road, Industrial Area. P.O.Box 46395 00100 GPO Nairobi	120	1,333	Jimbi
17	Mbsa Maize	Kisumu	Sabuni Road. P.O. Box 9494 40141 Kisumu	120	1,333	Swan

	Millers					
18	Eastern Flour Mills	Machakos	Machakos	120	1,333	Nzau, Faida
19	Eldoret Grains	Kitale	Kitale	120	1,333	-
20	Kabansora Millers	Nairobi	Old Airport Road, Embakasi, P.O. Box 78284, Nairobi	100	1,111	Shujaa
21	United Millers	Eldoret	Eldoret	100	1,111	
22	Osho Grains	Nairobi	Nairobi	90	1,000	Safari & Njema
23	Eldoret Grains-Mwingi	Mwingi	Mwingi	90	1,000	--
	Sub-Total			4,599	51,099	
Source: NCPB						

Appendix table M2: Small-Scale Maize Millers

	Name of Miller	Estimated Milling Capacity				Brand Name	Location/Address
		Bags/24 Hrs	MT/Day	MT/Month	MT/Year		
1	Cateress Milling Ltd	78	7.0	183	2,190	Cateress	-
2	Meru Central Multi-Purpose	70	6.3	164	1,966	Afya Rahisi	Meru
3	Aberdare Maize Milling Ltd	75	6.8	176	2,106	Aberdare MPA	-
4	Rosanne Investments Ltd	4	0.4	9	112	Ahadi	-
5	Beada Millers	4	0.4	9	112	Beada	-
6	Besoko Millers	4	0.4	9	112	Besoko	-
7	Babaku Enterprises	4	0.4	9	112	Bongo	-
8	Kapari Ltd	9	0.8	21	253	Chapa Royo	-
9	Family Flour Ltd	7	0.6	16	197	Family Flour	-
10	Midland Millers	60	5.4	140	1,685	Hybrid Swara	-
11	Joli Millers	10	0.9	23	281	Joli	-
12	Kalwa Maize House	1	0.1	2	28	Karibu	-
13	Centaur Milling Enterprise	10	0.9	23	281	Karibu Nyumbani	-
14	Organic Virgin	5	0.5	12	140	Kenflour	-
15	Kifaru Maize Millers	4	0.4	9	112	Kifaru	-
16	Umoja Flour Mills	7	0.6	16	197	Lucky Star	-
17	Mama Millers	35	3.2	82	983	Mama	-
18	Maycorn Kenya	60	5.4	140	1,685	Maycorn	-
19	Swaminarayan Industries	12	1.1	28	337	Milky	-
20	Msafiri Flours Ltd	42	3.8	98	1,179	Msafa	-
21	AUM Maize Millers	5	0.5	12	140	Nyuki	-

22	Meru Pendo Millers	1	0.1	2	28	Pendo	-
23	Kwest Millers	2	0.2	5	56	Pendo	-
24	Batian Grain Millers	24	2.2	56	674	Sana	-
25	Sava Industries	12	1.1	28	337	Sava	-
26	Katex Enterprises	8	0.7	19	225	Sawa	-
27	Pan African Grain Millers	14	1.3	33	393	Starehe	-
28	Sunrise Grain Millers	10	0.9	23	281	Sunrise	-
29	Njora Food Products	4	0.4	9	112	Superior	-
30	Sweet Meal Flour	4	0.4	9	112	Sweet Meal	-
31	Valley Posho Meal	10	0.9	23	281	Valley Star	-
32	Mabrouk Flour Mills	9	0.8	21	253	Neema	-
33	Daiga Millers	15	1.4	35	421	Rift Valley	-
34	Uchumi Grain Millers	14	1.3	33	393	Msosi	-
35	Summer Millers Ltd	7	0.6	16	197	Wembe	-
36	Range Food Products	10	0.9	23	281	Range Flour	-
37	Snow Maize Millers	10	0.9	23	281	Snow	-
38	Gakenge Maize Millers	10	0.9	23	281	Ziwa	-
39	Nanyuki Grain Millers	36	3.2	84	1,011	Manna	Nanyuki
40	Sabco Millers	10	0.9	23	281	Budget	-
41	Embu Food Industries	5	0.5	12	140	Besta	Embu
42	Nicely Nicely Maize Millers	20	1.8	47	562	Nicey Nicey	-
43	Glory Posho Millers	2	0.2	5	56	-	-
44	Subukia Millers & General	4	0.4	9	243	-	Subukia
45	Faru Flours	8	0.7	19	487	Dan MILL/Harmony	Dandora
46	Dandora Millers	17	1.5	40	1,034	-	-

47	Jamhuri Grain Millers	10	0.9	23	608	Kitale	Kitale
48	Kirima Millers	10	0.9	23	608	Kirima	Nairobi
49	Bima Grain Millers	4	0.4	9	243	Bima	-
50	Pamtack	4	0.4	9	243	Wamunyu Star	-
51	Garissa Maize Millers	6	0.5	14	365	Garissa	-
52	Queens Food Millers	2	0.2	5	122	Queens	-
53	FAJ Safeway Foods	2	0.2	5	122	Insta Health Builder	-
54	Royal Maize Millers	10	0.9	23	608	Malkia	-
55	Pripal Millers	4	0.4	9	243	Kep Unga	-
56	Amos Ndungu Gatiki	4	0.4	9	243	-	-
57	Jikaze Maize Millers	10	0.9	23	608	Maba	-
58	Miriru Millers	2	0.2	5	122	-	-
59	Crown Foods	2	0.2	5	122	-	
60	Thika Grain Millers	3	0.3	7	183	-	Thika
61	Umande Millers	2	0.2	5	122	Umande	-
62	Gilgil Grain Millers	2	0.2	5	122	Asili	Gilgil
63	Migosi Cosmos	2	0.2	5	122	-	-
64	Victor Posho	2	0.2	5	122	-	-
65	Riconero Agency	6	0.5	14	365	-	-
66	Ng'ang'a Posho Mills	6	0.5	14	365	-	-
67	Belgut Enterprises	6	0.5	14	365	Kanga	-
68	Gatakari Millers	6	0.5	14	365	Bora Bora	-
69	Mums General Suppliers	6	0.5	14	365	Mums	-
70	Milimani Stores	6	0.5	14	365	-	Naivasha
71	Sifa Millers	15	1.4	35	913	Sifa	-

72	Proctor Allan EA Ltd	10	0.9	23	608	-	-
73	Bemar Ltd	2	0.2	5	122	-	-
74	Muki Maize Millers	7	0.6	16	426	Muki	-
75	Karanda Millers	2	0.2	5	122	Karanda	-
TOTAL		**925**	**83**	**2,165**	**31,936**	**-**	-
Source: NCPB							

Appendix table M3: Smallholder Farmer Groups			
FARMER GROUP	**NUMBER OF MEMBERS**	**COMMODITIES**	**REGION**
ST JAMES A.C.K	23	Maize	ELDORET
CHEMASO	26	Maize/beans	BOMET
KAPNGETUNY CHEBARUS S.H.G	21	Maize/beans/wheat	KIPLOMBE
SHINDIKISHO	17	Maize/beans/millet	TURBO
CHEBARAR FARMERS ASSOCIATION	24	Maize/beans	TRANSMARA
KIBISI	48	Maize/beans/millet/sorghum	WEBUYE
NGONA ENGO	18	Maize/beans	WEBUYE
NAET FIFTEEN	30	Maize/beans	ELDORET
TESUN INVEST GROUP	21	Maize/beans/millet	NGORO
KAMNO FCS	400	Maize/beans/sorghum/millet	KAPSABET
KANDUI HIGH TECH	30	Maize/beans/sorghum/millet	BUNGOMA
KABECI	20	Maize/beans/millet	KAPENGURIA
TOWNSHIP S.H.G	30	Maize/beans	NYAMIRA
JIRANI WOMEN GROUP	12	Maize/beans/sorghum/millet	SOI
WISOP	50	Maize/beans	CHEPTAIS
LOLKERIGET	58	Maize/beans	KABIYET
MANGO YOUTH GROUP	47	Maize/beans/sorghum/millet	KITALE
KOSIRAI TAITA	25	Maize	CHEPSIRO
NYAFA	120	Maize/beans	NYAMIRA
BIIKOFA	80	Maize	NYAMIRA
KESES FARMERS FEDERATION	3900	Maize	ELDORET
KERGEI MOEK S.H.G	15	Maize/sorghum/millet	ELDORET
CAANAN	42	Maize/beans	SOTIK
KISIGAME UPENDO INITIATIVE	45	Maize/beans/sorghum/millet	MATUNDA
KOIMOI INVESTMENT	25	Maize	LITEIN
JORDAN FFS	20	Maize	BOMET
MWAITA S.H.G	30	Maize/wheat	MOIBEN
CHEBUNYO FCS	83	Maize/beans/sorghum/millet	BOMET
KOLONGEI SAROYOT	24	Maize/beans	ELDORET
Source: EAGC			

Appendix Table W1: Recommended Wheat Varieties

Variety Name	Altitude (m)	Yield (90kg bags/ha)	Maturity
Pasa	All	37	Late
Kenya Chirika	All	36	Medium
Mbuni	All	37	Late
Kenya Kwale	All	32	Late
Kenya Popo	All	32	Medium
Kenya Fahari	1800 – 2100	29	Medium
Kenya Kongoni	2100 – 2400	32	Medium
Kenya Nyumbu	1800 – 2400	32	Medium
Kenya Nyangumi	1800 – 2100	25	Early
Kenya Paka	1800 – 2100	24	Early
Kenya Kulungu	1800 – 2400	30	Late
Kenya Nungu	1800 – 2400	24	Medium
Kenya Mbweha	1800 – 2100	28	Medium
Kenya Tembo	1800 – 2100	32	Medium
Duma	Below 1800	22	Early
Ngamia	Below 1800	20	Early
Mbega	Above 1800	36	Medium

Varieties and baking characteristics

Group 1: Weak wheat not ideal for baking. Can be blend with superior wheat for baking
Group II: Strong stable wheat. Fairly good bread baking qualities.
Group III: Strong dispensable wheat. Good baking quality. Also used for pasta.
Group IV: White wheat's used for confectionery and pasta. Good for home baking.

Group I	Group II	Group III	Group IV
Kenya Bongo	Kenya Mamba	Kenya Zabadi	Kenya Kulungu
Kenya Kudu	Kenya Nyangumi	Kenya Kiboko	Kenya Nyoka
Kenya Kongoni	African Mayo	Kenya Swara	Kenya Leopard
Kenya Tumbili	Kenya Tembo	Kenya Paka	Bounty
Kenya Tausi	Kenya Nyumbu	Kenya Fahari	Mbuni
Kenya Chirika	Kenya Popo	Kenya Kuro	Pasa
Ngamia	Duma	Kenya Nyati	Kenya Paa
	Kenya Ngiri	Mbega	
	Kenya Nungu		
	Kenya Kifaru		
	Kenya Mbweha		
	Kenya Kwale		

Appendix Table W2: Milling Capacities of Wheat Flour Millers

	COMPANY	Address	MT/Day (24 hrs)	Brand Names
1	Atta	Mwangeka Road, P. O. Box 83272-80100, Mombasa	200.00	Chef
2	Bakex	Plot No. 4953/1411, off Garissa Road, P. O. Box 25-001000 Thika	180.00	Boma, Oboma
4	Eldoret Grains	Iten Road near Kipchoge Stadium, P. O. Box 6284-30100 Eldoret	200.00	Dola, Jahazi & Maisha
5	Kabansora	Old Airport Road, Embakasi, P. O. Box 78284, Nairobi	140.00	Shujaa
6	Kitui Flour Mills	Mariambai Lane, Off Lumumba Rd, P. O. Box 42160 -80100, Mombasa	120.00	Dola
7	Maisha	Kiganjo-Nanyuki Highway, Plot No. LR 12875 & 12897, P. O. Box 249-10102, Kiganjo	90.00	Maisha
8	McNeel	Garissa Road, P. O. Box 16, Thika, Kenya	140.00	
9	Milly Grain		100.00	Tima
	Msa Maize Millers – Ksm	Sabuni Road, P. O. Box 9494 40141, Kisumu	140.00	Swan
10	Msa Maize Millers - Msa	Mwangeka Road, Kingorani P. O. Box 87074, 80100, Mombasa	180.00	Taifa
		Runyenjes Road, off Nanyuki Road, Industrial Area, P. O. Box 17630-00500, Nairobi	560.00	Ndovu
11	Nairobi Flour Mills	Plot No. 207/7188 Homabay Road, Industrial Area, P. O. Box 46395-00100, GPO Nairobi	50.00	Jimbi
12	Pembe	Lungalunga Road, Industrial Area, P. O. Box 17955-00500 Nairobi	480.00	Pembe
13	Premier	Mogadishu Road, Industrial Area, P. O. Box 59307, 00200, Nairobi	500.00	Chef
14	Rafiki	Off Mombasa Road, next to ICD, P. O. Box 45298-00100, GPO Nairobi	340.00	Lotus
15	TSS Grain	Daresalaam Road, Shimanzi P. O. Box 85039, Mombasa	100.00	TSS
16	Unga	Ngano House, Commercial Street, P. O. Box 30096-00100 Nairobi	220.00	Unga Exe
17	United Millers	Obote Road, Industrial Area Kisumu, P. O. Box 620-40100, Kisumu	400.00	Tropicana Wheat, Jambo
18	Uzuri Foods	Off Mogadishu Road, Industrial Area, P. O. Box 53366-00200, Nairobi	350.00	Golden

Appendix Table W.3: Members of AKEFEMA

1.	A.J. Faulkner and Sons Ltd	37	May Feeds Ltd.
2.	ABS TCM Ltd.	38	Meru Central Multi-Purpose Co-op Society
3	AFRI_VET Ltd.	39	Millet Company Ltd.
4	AllTech Biotechnology (EA) Ltd.	40	Miracle Feeds Ltd.
5	Athi Feeds Ltd.	41	Modern Ways Supplies Ltd.
6	Batian Feeds	42	Moi's Bridge Millers Ltd.
7	BEGAM Agencies Ltd.	43	Molaplus Investment Ltd
8	Biomedica Labs	44	Mombasa Maize Millers Ltd.
9	Brook Feeds Ltd	45	Mwonyoo Millers Ltd.
10	Bunda Cakes and Feeds Ltd.	46	Nairobi Feed Manufacturers Ltd.
11	CAREVET Animal Feeds Ltd.	47	NAKU Modern Feeds Ltd.
12	Catalyst Chemicals Ltd.	48	Ngenia Feeds Ltd.
13	Chania Feeds	49	JUCA Feeds Ltd.
14	Chemical and Technical Services Ltd.	50	Nutri Feeds Ltd.
15	Crown Feeds Ltd.	51	Nutrimix Ltd.
16	Dandora Millers Ltd.	52	OHAMI Millers Ltd.
17	Eagle Vet (K) Ltd	53	Pembe Feeds Ltd.
18	Economy Farm Products Ltd.	54	Pioneer Feeds Limited

19	Formula Farm Feeds Ltd.	55	Pwani Feeds Ltd.
20	HallMark Feeds Ltd.	56	Ranalo Millers Ltd.
21	Happy Feeds Ltd	57	S. Rocky General Contractors Ltd.
22	Healthier Feeds Ltd.	58	Sifa Feeds Ltd.
23	HEMCO Feeds	59	Sigma Feeds Ltd.
24	High-Line Feeds Ltd	60	Sirari Feeds
25	Imenti Millers	61	TAM Feeds Ltd.
26	Jacaranda Feeds Ltd.	62	Tarime Suppliers Ltd.
27	JoeLiz Bone Meal Ltd.	63	Tosha Products (K) Ltd.
28	Jubilee Feed Industries Ltd.	64	Treasure Industries Ltd.
29	Jupiter Manufacturers Ltd.	65	Trust Feeds Ltd.
30	KARMARTS Ltd.	66	Turbo Feeds Ltd.
31	Kengrow Ltd	67	Twiga Chemical Industries Ltd.
32	Leghorn Feeds International Ltd.	68	Unga Farm Care (EA) Ltd.
33	Lens Agricultural Agencies Ltd.	69	Vetcare (K) Ltd.
34	LIMA Feeds Ltd.	70	Wakulima Dairy Feed Company
35	Maisha Millers Ltd.	71	Wonder Feeds Ltd.
36	Maridadi Enterprises Ltd.	72	Wororo Feeds Ltd.

Appendix Table M1a: Production zones and Recommended Varieties

Zones/Types of Millet	Finger	Pearl	Pros	Fox Tail
Moist Mid – Altitude Busia, Kakamega, Siaya, Kisumu, Homabay, Migori, Kuria, Coffee zones of Meru, Embu and Nyeri Districts	P224 Gulu E		KAT/PRO - 1	KAT/FOX - 1
Semi-Arid Lowlands. Machakos, Makueni, Lower Embu and Tharaka Nithi, Kajiado, parts of Rift Valley, parts of North Eastern provinces.	KAT/FM – 1	KAT/PM – 1 KAT/PM - 2	KAT/PRO – 1	KAT/FOX - 1
Cold semi arid Highlands Nakuru, Baringo, Laikipia, Naivasha, Narok, Parts of Koibatek, Taita/Taveta	Lanet/FM – 1		KAT/PRO – 1	KAT/FOX - 1
Humid Coast Lamu, Kilifi, Taita/Taveta, Kwale, Mombasa	P224 Gulu E		KAT/PRO - 1	KAT/FOX - 1

Appendix Table M1b: Some Characteristics of Recommended Varieties

Crop	Variety	Maturity (Months)	Grain colour	Grain Yield Potential (Bags/Acre)
Finger Millet	P224	4	Brown	10
	Gulu E	4	Brown	8
	KAT/FM/FM – 1	3	Brown	7.5
	Lanet/FM – 1	4	Brown	7
Pearl Millet	KAT/PM – 1	2.5 – 3	Grey	12
	KAT/PRO – 1	2.5 – 3	Grey	10
Proso Millet	KAT/PRO – 1	2.5	Cream	8
Fox tail millet	KAT/FOX - 1	3 - 4	Yellow cream	8

LIST OF PEOPLE MET

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24	Dorothy Kawira	RTTC	0733-279873
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26	Karim Francis	Tegemeo	0722-634862
27	Kimwele Julius		0722-896307
28	Cecilia Owiti		0723-761424
29	Mrs. Kimani	KARI - Mwea	0722-892672
30	Geoffrey Mugera	RIA Rice Mills	0723-552243
31	Joseph Gachie	MRGM	0721-331036
32	Kinuthia Njoya	KACE	0723-142332
33	Marion Gathumbi		0722-649292
34	Gladys Maingi	PSDA	0722-828021
35	Manyara	WRS	051-851761, 0723-263312
36	Marion Gathumbi		0722-649292
37	Anne Gikonyo	HCDA	0722-651812
38	Njuguna	Agribusiness - Maendeleo	0733 954102
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48	Samuel K. Mburu	Tegemeo	020-2717818/0722-560163
51	Esther Kimani	KEPHIS	020-3536171/2, 0722-516221/0733-874274
	Abdi Alow	EAGC Boarder Monitor	0720 401408
	Beatrice Magaki	EAGC Boarder Monitor	0727 751680
	Henry Bwire	EAGC Boarder Monitor	0772 687725

LIST OF TRADERS INTERVIEWED					
NAME	**MARKET**	**NO. OF YEARS IN TRADE**	**COMMODITIES**	**TYPE OF ACTOR**	**CONTACT**
WANGUI	Nyamakima	10 Yrs	Groundnuts	Wholesaler	0725-8475
DAVID	Nyamakima	10 Yrs	Groundnuts	Wholesaler Retailer	0724-155090
NDUTA	Nyamakima		Groundnuts	Wholesaler	
Lucy Wairimu	Gikomba		Groundnuts	Retailer	
NJOROGE	Nyamakima	5 Yrs	Millet Sorghum	Wholesaler	0722-645874
ACHULANGA	Gikomba	7 Yrs	Millet Sorghum	Retailer	0750-502779
Irene	Githurai	5 Yrs	Millet Sorghum	Retailer	0722-467878
PAMELA	Gikomba	10 Yrs	Millet Sorghum	Retailer	0727-269625
Njambi	Gikomba	10 Yrs	Millet Sorghum	Retailer	0720-923638
John Gitau	Nyamakima	6 Years	Maize, Beans Pigeon peas	Wholesaler	0721-695852
Rahab Wangari	Nyamakima	7 Years	Maize, Beans, Pigeon peas	Wholesaler and Retailer	0720-332455
Joseph Gicheha	Nyamakima	8 years	Maize, Beans, Pigeon peas	Wholesaler and Retailer	0725-727183
Daniel Kariuki	Nyamakima	20 Years	Beans	Wholesaler and Retailer	0729-054054
Mark Ndegwa	Nyamakima	25 years	Maize and Beans	Wholesaler	0722-433457
Mutinda John	Nyamakima	4 years	Beans and Pigeon peas	Retailer	0716-153409
Mweni Mutua	Gikomba	2 years	Beans	Retailer	0711-730566
Stephen Mwatha	Gikomba	8 years	Beans, Pigeon peas	Retailer	0724-859319
Kakiei Muthani	Gikomba	22 years	Maize, Beans, Pigeon peas	Retailer	0727-921143
Florence Kanini	Gikomba	9 Years	Maize and Beans	Retailer	0714 – 270762
Muyoni Muji	Gikomba	26 years	Beans, Maize	Retailer	-
Loise Wambui	Gikomba	6 years	Beans, Maize	Retailer	0722 -483381
Agnes Wanjiru	Gikomba	20 Years	Beans	Retailer	0725-649379
Naomi Njoki	Gikomba	3 years	Beans, Pigeon peas	Retailer	0725-307138
Kimende Enterprises Joseph Gicheha	Nyamakima	10 Years	Rice Cowpeas	Wholesaler Retailer	0725-727183
Upendo Store David Muriuki	Nyamakima	10 years	Rice Cowpeas	Wholesaler Retailer	0724-155090

Joystar Bargain	Nyamakima	10 years	Rice Cowpeas	Wholesaler Retailer	0722-823081
Chania Investment Mark Ndegwa	Nyamakima	25 Years	Rice Cowpeas	Wholesaler Retailer	0722-483457
SMAG Cereals Wangui	Nyamakima	18 Years	Rice Cowpeas	Wholesaler Retailer	0725-847542
Kandara Store Florence Njenga	Nyamakima	12 Years	Rice Cowpeas	Wholesaler Retailer	0722-609346
IRA Shop Mr. Gichuru	Nyamakima	10 Years	Rice Cowpeas Cassava Flour	Wholesaler Retailer	0724-752888
Shariffa Millers Margaret	Gikomba	20 Years	Cassava flour Millet Wheat	Wholesaler	0721-698131
Nyataya Posho Maureen Otieno	Gikomba	15 years	Cassava Flour Millet, Sorghum Wheat	Wholesaler Retailer	0722-871485
Wa Carol Retail Wa Carol	Gikomba	3 Years	Cow Peas Amaranth	Retailer	0729-496474
Giodaki Eunice	Gikomba	5 years	Cassava Flour Millet Sorghum	Retailer	0724-654274
Chinga Enterprises	Nyamakima	10 Yrs	Rice Cowpeas	Wholesaler Retailer	
Kihiko Millers	Gikomba	12 Years	Cassava Flour Millet Sorghum	Wholesaler Retailer	
Miracle Enterprises	Gikomba	18 Years	Cassava Flour Millet Sorghum	Wholesaler	

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