

Agro-industrial Development Policies

What Nexus to Climate, Food
Security, and Trade?

Kenya



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Acronyms

AfDB	African Development Bank
AGOA	African Growth Opportunity Act
AGRA	Alliance for Green Revolution in Africa
AU	African Union
CBO	Community Based Organisation
CIAT	International Centre for Tropical Agriculture
CDM	Clean Development Mechanisms
CMD	Cassava Mosaic Disease
COMESA	Common Market for Eastern and Southern Africa
COO	Certificate of Origin
DFID	Department for International Development
EAC	East African Community
EACIF	East African Community Industrialisation Framework
ERA	Economic Review of Agriculture
FAO	Food and Agriculture Organisation
GDP	Gross Domestic Product
GHG	Green House Gas
GIZ	Gesellschaft für Internationale Zusammenarbeit
GNI	Gross National Income
GOK	Government of Kenya
ICRISAT	International Crops Research Institute for Semi-Arid Tropics
IITA	International Institute for Tropical Agriculture
ILRI	International Livestock Research institute
IPCC	Intergovernmental Panel on Climate Change
JICA	Japan International Cooperation Agency
JKUAT	Jomo Kenyatta University of Agriculture and Technology
KALRO	Kenya Agriculture & Livestock Research Organisation
KAPAP	Kenya Agricultural Productivity and Agribusiness Project
KACP	Kenya Agricultural Carbon Project

KDLC	Kenya Development Learning Centre
KEBS	Kenya Bureau of Standards
KENAFF	Kenya national Farmers Federation
KEPHIS	Kenya Plant Health Inspectorate Services
KIRDI	Kenya Industrial Research and Development Institute
MLN	Maize Lethal Necrosis
MOALF	Ministry of Agriculture Livestock and Fisheries
NAPA	National Adaptation Plan of Action
NAMA	Nationally Appropriate Mitigation Action
NCCRS	National Climate Change Response Strategy
NEMA	National Environment Management Agency
NEPAD	New Partnerships for Africa's Development
NGO	Non-governmental Organisation
NTBs	Non Technical Barriers
PALWECO	Program for Agriculture and Livelihoods in western Communities
SACCO	Savings and Credit Cooperative organisation
SADC	Southern African Development Cooperation
SEATINI	Southern and Eastern Africa Trade Information and Negotiations Institute
SIDA	Swedish international Development Agency
SNV	Netherlands Development Organisation
UNECA	United Nations Economic Commission for Africa
UNIDO	United Nations Industrial Development Organisation
USAID	United States Agency for International Development
WTO	World Trade Organisation

Chapter 1

Introduction

Kenya attained lower middle income status in 2015, having achieved a Gross National Income (GNI) of \$1,290 per capita. Income levels have increased with 45 percent of Kenya's population is in the middle income bracket. Gross Domestic Product (GDP) growth rate currently stands at 5.9 percent (Government of Kenya (GOK) Economic Survey, 2015). Agriculture still remains a major sector in the Kenyan economy, contributing food and nutrition security to over 40 million Kenyans and livelihoods to over 17 million rural Kenyans. Agriculture contributes to 26 percent of GDP and 65 percent of employment, 18 percent of which is formal employment (GOK Economic Review of Agriculture (ERA) 2015). Agricultural exports constitute two thirds of total exports, comprising primarily horticulture, tea, coffee and fish. The growth of the economy is therefore highly correlated to growth in agriculture.

However, Kenya's agricultural sector is dominated by smallholder farmers who produce about 75 percent of total agricultural outputs on land holdings as low as 0.2 to 3Ha. The current system is highly dependent on rain-fed agriculture, and has recently been affected by climate change with unpredictable seasons, flooding, long dry spells, and increased temperatures leading to productivity losses and incidences of food insecurity. Agricultural markets are highly volatile, and dependent on seasonal variation and infrastructure, such as rural roads, which are largely in poor condition. Most of the marketed agricultural outputs are unprocessed, resulting in post-harvest losses and low returns on investments for farmers. The Kenyan Industrialisation Transformation

Programme recognises these challenges and has developed a strategic, comprehensive and integrated programme towards industrializing Kenya by 2030. The strategy recognises the importance of agro-processing and value addition to agricultural commodities as one of the interventions that will have a positive impact on growth, job creation, and industrial development (GOK2015 - Kenya Industrialisation Transformation Program).

The East African Community (EAC) also recognises the need to embark on agro-industrialisation by converting raw agricultural products into value-added products for enhanced food security, poverty reduction and overall economic development. Currently only about 28 percent of the agricultural produce in the region is processed, largely owing to lack of capacity, infrastructure, and unreliable supply of raw materials (EAC 2012). To this end, the EAC created the EAC Industrialisation Policy 2012-2032, which states its overarching objective as "*Transforming the manufacturing sector with high value addition and product diversification, using competitive and comparative advantages of the region.*" It provides general principles for the industrialisation of its economy, which also apply to agro-industry. In general, the EAC Industrialisation Policy Framework (EACIF) seeks to harmonise existing national legal frameworks, thereby promoting the creation of regional value chains and their integration on the global level.

This study looked at Kenya's agro-industrialisation policies with a view to understand the nexus between agro-

industrialisation, trade and food security, bearing in mind that climate change directly affects agriculture and food security. The study used secondary information and policy documents to analyse how integrated food security, climate change, and agro-industrialisation policies are structured in the country, and to what extent they are aligned to regional level policies. This is augmented by key informant interviews that provided useful information regarding policy implementation and the challenges envisioned. The study also use two case studies of banana and cassava value chains to understand the challenges and opportunities in production, processing, and trade of the respective value chains and the policy issues that affect agro-processing within each of the two sub-sectors.

1.1 Objectives and TORs

The main objective of the study was to identify and fill knowledge gaps in relevant policies of agro-industrial development, to ensure sensitivity to climate change, food security, and trade linkages in the East African Community.

Specific Objectives

1. To find out how agro-industrial policy at the regional and national level currently addresses climate change, food security, and trade?
2. What are the missing links? What policies should be put in place to mainstream climate change, food security, and trade linkages into the agro-processing industry?
3. The role of gender issues in climate change, food security, and trade linkages in agro-industrialisation.
4. Challenges of mainstreaming climate change, food security, and trade linkages into agro-processing industry.
5. Challenges and opportunities of the agro-industrial sector in EAC region.
6. How national plans align with the EAC's regional policies and Kenya's agro-processing strategy.

In Summary, the research should, inter alia, address the following:

- The cope of agro-industrial and related national/regional policies;
- Analysis of the extent to which above policies take into account climate change, food security, and trade linkages;
- Identify gaps/missing links to climate change, food security, trade, gender and related issues in the above policies; and
- Provide recommendations/best practices to ensure agro-industrial development takes into account climate change, food security, and trade as well as gender and marginalised groups' issues.

1.2 Methodology

The study's conceptual framework is presented by a summary of the linkages between agriculture, agro-industrialisation, climate change, food security and trade. These form the basis through which the study is conducted and presented in the second section of this report. Section 3 of this study presents the policy analysis and gives a summary of the current policy landscape, gaps, and challenges. The study relies on secondary literature review and an analysis of policies, strategies, bills, and other development related documents on agriculture, industrialisation, agro-processing, climate change, food security, trade, and gender in Kenya and the EAC. A complete list of the policies analysed can be found in Annex 1. Key informant interviews are also used to augment policy analysis by engaging with key policy-makers and implementers. A total of 63 key informants were interviewed from various institutions, mainly key government ministries such as the Ministry of Agriculture, Livestock and Fisheries (MOALF), the Ministry of Foreign Affairs and International Trade, the Ministry of Environment and Natural Resources, and the Ministry of Industrialisation and Enterprise Development. Research institutions included Kenya Agriculture and Livestock Research Organisation (KALRO), and parastatals included Export Promotion Zones and the Kenya Investment Authority. Local and international non-governmental organisations (NGOs) also provided valuable information, as

well as local community based organisations (CBOs). At the county level, various county government ministries were visited together with KALRO offices in the respective counties, local NGOs, grassroots CBOs, farmer groups, and women's groups were also visited. Other key informants have been international NGOs working with farmers or involved in agro-processing, national and international research organisations, donors – such as USAID, GIZ and SIDA – and CBOs. At the national level, 12 key informants were interviewed (Annex 2).

Case studies from the banana and cassava sub-sectors have been used to present the dynamics of agriculture, food security and climate change as well as illustrate the linkages with current and potential agro-processing opportunities. This is also analysed from a climate change, youth and

gender perspective. Existing studies and secondary data on the two sectors are analysed and augmented with information from key informants in major cassava and banana growing areas in the country. For the cassava sub-sector, Makueni and Busia counties were selected and 23 key informants were interviewed, in addition to four focus group discussions with farmer groups. For the banana sub-sector Kisii and Meru counties were selected and 14 key informants were interviewed. Two focus group discussions were also done. Key informants included county government officials in charge of agriculture, agro-processing, climate change, trade, and gender. Also interviewed were local NGOs and grassroots CBOs, including producer organisations, trade associations, women's and youth groups, and traders.

Chapter 2

Conceptualising Agro-industrialisation, Climate, Food Security and Trade Linkages

2.1 Agro-industrialisation and Development

In contemporary economics and development, agriculture and industry are viewed as ‘separate’ sectors based on their role in economic growth. However, agriculture contributes to industry through the provision of raw material input. Agro-industrialisation can be defined as “*the transformation of products originating from agriculture, forestry & fisheries to intermediate and finished products*” through value addition. Agro-industrialisation is driven by rising consumer incomes, higher urbanisation and increasing rates of women in the workforce which leads to increased demand for value-added, processed and ready-prepared foods (FAO, 2007). There is also a growing trend for the use of agricultural products in industry and manufacturing, or bio-energy production. These changes in the global demand of agro-food and agro-industrial products provide many opportunities for diversification and value addition in agriculture.

According to the FAO (2015) report on the state of agricultural commodity markets, at the global level, the share of processed products in agricultural exports remained constant between 2001-04 and 2009-12 at approximately 41 percent, while it shrank in least-developed countries (LDCs) from 31 to 26 percent. Over the same period, the share of raw commodities in the total value of agricultural exports increased substantially in developing countries

from 33.5 to 48.5 percent. The world’s population is set to increase to 9.1 billion by the year 2050, and nearly all of this population increase will occur in developing countries alongside the acceleration of urbanisation. 70 percent of the world’s population is expected to be in urban areas. In order to feed this population, global food production will have to increase by 60 percent and an estimated USD \$83 billion investment in agricultural production and agro-industrialisation will be required to meet this demand (FAO, 2015). The prospects for continued growth in demand for value-added food and agricultural products constitute an incentive for increased attention to agro-industrial development in the context of economic growth, food security, and poverty-fighting strategies.

The developmental role of agro-industrialisation is rooted in theoretical and empirical studies which demonstrate that structural changes that accompany development often reveal a decline in the relative weight for agricultural sector versus non-agricultural sectors as per capita income increases. This is often accompanied by a drop in the share of primary production and a parallel increase in agro-processing (FAO, 1998). The potential for agro-industrial development in developing countries is largely linked to the relative abundance of agricultural raw materials and low-cost labour in most of them. The most suitable industries in such conditions are indeed those that make relatively intensive use of these abundant raw materials and unskilled labour, and

relatively less intensive uses of presumably scarce capital and expensive skilled labour (Ibid). Furthermore, in developing countries where the domestic market is limited by purchasing power, value addition by small- and micro-enterprises (SMEs) (for instance through small agro-industrial plants and cottage industries) may have higher impacts economically, especially for women and youth who face high rates of unemployment.

Forward-backward linkages in agro-processing and value chain dynamics may also present more opportunities for many economic sub-groups to participate in agro-industrialisation through farm-level production, transportation, post-harvest handling, and value addition. This also stimulates the service industry and provides an opportunity for service providers in areas of marketing, advertising, branding, labelling, and exports to participate in the process, thereby creating employment and propelling economic growth.

Finally, agro-industrial development has many beneficial feedback effects on agriculture. For example, agro-industrial development can directly stimulate increased agricultural production as a source of raw materials for industries and indirectly stimulate consumer demand for processed products. The construction of agro-industries and subsequent provision of power, transport infrastructure, water, and communication has 'spillover' effects on agricultural production which contributes to the development of other sectors at the local level, creating a favourable atmosphere for technological progress.

2.2 Climate Change, Agriculture and Agro-industrialisation

The relationship between climate change and agriculture is two sided. On one hand, agricultural activities may exacerbate climate change, and on the other hand, climate change may also affect agricultural production. According to the Intergovernmental Panel on Climate Change (IPCC), agriculture is responsible for 10 to 12 percent of global

anthropogenic greenhouse gas (GHG) emissions, and 24 percent of the increases in atmospheric GHG emissions (IPCC 2007). Agriculture's critical dependence on fossil fuels, as well as the clearing of forests and grasslands for farming are the top two factors responsible for today's massive global increases in CO₂ and other GHGs. As GHG emissions contribute to global warming, the effects of climate change are invariably triggered through increases in temperature, unpredicted rainfall patterns, and increased incidences of weather extremes such as flooding and cyclones.

Agro-industrialisation contributes to climate change in three ways. First, agro-industrialisation, which is dependent upon the raw materials produced from agricultural production, spurs increased GHG emissions by expanding agricultural production activities which make use of petroleum-based fertiliser and pesticides, whose production contributes to climate change. Secondly, industrial activities associated with agro-processing would also contribute to increased GHG emissions and further exacerbate climate change. Thirdly, through trade, agri-business and global value chains, the movement of goods across continents also leads to increased carbon footprints, which are also directly linked to global warming and climate change. Most notably, industrial-based agriculture also destroys biodiversity and the ability to capture carbon, leading to climate change.

Climate change has become a global issue of concern because it poses a threat to people, ecosystems, livelihoods, and agricultural food production. The 2007 IPCC report on global climate change scenarios shows that there will be shifts in patterns of rainy seasons (IPCC, 2007). These patterns interfere with cropping systems, negatively affecting yields and food security (Otieno et al, 2013). The most vulnerable groups are the poor, especially rural farmers. Future farming and food systems will face substantial, albeit distinct, changes in their environments. Some regions (the few winners) may benefit from more favourable climate conditions for production, while others (the

larger group of losers) will face increased climate-change-related biotic and abiotic stresses.

Although climate change impacts will be felt all over the world, developing countries will likely be the most affected, particularly Africa because of its low adaptive capacity. There will be a general 3.2 degree increase in average temperatures, and humid areas will be wetter with a 7 percent increase in average precipitation (World Bank, 2009). Projections indicate an increase of arid and semi-arid lands, a reduction in crop growing times, and, in some countries, yield reductions in rain-fed agriculture of up to 50 percent by 2050, but some parts will also get wetter and will be more prone to flooding (Ibid).

In Kenya, climate change has led to increased temperatures of between 0.3 to 2.9 degrees Celsius depending on the region, in addition to unpredictable rainfall patterns with increased risks of floods over the past 10 years (GoK, 2012). Climate change potentially poses one of the greatest challenges for Kenya to realise its vision to become a prosperous country. The World Bank affirms that “poverty and vulnerability to climate change remain the most critical development challenges facing Kenya” (World Bank, 2009).

2.3 Climate, Trade and Food Security Linkages

Globally, the phenomenon of climate change will affect all four dimensions of food security: food availability, food accessibility, food utilisation and food systems stability. It will have an impact on human health, livelihood assets, food production, and distribution channels, as well as changing purchasing power and market flows. Its impacts will be both short-term, resulting from more frequent and more intense extreme weather events, and long-term, caused by changing temperatures and precipitation patterns.

With the advent of agro-processing, advances in storage, preservation, and transport technologies have made food processing and packaging a new area of economic activity. This has allowed food distributors and retailers to develop global value

chains that move produce and packaged foods throughout the world. The consumer demand that has driven the commercialisation and integration of the global food chain derives from the mass conversion of farmers into wage-earning workers and middle-level managers, which is another consequence of the industrial revolution. Today, food insecurity persists primarily in those parts of the world where industrial agriculture, global value chains, and diversified non-agricultural livelihood opportunities are not economically significant.

At the global level, therefore, modern food system performance depends more on climate than it did 200 years ago. The possible impacts of climate change on food security have tended to be viewed with most concern in locations where rain-fed agriculture is still the primary source of food and income, especially in Africa. Projections indicate that as a result of climate change, reductions in agricultural production could be up to 50 percent, especially in places where rain-fed agriculture is predominant. This could lead to up to increases of 40 percent in food prices, further exacerbating the situation for poor rural and urban households (Anderson et al, 2010).

Other global developments such as agro-fuel production and carbon trading are presented as solutions to mitigate global warming; however, the use of agro-fuels will invariably lead to increased GHG emissions. Carbon trading is essentially a privatisation of carbon that allows governments to allocate permits to large industrial countries to trade “rights to pollute”. Article 17 of the Kyoto Protocol allows countries to trade emissions credits amongst themselves, and this encourages countries to continue polluting and lose the world’s capacity to attain a sustainable climate (Lohman, 2006).

2.4 Climate Change, Gender and Livelihoods

Climate change impacts on individuals and groups differ depending on their social status, gender, poverty level, power, and access to and control over resources. Despite the international community’s increasing acknowledgement of the

differential experiences and skills women and men bring to development and environmental sustainability efforts, women still have lesser economic, political, and legal clout. Hence, women are less able to cope with, and are more exposed to, the adverse effects of climate change (World Development report 2008). Women in developing countries are particularly vulnerable to climate change because they are highly dependent on local natural resources for their livelihoods. Women have the primary responsibility of securing food, water, and fuel for cooking. Yet, women experience unequal access to resources and decision-making

processes, with limited mobility in rural areas (Dankelman 2010).

In general, there is gender disparity in policy and decision-making; therefore, gender transformation is both an important condition and a potential end-goal of effective climate change responses and poverty reduction. This coupled with the provision of opportunities for women to participate in global and local value chains through production, agro-processing participation in markets, and participation in decision-making.

Chapter 3

Agriculture & Agro-industrial Development Policies in Kenya: Nexus to Climate Change, Trade and Food Security

3.1 Agriculture and Industry in Kenya

3.1.1 Sector Background, Gaps and Challenges

The agricultural sector in Kenya is mainly rain-fed, comprising of different agro-ecological zones. Approximately 75 percent of agricultural production in Kenya is done by smallholders who are fragmented. They produce mainly for subsistence, selling the surplus in the market. The agricultural sector comprises six subsectors: industrial crops (tea, coffee, sugar cane, cotton, sunflower, pyrethrum, barley, tobacco, sisal, coconut and bixa), contributing 55 percent of agricultural exports; food crops (cereals, legumes, roots and tubers), contributing 3 percent to exports; horticulture (flowers and high value fruits and vegetables), contributing about 33 percent of agricultural exports; livestock production; fisheries; and forestry, employing factors of production such as land, water, and farmer institutions (e.g. cooperatives, associations) (GoK 2010a - Agricultural Sector Development Strategy). Agricultural cooperatives also form an integral part of the agricultural economy in Kenya, as they have contributed immensely in organizing otherwise fragmented farmers to achieve economies of scale, helped farmers access inputs and markets; and currently play a major role in providing a basis for access of financial services and subsidies.

The structure of the Kenyan agricultural sector is such that primary agricultural production plays an important role in maintaining the country's food security, while the industrial and horticultural crop sub-sectors are important foreign exchange earners. A range of policies and strategies have been developed to maximise its potential for development through agro-processing.

Kenya's manufacturing base has been stagnant, constituting 11 percent of the country's GDP for the past 11 years. This is because the growth of other sectors such as agriculture, mining and quarrying, and construction, among others, has not grown as expected owing to the slow growth and low levels of support from the manufacturing sector. The performance of the manufacturing sector in general has been affected by low capital injection, the use of obsolete technologies, high costs of energy, and high costs of doing business (GoK 2010b - National Industrialisation Policy Framework). The manufacturing sector in Kenya is mainly agro-based, with grain milling, dairy production, beer production, and sugar production (ibid, pp.4-6). Currently only 16 percent of Kenya's agricultural exports are processed. Agro-industry in Kenya is characterised by relatively low value addition and subsequently provides low levels of employment as a result of its low capacity utilisation and low export volumes, which is partly owing to weak linkages to other sectors (ibid p.6).

Intermediate and capital goods industries in Kenya are also relatively underdeveloped, implying that Kenya's manufacturing sector is highly import-dependent. In order to make agro-processing more viable, there is a need for the expansion of capacity through value addition, the engagement of SMEs, the reduction of energy costs, and the improvement of technical and technological capacities. As a matter of priority, the National Industrialisation Policy recommends the reduction of costs of doing business by improving infrastructure, lowering energy costs, improving access to finance (especially for SMEs), improving institutional frameworks, and capacity enhancement specifically for technical skills required for manufacturing.

3.1.2 An Overview of Present and Future Climate Change in Kenya and Effects on Selected Crops

Climate change occurred more frequently in Kenya with recent reports of unpredictable rainfall, flooding, and prolonged droughts. Temperatures have also increased by about 1.2 to 1.5 degrees since the 1960s, leading to losses in genetic diversity, increased pests and diseases, crop failures, and ultimately lower productivity with long term effects on food security and livelihoods. According to Special Report on Emissions Scenarios (SRES), future projections on climate change suggest that for the A1B¹ emissions scenario projections for temperature increases over Kenya, of up to around 3°C, show good agreement between the Coupled Model Inter comparison Project (CMIP3)² ensemble members. The CMIP3 model ensemble projects strong precipitation increases over East Africa, in particular Kenya, with increases of over 20 percent projected with strong agreement across the CMIP3 models. Increased precipitation will be accompanied by erratic rainfall and periodic flooding.

The resultant projected effects of climate change on crop productivity by 2050 under a scenario where there is an increase in temperature by about 2 degrees would be a decreased yield in maize by about 20 to 30 percent, a decreased yield in bananas by about 30 percent, and

increased yield in more resilient crops like cassava by about 8 percent and millet by about 2 percent (Adhikari *et al*, 2015). Resilient crops like cassava and millet are likely to become the countries' strategic crops for climate change adaptation. It is therefore important to devise adaptation strategies that can help mitigate future climate change, meet future food security needs, and foster agro-industrialisation.

3.2 A Synopsis of the Policy Environment for Agro-industrialisation, Trade, Climate Change, and Food Security in Kenya

3.2.1 Agro-industrialisation and Development Policies in Kenya

Kenya's Vision 2030 and the industrialisation policy framework identify agro-processing as a priority sector that would boost growth and economic development. The Vision also identifies key policy interventions such as: provide incentives for investment in high value processing and value addition of agricultural products, such as tea, coffee, pyrethrum, cotton, nuts, oil crops, hides and skins, gum Arabica, aloe vera, and fruit crops such as bananas, pineapples, passion, oranges, and mangoes. The policy framework also identifies the clustering of similar industries as a way of ensuring that forward-backward linkages are maximised for global value chains. The policy strategy recognises the importance of rice and sugar industries for development and poverty reduction, and has proposed their expansion accompanied by their reviving to stimulate the use of local available materials (GoK 2007).

Kenya's Industrial Transformation Strategy recognises the need to increase the manufacturing base in order to stimulate economic growth and development (GoK 2015a). The Strategy identifies agro-processing as a key to create employment opportunities, economic growth, and reduce poverty through increased value addition of primarily raw products bound for export. The Strategy identifies tea, fish, and leather products as some of the sectors which would have a high impact on poverty,

employment, and economic growth through agro-processing and value addition. Textiles and apparels are also flagged as a potential sector with backward-forward linkages that would positively affect economic development (ibid, pp.5-6). The Strategy also mentions developing Kenyan SMEs by strengthening their participation in business through a sub-contracting policy, and supporting them with capacity development, credit, and market information, which are important for industrialisation. Other strategies include creating an enabling environment for industrial development and the creation of an industrial development fund. The Strategy does not mention any gender specific initiatives or strategies.

Recent developments toward the implementation of these policies have seen the development of a National Industrialisation Transformation Strategy; the establishment of an Industrial Development Fund; the improvement of the regulatory environment for doing business; the development of a national sub-contracting policy that encourages SMEs to participate in business; and an intellectual property rights policy to facilitate innovation and industrial development. The implementation of energy reforms as outlined in the Vision 2030 have also led to the improvement of energy provisions through different avenues such as wind power, hydro-electric power projects, solar energy, and geothermal power in a bid to reduce the cost of energy and stimulate manufacturing. Although these reforms in the energy sector are currently taking place, the cost of energy in Kenya is still too high owing to a monopoly of the Kenya Power and Lighting Company and high fixed costs. This acts as a disincentive for agro-processing. It is hoped that with the implementation of the rural electrification programme, more industries, including cottage industries, can be established in rural areas close to the supply of raw materials to stimulate rural development and reduce the costs of doing business.

A further interrogation of these policies reveals no direct linkages with climate change or strategies or incentives that would integrate a

green economy into agro-industrial and/or manufacturing sectors or reduce GHG emissions. Furthermore, the policies subtly mention the importance of ensuring food security and securing livelihoods, but do not emphasize the role of women and youth, or outline strategies for their participation. Kenya's Vision 2030 has outlined ways of engaging women and youth to improve their access to opportunities for participation in production and in business through various women and youth funds and programs; however, these funds or programs do not integrate women into agro-processing or specify ways they can be integrated in national and global agro-processing activities. When women and youth receive these monies, they do not necessarily invest or use it in agro-processing activities as a result of missing linkages with markets or owing to the instability of their participation in value chains.

3.2.2 Climate Change, Trade and Food Security Policies in Kenya

Kenya's Vision 2030 identifies agriculture as a key sector through which annual economic growth rates of 10 percent can be achieved. Under the Vision, smallholder agriculture is to be transformed from subsistence activities, marked by low productivity and low value addition, to "an innovative, commercially-oriented, internationally competitive and modern agricultural sector" (GoK, Vision 2030). Kenya's trade policy, which aims at "*Transforming Kenya to a Competitive Export Led and Efficient Domestic Economy*", recognises that trade supports agriculture, manufacturing, and service industries by creating markets through which goods and services get to the consumer and therefore provide the channel through which effects of economic growth are transmitted to various players in the economy (GoK, Kenya's draft trade policy 2016).

The country's export destination market remains quite narrow, with over 70 percent of Kenya's total exports being destined to 12 countries³ globally. The country's export products base is also narrow, as evidenced by about 5 products/subsectors⁴, accounting for 56 percent of total

exports in 2014. This explains the dismal share of the country's total export in total global merchandise trade, which is estimated at 0.03 percent (GoK 2015c). This scenario demonstrates the existence of huge export potential in untapped regional and continental markets, the EU, and rest of the world. Potential for exports to the USA is also abundant, given the tendency for clothing and apparel to dominate Kenya's exports to the USA against an over 6,000 African Growth Opportunity Act (AGOA) eligible products (GoK 2015c). Textile exports also have strong forward-backward linkages with cotton production, ginning, and milling that have the potential to provide production and employment opportunities for over 5 million Kenyans (Otieno, 2006).

The trade policy and the Kenya National Agribusiness Strategy outlines measures for engaging SMEs and farmers in supply chains through contract farming, seed supply, agrichemicals, farm machinery, wholesale and distribution, processing, marketing, and retail sales. The trade policy identifies 6 pillars that are important for trade and economic growth:

- (i) Access to financial services;
- (ii) A regulatory environment that is conducive for both small and large enterprises to thrive;
- (iii) Support services such as infrastructure, information and communication technology (ICT);
- (iv) Organised supply chains or value chains that have forward-backward linkages;
- (v) Access to markets – domestic, regional (EAC), and international: all determined by the trade rules and standards in those particular markets; and
- (vi) A sound macro-economic regime such as low inflation rates, sound exchange rates, and a monetary policy that supports local businesses and exporting companies to flourish.

Trade through various multilateral (World Trade Organisation (WTO)), regional (EAC and Common Market for Eastern and Southern Africa (COMESA)), and bilateral agreements

provide an opportunity for farmers to participate in global supply chains. Intermediaries play an important role in providing linkages with international markets and often add value through intermediary processing. There are few intermediaries that have recently involved women and youth in global value chains through various programs such as beekeeping and honey production; however, the modalities of their participation are not currently articulated in trade policy or related strategies.

Climate change is a key element in determining production, and subsequently agro-processing and exports. Kenya's national climate change policies have recently revolved around the development of a National Climate Change Response Strategy (NCCRS), which has been operationalised through the National Adaptation Plan of Action (NAPA). Kenya's NAPA has emphasised the prioritisation of the most vulnerable sectors of the economy, being agriculture and food security (GoK 2010:45). This view is reflected in the strategies of the agricultural sector ministries and many non-governmental organisations, which focus on building resilience within communities through the promotion of agricultural practices such as drought-resistant crop varieties, as well as improved management of livestock and water resources. International NGOs, such as CARE, and international research bodies, such as the World Agroforestry and ILRI, are also involved with a large number of adaptation actions which integrate gender and youth issues (Maina et al, 2013).

Kenya's National Appropriate Mitigation Action (NAMA) recognises carbon trading as an opportunity for achieving mitigation actions. In this regard, carbon funding holds great promise for the agricultural sector in that it can potentially give major contributions to energy security as well as lower degradation (GoK 2013). Kenya has recently benefited from the World Bank's Biocarbon Funding through a project known as the Kenya Agricultural Carbon Project (KCAP), where a consortium of organisations including Vi-Agroforestry, Kenya Government, and World Bank work with smallholder farmers on

sustainable land management and climate-smart agriculture.

Despite progress in the development of Kenya's NAPAs, NAMAs and climate change related policies, the climate change-food security-trade linkages are still not clearly defined. While many policies advocate for the modernisation of agriculture and agro-processing, they do not take into account the repercussions of such actions on climate change or related backward-forward linkages with agro-industrialisation, trade, and climate change. Kenya's NAMA outlines critical measures towards providing 'green energy' to reduce GHG emissions, but it does not take into consideration the interests of smallholder farmers and fails to provide innovative ways of linking agro-processing with mitigation and adaptation strategies. This is in part owing to the inherent complexities involved in agricultural production and agro-processing, which increase GHG emissions. Gender issues are also not well integrated in climate change policies. In addition the NAMAs do not take into consideration any gender-specific measures for mitigation or adaptation to climate change.

3.3 Agro-industrialisation, Climate Change, and Trade Policies in the EAC

The EAC is implementing the EAC Industrialisation Strategy 2012-2032, which is underpinned by national industrialisation policies and strategies, drawing lessons from best regional and international practices.

The Strategy aims at diversifying the manufacturing base and raising the local value-added content of resource-based exports to 40 percent from an estimated value of 8.62 percent by 2032. The Strategy affirms the importance of national and institutional frameworks in the region in order to effectively implement the strategy. According to the Strategy, successful industrialisation will depend on ensuring coherence in implementation of the various sectoral policies and instruments which affect industrialisation, including the application of a Common External Tariff and Customs Union

instruments; implementation of the Common Market Protocol; harmonisation of taxation and management of taxes; removal of Nontariff Barriers (NTBs); and harmonisation of standards.

Six strategic industries⁵ were identified as key contributors to growth and development in the EAC, one of which was agro-processing. The key tenets of industrialisation identified in the Strategy include:

- Strengthening Research and Development (R&D), technology, and innovation capabilities to facilitate structural transformation of the manufacturing sector and the upgrading of production systems;
- Increasing the contribution of intra-regional manufacturing exports relative to total manufactured imports in the region from the current share of 5 percent to about 25 percent by 2032, and increasing the share of manufactured exports relative to total merchandise exports up to 60 percent from an average of 20 percent;
- Transforming SMEs into viable and sustainable business entities, capable of contributing up to 50 percent of manufacturing GDP from a base rate of 20 percent;
- Sustainable industrial development through environmental protection and efficient use of energy resources; and
- Integrating gender in industrialisation, value addition, and trade through SMEs and related support, such as finance and capacity development.

In accordance with the EAC Common Market Agenda, free intra-trade in goods that are locally produced within the region are allowed, provided these goods are accompanied by the EAC Certificate of Origin (COO). East African countries have also agreed to common standards and the common market protocol will remove any tariff and non-tariff barriers, such as police road blocks and weigh bridges to foster intra-African trade. Many agro-processing industries are taking advantage of the common market in order to increase their trade in the region; however, barriers (such as road blocks, weigh

bridges, and lengthy and tedious processes of clearing goods at border posts) and challenges still exist that need to be addressed at country and regional levels. Furthermore, new developments in the regional trade agenda have seen the establishment of the EAC-SADC-COMESA tripartite Free trade Area as a move towards increasing intra-African trade as per Agenda 2063 of the African Union. These are opportunities which will facilitate the movement of goods in the region, and would be useful in providing a market for agro-processed products originating from the EAC such as tea, coffee, and other traditional agro-industrial goods.

Finally, the EAC recognises the importance of sustainable industrialisation in the context of climate change. Climate change policies in the EAC are aimed towards: (i) the diversification of economies to reduce dependence on climate-sensitive sectors; (ii) support the implementation of NAPAs as a short-term measure to address the immediate and urgent concerns of climate change; (iii) develop and implement a regional Climate Change Response Master Plan which include Clean Development Mechanisms (CDMs); and (iv) establish and operationalize an EAC Climate Change Adaptation Fund.

EAC policies and strategies are very clear and coherent with respect to industrialisation in the region. For instance, industrialisation policies recognise the importance of efficient resource utilisation and sustainable industrialisation to curb climate change, and at the same time climate change policies advocate for CDMs. Trade policies and strategies in the EAC and the African region will provide numerous opportunities for agro-processed products to be marketed and sold in the EAC by the removal of NTBs and the harmonisation of standards, among others.

3.4 Institutions and Policy Coherence: Results from Key Informants

3.4.1 Key Roles of Stakeholders and Institutions in the National Policy Agenda

According to Table 1, most national level institutions are involved in formulating, developing, and implementing various policies

and strategies. They are also charged with the responsibility of developing technical capacity for the implementation of these policies and strategies. Linkages with research are low because national research organisations such as KALRO are involved in R&D, strategy implementation, and capacity development. The Ministry of Agriculture and KALRO are the key institutions involved in policy implementation of agriculture-related policies; however, they are not involved in the development or implementation of industry-related policies or strategies, which makes it difficult to integrate agro-industrialisation policies into agriculture, food and nutrition security, or agri-business strategies.

A closer look at the institutions involved in the development of climate change and related policies reveals that, although the Ministry of Environment takes the lead in the development of climate change policies and strategies, there is a Climate Change Desk at the Ministry of Agriculture, which has helped integrate climate-related issues into agricultural policy. However, the opposite applies for agro-industrialisation policies, where they do not participate in the formulation, development, or implementation of climate related policies. Thus, agro-industrialisation policies are not well integrated with adaptation and mitigation strategies being pursued by the ministries of Agriculture and Environment.

Trade and industrialisation policies are developed and implemented by the Ministry of Industry, Trade and Cooperatives which is also responsible for developing SME policy. The Ministry does not overlap with other ministries that work on issues of food and nutrition security or climate change. As a result, climate-related or food security policies are not well integrated into trade policy.

Given the above results, it is imperative that national level policy-making needs to be more integrated and the development and implementation of policies related to agro-industrialisation, climate change, food security, and trade need to be collaborative between the key institutions involved.

Table 1: Scope of national level actors, their roles and policies they are involved in developing or implementing

Ministry, Department or Agency	Roles	Scope of policies developed/implemented
Ministry of Agriculture Livestock and Fisheries	<ol style="list-style-type: none"> 1. Policy & Strategy development 2. Policy & strategy implementation 3. Capacity Development 	National Food and Nutrition Security Policy, Agricultural Sector Development Strategy (ASDS) National Agri-business Strategy, National Horticulture Policy Strategy for Revitalizing Agriculture (SRA) Kenya draft Cassava Policy
Ministry of Environment and Natural Resources (Climate change desk)	<ol style="list-style-type: none"> 1. Policy & Strategy development 2. Policy & strategy implementation 3. Capacity Development 	Kenya National Climate Change Action Plan (2013-2017) Kenya National Climate Response Strategy, National Climate Change Bill 2014
Ministry of Industry, Trade and Cooperatives	<ol style="list-style-type: none"> 1. Policy & Strategy development 2. Policy & strategy implementation 3. Capacity Development 	Draft National Trade Policy (2015)
Ministry of Industrialisation and Enterprise Development	<ol style="list-style-type: none"> 1. Policy & Strategy development 2. Policy & strategy implementation 3. Capacity Development 	Kenya National Industrialisation framework, Kenya National Industrialisation Strategy
Ministry of Water & Irrigation	<ol style="list-style-type: none"> 1. Policy & Strategy development 2. Policy & strategy implementation 	National Irrigation Policy
Kenya Agriculture Livestock Research Organisation (KALRO)	<ol style="list-style-type: none"> 1. Research & Development 2. Capacity development 3. Policy and strategy Implementation 	National Food and Nutrition Security Policy, Agricultural Sector Development Strategy (ASDS) National Agri-business Strategy, National Horticulture Policy, Strategy for Revitalising Agriculture (SRA) Kenya Draft Cassava Policy, Kenya National Industrialisation Strategy
Kenya Meteorological Department	<ol style="list-style-type: none"> 1. Capacity development 2. Information provision 3. R&D 4. Policy and strategy implementation 	Kenya National Climate Change Action Plan (2013-2017), Kenya National Climate Response Strategy National Climate Change Bill 2014
Export Promotion Council	<ol style="list-style-type: none"> 1. Policy and strategy implementation 2. Capacity development 3. Research and Development 	National Trade Policy, National Agri-business Strategy
Export Processing Zone	<ol style="list-style-type: none"> 1. Capacity development 2. R&D 3. Policy and strategy implementation 	National Trade Policy, Kenya National Industrialisation Strategy National Agribusiness Strategy
Kenya Investment Authority	<ol style="list-style-type: none"> 1. Research 2. Capacity development 3. Financing 	National Industrialisation Strategy

An analysis of the institutions that various government ministries relate with reveals that government policy-makers have several partners performing a wide range of roles (Table 2). Most of the donor organisations mentioned, such as the Food and Agriculture Organisation (FAO), Department for International Development (DFID), Swedish International Development Agency (SIDA), World Bank, African Development Bank (AfDB), United States Agency for International Development (USAID), and the United Nations Development Programme (UNDP), have been responsible for providing financial support for the development of policies or implementation of programmes and projects. International research organisations that form part of the CGIAR centers, such as International Livestock Research Institute (ILRI), International Center for Tropical Agriculture (CIAT), International Institute for Tropical Agriculture (IITA), International Crops Research Institute for Semi-Arid Tropics (ICRISAT), and Climate Change Agriculture and Food Security (CCAFS) contribute to implementation through research projects and capacity development, working with various ministries and KALRO for the development of climate smart agricultural technologies. The Alliance for Green Revolution in Africa (AGRA) is also involved in research and capacity development for climate resilient technologies, markets, and gender in agriculture. The above institutions also work with local level NGOs to implement programmes in conjunction with local CBOs. Policy advocacy is mainly done by regional and local NGOs such as Southern and Eastern Africa Trade Information and Negotiations Institute (SEATINI) and Kenya National Farmers federation (KENAFF).

Other government departments involved in the implementation of these policies as partners included the National Environmental Management Agency (NEMA), Kenya Plant Health Inspectorate Services (KEPHIS), Kenya Bureau of Standards, department of Weights and Measures, and the Kenya Revenue Authority, which perform regulatory and enforcement functions and provide standards required for production and marketing of goods, services, and technologies. Kenya Forestry Research Institute

is also involved in mitigation measures for climate change. Kenya Investment Authority, Export Promotion Council, and Export Processing Zones are involved in trade issues, such as financing, exports, and trade promotion.

Regional policy initiatives are spearheaded by regional organisations to which Kenya belongs, such as the EAC, COMESA, New Partnerships for Africa's Development (NEPAD), and the African Union (AU). The EAC has developed a food and nutrition policy framework, an agro-industrialisation policy framework, and various trade and agri-business strategies that need to be integrated into the National Policy Agenda. The African Technology Policy Studies Network is a conglomerate of researchers, civil society, and development partners in policy research and development for sustainable development, including agro-industrialisation in Africa and contributes to policies through evidence-based research.

Institutions which are conspicuously absent or not mentioned by any of the key informants included the Kenya Institute for Public Policy Research and Analysis (KIPPRA), which is the government's think tank and responsible for providing evidence-based research for policy development and implementation. The Kenya Industrial Research and Development Institute (KIRDI) is also conspicuously missing in most of the policy or programme implementation related to agro-industrialisation, climate change, food security, and trade, yet this is the leading institute for R&D of appropriate technologies.

3.4.2 Gaps and Challenges in the Development and Implementation of Agro-industrialisation, Climate Change and Trade Policies in Kenya

An analysis of the policy landscape for agro-industrialisation, agro-processing, and value addition of agricultural products in Kenya reveals that there are weak linkages between agro-industrialisation policies with climate change and food security policies, as none of the policy implementers are involved in joint development of programme implementation. There exists

Table 2: Summary partnerships and their roles in policy development and programme implementation

Role	Institution 'type'	Institutions Involved
Program/project Financing	Donors	DFID, FAO, USAID, SIDA, DANIDA, UNDP, CCFAS, AfDB, World Bank
Research Development	International Research	CCAFS, ILRI, ICRISAT, CIAT, IITA, AGRA
	Local research	KEFRI, KALRO, Universities
Capacity Development	International level	DFID, FAO, USAID, SIDA, UNDP, CCFAS, AfDB, World Bank CCAFS, ILRI, ICRISAT, CIAT, IITA, AGRA
	Local level	KEFRI, KALRO, Universities, Various Ministries, Local NGOs Farmer organisations such as Kenya Small Scale Farmers Forum
Regulatory/enforcement		KEPHIS, KEBS, KRA, KIA, NEMA
Program implementation with local NGOs and CBOs	International NGOs	AGRA, Farm Concern International, World Vision, Action Aid, OXFAM
Policy Advocacy	Local and International NGOs	SEATINI, CUTS, Action Aid, OXFAM
	Farmer organisations	Kenya Small Scale Farmers Forum
Regional policy development	Regional organisations	EAC, COMESA, AU, ARIPO, ATPC, NEPAD
Climate change mitigation	National	National Drought Management Authority
Input Provision	National and Local	Sygenta, Bayer, Monsanto, Kenya Seed company

linkages between trade and agro-industrialisation, especially as the two ministries charged with the responsibilities of developing and implementing their policies were under one ministry until recently. As evident from the above analysis trade policies have identified value addition and agro-processing as key sectors that would create a positive impact on economic growth, yet these still need to be properly integrated into the national agro-industrialisation policy framework.

Although the industrialisation and trade policies in the EAC are very clear and coherent, policies in Kenya are still not in line with the strategies developed for the region. For example, the pursuit of sustainable agro-industrialisation through management and efficient use of energy resources in the EAC; the integration of gender in agro-industrialisation and trade; and the

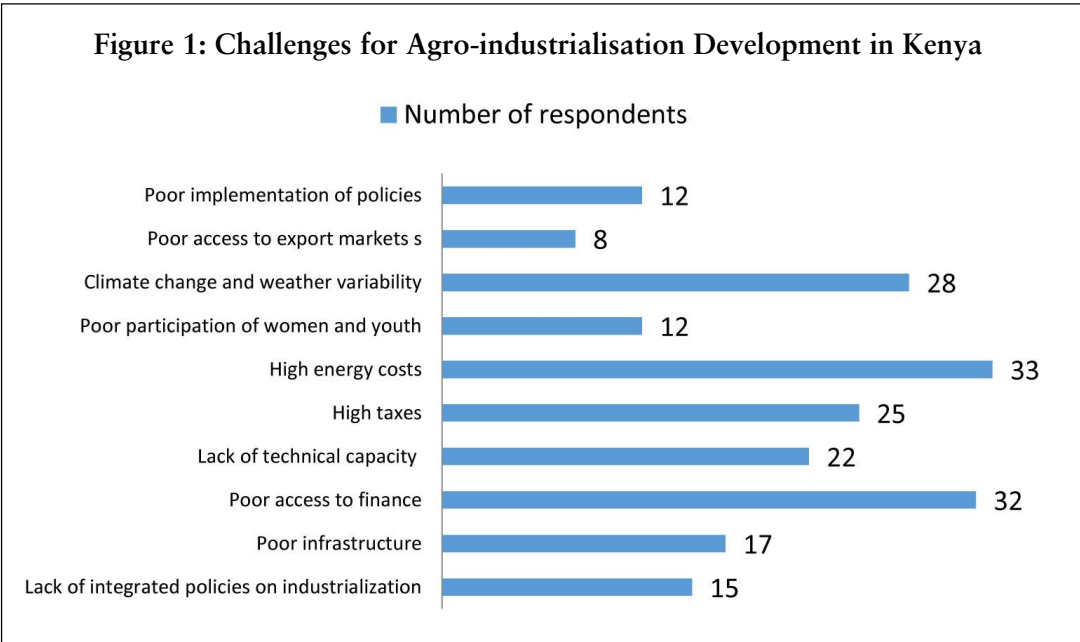
pursuit of capacity development for agro-industrialisation and trade, among others, are not similarly reflected in Kenyan policy.

Key informants identified the following policy challenges, as summarised in Figure 1: (i) a lack of coherent and integrated policy on agro-industrialisation that takes into consideration the supply side factors affected by climate change, such as agricultural production or food security issues; (ii) poor technology and lack of capital to develop technologies needed for agro-industrialisation; (iii) poor access to financing for agro-industrialisation; (iv) high energy costs making agro-processed or value-added products uncompetitive; (v) high taxation rates; (vi) poor information communication technologies required to support agro-processing and agro-industrialisation; (vii) poor post-harvest handling; (viii) low technical capacity and lack of human

resources for agro-industrialisation; (ix) climate change and lack of adaptation strategies; (x) poor integration of women and youth integration into agro-processing and value addition; (xi) TBT measures that discourage exports of value-added products into developed country markets; and (xii) poor implementation of policies.

Regarding the above-mentioned challenges, key informants have suggested several issues that need to be addressed in order to improve agro-industrialisation. These include: (i) ensuring that the policies are well integrated, (i.e. agro-industrialisation with climate, trade and food security); (ii) encouraging technological

investments in agro-processing, allowing duty free imports of related equipment, or technologies for agro-processing; (iii) capacity-building for human resources in technology for agro-processing through local polytechnics specifically targeting women and youth; (iv) regional initiatives through COMESA and EAC to stimulate agro-processing and to allow related goods duty free in EAC and COMESA countries; (v) engaging women and youth in agro-processing value chains; (vi) improving access to finance, specifically for smallholders and local farmer groups; (vii) providing meteorological information to farmers to ensure proper planning.



Chapter 4

Case Studies

4.1 Case Study 1: Cassava Agro-industrialisation and Sustainable Livelihoods in Busia and Makueni Counties

4.1.1 Cassava Production and Value Chains in Kenya: Contribution to Food Security and Livelihoods

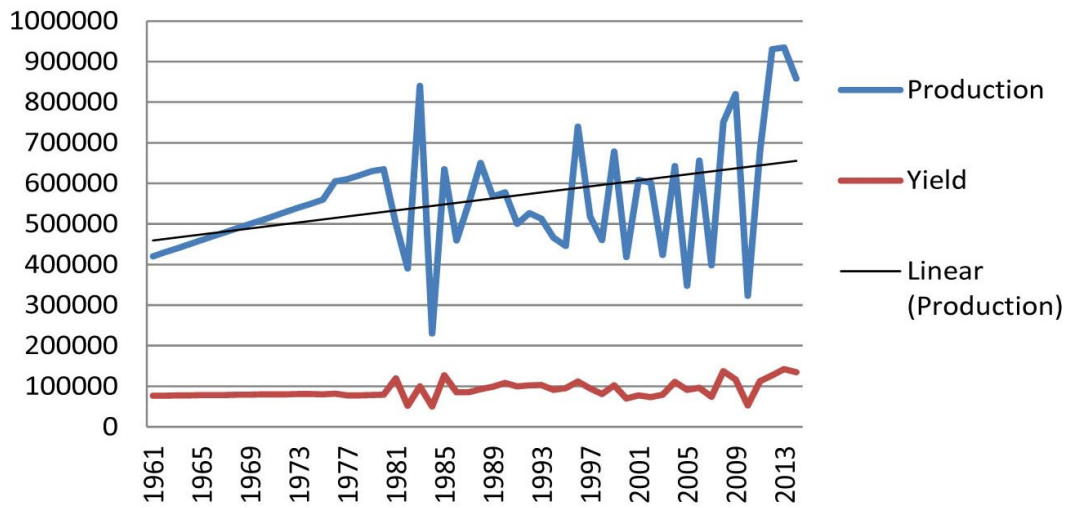
Cassava, also known scientifically as *Manihot esculenta crantz*, is grown widely in sub-Saharan Africa and is the number one crop on the continent in terms of consumption. It is the cheapest source of calorie energy and provides an average of 300 calories a day to 200 million people in Africa. Cassava is a food crop that can be prepared and eaten in many forms, as fresh roots are processed into products such as flour, crisps, and starch; and the leaves can be eaten as green vegetables. Besides being a staple food crop, cassava can be used as raw material for the production of industrial starch, ethanol, and wood adhesive. Cassava is also a drought tolerant crop that can be grown in poor soils in drought-affected areas, and is therefore an important crop for climate change adaptation and food security. In Kenya, cassava is predominantly grown in western, coastal and eastern areas in semi-arid areas with low agricultural potential. It is currently providing 9 percent of daily calorie intake for Kenyans, and is predominantly a staple crop in western Kenyan where 60 percent of the population relies on it as a subsistence food crop.

Trends show that although the yields have remained the same over the years, the production of cassava in Kenya has had an upward trend.

This is in part owing to the recent adoption of cassava crop in eastern and western parts of the country (Figure 2). Cassava production has been affected by virulent and fungal diseases, most notably Cassava Mosaic Disease (CMD) which attacked most of the local varieties in 1994-95 and 1998. CMD-related yield losses in 1998 were estimated at 150,000 tons which were valued at USD \$10 million. As a result of this, IITA and KARI (now KALRO) developed 15 desirable clones that are resistant to CMD. Over 34 million stems from primary sites have been distributed to farming communities. The coverage under improved cassava is approximately 13,000 ha, which is 38 percent restoration of the crop. Over 300,000 households grow improved cassava in western Kenya. Fresh cassava tubers and processed cassava products are now available on local and urban markets in the region (Obiero et al, 2007).

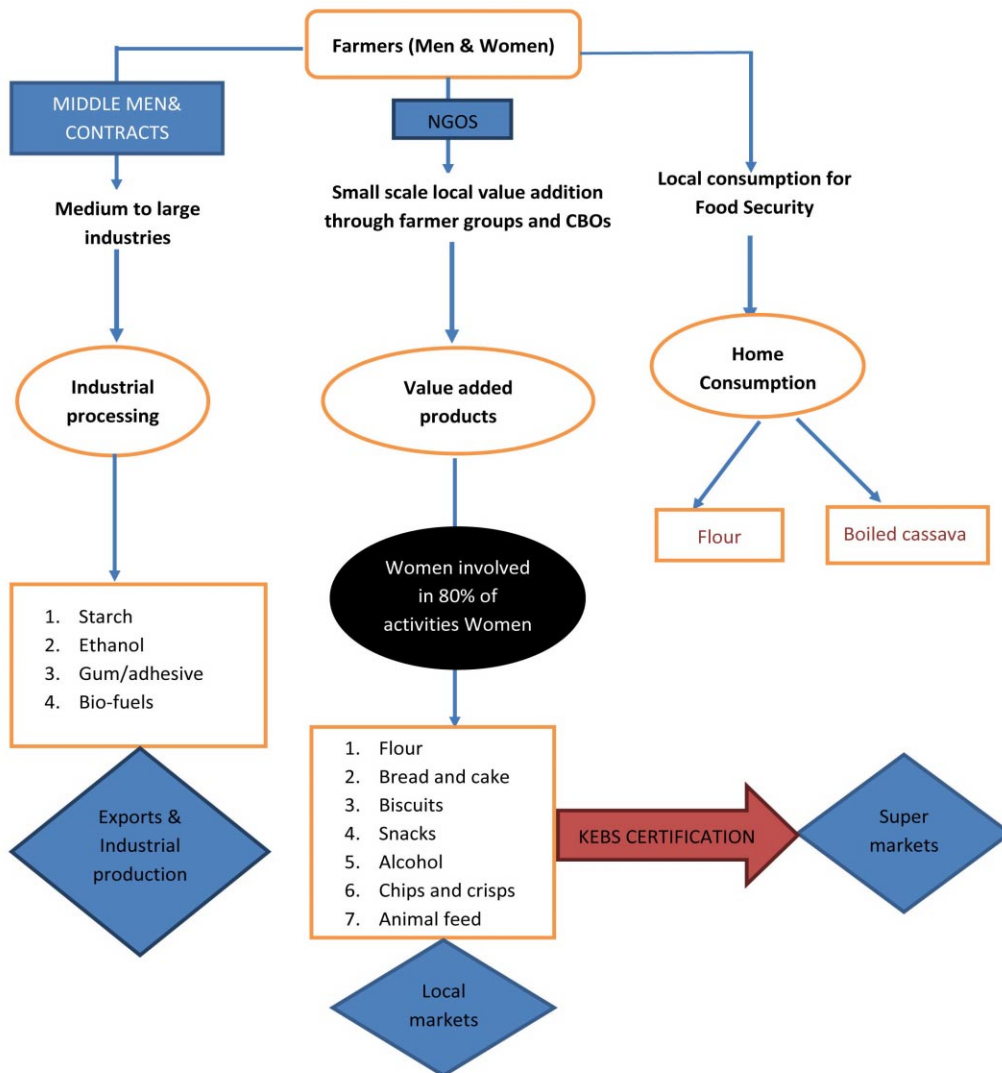
As a result of climate change in recent years, Kenya has experienced an increase in temperatures by about 1.5 degrees, with increased but erratic rainfall resulting in periodic episodes of flooding and drought. This has affected the production of maize, beans, and other common food crops. These drastic variations in climate have also led to the emergence of diseases such as Maize Lethal Necrosis (MLN), which has led to a shift by farmers to more resilient crop varieties such as sorghum, millet, and cassava. Future projections of climate change also indicate that there will be an increase in temperature by 2 degrees by the year 2050, and precipitation will likewise

Figure 2: Trends in Cassava Production and Yields in Kenya (1961-2014)



Source: FAOSTAT

Figure 3: Simplified version of the cassava value chain in Kenya



increase along with erratic rainfall and flooding. As a result, the currently cropped maize area is projected to experience negative impacts, with production reductions in the range 12 to 40 percent (J. Ramirez & Thorton, 2015).

Cassava's potential for food security and climate change adaptation has been recognised. More recently, the government of Kenya has also recognised the importance of cassava as an industrial crop for the production of gum/adhesive, ethanol, animal feeds, and starch. In the two counties visited, the backward-forward linkages in cassava production are numerous, with women participating in various forms of agro-processing and value addition. Seven food products are made from cassava, including cassava flour, cassava chips, cassava crisps, cassava bread and cakes, alcohol, and snacks mixed with wheat flour made into crunchy sticks. These products are sold in local markets and have helped improve the livelihoods of women (Figure 3), with at least two potential additional products known as gari and fufu.

4.1.2 Cassava Production and Value Chains in Makueni and Busia Counties

1. Makueni County

Farmers in Makueni county have recently faced climate change with persistent unreliable rainfall, changing weather patterns, and maize diseases that have resulted in the adoption of drought-resistant crops such as sorghum, finger millet, green grams, cow peas, cassava, and mangoes. Farmers are also engaged in livestock production, mainly small ruminants such as goats and chickens. Interviews with key stakeholders in Makueni reveal that cassava is one of the major food crops that has been lauded as a contributor to food security, climate change adaptation, and livelihoods, especially of women.

Cassava production and agro-processing is mainly done at a small scale through farmer groups. Two such groups were visited during the survey, the Mbuvo Commercial Farmers Group (Box 1) and the Muvao farmers group, which both produce, process, and sell cassava. The farmers also produce for home consumption,

and sell the surplus through their groups to local CBOs and NGOs which then help them to process the cassava into flour and other products, package, and then sell the cassava-based products in the local markets. The 'model' of agro-processing is such that NGOs, through local CBOs and farmer organisations, help farmers in various ways, particularly in:

- (i) Technology development – setting up small commercial villages complete with driers, grinders and simple equipment for processing and storage facilities;
- (ii) Providing 'seed' money for table banking to the farmers to help them purchase inputs they require;
- (iii) Training and capacity development on agro-processing and business related issues, including accounting and bookkeeping;
- (iv) Linking farmers to research organisations that provide suitable varieties such as KALRO that provide clean planning material and provide extension services and advice to farmers;
- (v) Linking farmers to financial providers, (i.e. SACCOS and banks for credit to expand production and processing);
- (vi) Linking farmers with KEBS that train and provide standards for production, packaging, and labelling and provide certification for the sale of products in the market; and
- (vii) Product diversification (e.g. finger millet, green gram, sorghum and cow pea production) as a food security and income diversification strategy.

Farmers currently produce cassava flour for sale, in addition to cassava snacks, bread, cakes, and animal feeds at the local market, and are in the process of receiving KEBS certification so that they can begin supplying supermarkets in Nairobi.

KEBS certification entails sending KEBS auditors who assess the suitability of the premises for production, the equipment used and specifications, the quality management Systems (QMS) in place, and food safety management systems. The applicant pays the cost of auditing which depends on the size and nature of the enterprise and auditor time which is calculated based on the requirements in International Accreditation Forum (IAF) document. If the auditing is conducted outside Nairobi, as in the case for Makueni county farmers, the applicant also pays for the accommodation and daily sustenance of the auditor(s).

2. Busia County

In Busia county, over 10,000 smallholders are involved in cassava production for the local market and for household food security. Busia county has also faced considerable climatic changes in recent years, with declining maize

production as a result of unpredictable weather. MLN disease has also prompted farmers to switch to mainly sorghum and cassava production. Cassava from Busia county is mostly sold to other counties through middlemen who buy the produce at the farm and transport it to other markets in Kakamega, Bungoma, Kisumu, and even Nairobi. However, 40 percent of the cassava grown is processed into flour and other products for sale. 10 percent of farmers produce clean planting material in conjunction with KALRO, which distributes planting material to farmers. KALRO has recently introduced six new varieties that are suited to the agro-ecology of Busia cassava, are high yielding, and resistant to diseases such as Cassava Mosaic Disease (CMD). These varieties are also early maturing and require low levels of inputs. They include MM 96/9362, MM 96/4684, MM 96/1871, MM 96/3868, and MM 96/4884.

Box 1: Mbuvo Commercial Village: Cassava Agro-processing and Food Security

Mbuvo cassava commercial village was established in 2010, through Kenya Agricultural Productivity and Agri-business Project (KAPAP), with the help of Farm Concern International and Alliance for Green Revolution in Africa (AGRA). It has 343 members producing principally cassava but also sorghum, millet, cow peas, pigeon peas, green grams, and beans. Of these 343, 60 percent are women.

Through the project, a cassava processing plant was established in Kathonzweni and farmers were trained on cassava processing. Currently the plant produces cassava flour which they package and sell locally, but are also involved in production of bread, cakes, snacks, and animal feeds. A local private trader, known as Mwilu Enterprises, buys most of the products for sale within Kathonzweni.

Women are involved in 80 percent of the activities and take the lead in processing and marketing the produce. The group also has table banking facility where members contribute and borrow money at low interest rates. Members have also received group and individual loans from Universal Traders SACCO, which not only provides loans but also trains farmers on agri-business management.

In 2015, the commercial village has installed a solar power plant through KAPAP, with the output of 16.5 kilowatts which is used for running the power plant. Excess power produced is sold to the grid.

Finally, Mbuvi commercial village is in the process of registering as a limited company, with the hope of expanding production and engaging more farmers, especially women, in cassava processing and value addition.

The county government of Busia is putting up a cassava processing plant in Simba Chai in Teso South for industrial processing of cassava into ethanol, starch, adhesives, and other industrial products. Through support from the East Africa Productivity Project (EAPP), which has pumped in KSh. 5 million for construction, the county government of Busia which has provided Kshs. 11 million for the construction of the plant. An additional Kshs. 22 million has been contributed by EAAP for equipment. It is envisioned that the factory will provide incomes and livelihoods for over 10,000 farmers in Busia county, and another approximately 20,000 from neighbouring counties of Siaya and Bungoma. In addition, the factory will create direct and indirect employment for about 5,000 people, spurring economic growth and development in the region.

Currently cassava agro-processing in Busia is being done by small-scale village and community-based initiatives. Two such initiatives were

visited during the survey, namely Tangakona Commercial Village and Program for Agriculture and Livelihoods in Western Communities (PALWECO) (Box 2). These initiatives are funded by NGOs, and they help in the construction and installation of small agro-processing plants and buying equipment. They also train farmers in cassava agro-processing, packaging, and marketing their products as well as agri-business management. Table banking is also a key feature of these locally-managed groups, who also access loans from SACCOS through their groups for the expansion of their farming and processing activities. Tangakona commercial village, like Mbuvo commercial village in Makueni, was also established with the support of Farm Concern International in a project funded by AGRA and has the same key features as Mbuvo commercial village. It relies on KALRO for clean planting material and extension advice, and produces flour and other products for sale in the local market. 80 percent

Box 2: Supporting smallholders farmers in agro-processing and agri-business by PALWECO

PALWECO is a locally-based CBO established in the year 2011 with the sole purpose of improving livelihoods of farmers through interventions such as the rolling out of **flagship projects in horticulture, small stock, high value trees and irrigation**, in addition to supporting **contract farming and agribusiness** to attain **economic and social stability**. PALWECO is mainly funded by the Finnish Government in collaboration with the Government of Kenya, USAID, GIZ and ASARECA.

PALWECO works with producer groups and women's groups on cross-cutting issues related to increasing household food insecurity, gender, social inequality, and climate change adaptation. One of their activities aimed at enhancing climate change adaptation and improving food and nutrition security has seen the organisation work with women's groups on cassava agro-processing, mainly through value adding activities for cassava (drying, milling and packaging into flour). Various groups have also engaged in the production of composite flours, consisting of mixtures of cassava, millet, soya beans, sorghum, and silverfish, which are packaged and sold to local markets. These products are also aimed at improving the nutritional status of children below 5 years of age.

Farmers working with PALWECO get their cassava cuttings from KALRO; other seeds of millet and sorghum are provided by KALO and ICRISAT, who also provide capacity-building on good agricultural practices and aflatoxin management. They also work with universities and research organisations to provide technical advice and capacity-building on composite mixtures and correct fortification procedures for the flour they sell. KIRDI provides appropriate technologies which the farmers use for agro-processing.

of agro-processing and product development is done by women and they have received KEBS certification. They supply their products to the local supermarkets. Women contribute 80 percent of value addition, mainly because the value-adding activities such as pounding, grinding, cooking, and baking are culturally considered to be women's roles.

4.1.3 Institutional Dynamics in Cassava Agro-processing in Busia and Makueni Counties

An analysis of the landscape of institutions reveals that collaborative partnerships play a critical role in agro-processing and value addition activities. Financing is a critical element in agro-processing and through various projects, various donors have financed long-term projects in setting up processing units and capacity

development. Government support is often required for any successful and meaningful impact at the county level. County governments are often involved in priority setting and support in terms of funding activities related to agro-processing. Research organisations also play a critical role in providing appropriate seeds, capacity development on production and processing, and providing technical support. NGOs play a critical role in development work by enhancing capacity, financing, and linking farmers to markets, among others. Local producer groups, women's groups, and local CBOs provide critical mass and an avenue through which outreach to farmers can be done. They also act as intermediaries when providing a market for goods. They also provide other functions, such as social capital provision.

Table 3: Landscape of institutions in cassava agro-processing and their roles

Role	Institution 'type'	Makueni	Busia
Program/project Financing	Donors	USAID, World Vision, Dorcas AID, FAO, AGRA, World Bank, CCAFS	USAID, GIZ, ASARECA, AGRA, ASARECA
Research Development	International Research	CCAFS, ILRI, ICRISAT, CIAT, IITA, AGRA,	IITA, ILRI, AGRA, ICRISAT, CIAT, CIP, ASARECA
	Local research	KALRO, KEFRI Universities	KEFRI, KALRO, Universities
Capacity Development	International level	DFID, FAO, USAID, , CCFAS, IITA, ICRISAT, CIAT, AGRA	ILRI, ICRISAT, CIAT, IITA, AGRA, CIP
	Local level	KEFRI, KALRO, Universities, Various Ministries, Local NGOs Farmer organisations such as Kenya Small Scale Farmers Forum	KALRO, Universities, Various Ministries, Local NGOs
Regulatory/enforcement		KEPHIS, KEBS, KRA, KIA, NEMA	KEPHIS, KEBS, KRA,
Program implementation with local NGOs and CBOs	International NGOs	AGRA, Farm Concern International, World Vision, Action Aid, OXFAM, Dorcas AID	AGRA, Farm Concern International, Action Aid, PALWECO, REFSO
Policy Advocacy	Farmer organisations	Kenya Small Scale Farmers Forum	
Credit, finance and Loans	SACCOs and Banks	UTS, Equity Bank	Equity bank
Market	Private sector	Mwailu enterprises	Local supermarkets, EDOM-Kisumu
Input Provision	National and Local	Sygenta, Bayer, Monsanto, Kenya Seed company	Sygenta, Bayer, Kenya Seed company

4.1.4 Constraints in Agro-processing and Cassava Value Addition in Busia and Makueni Counties

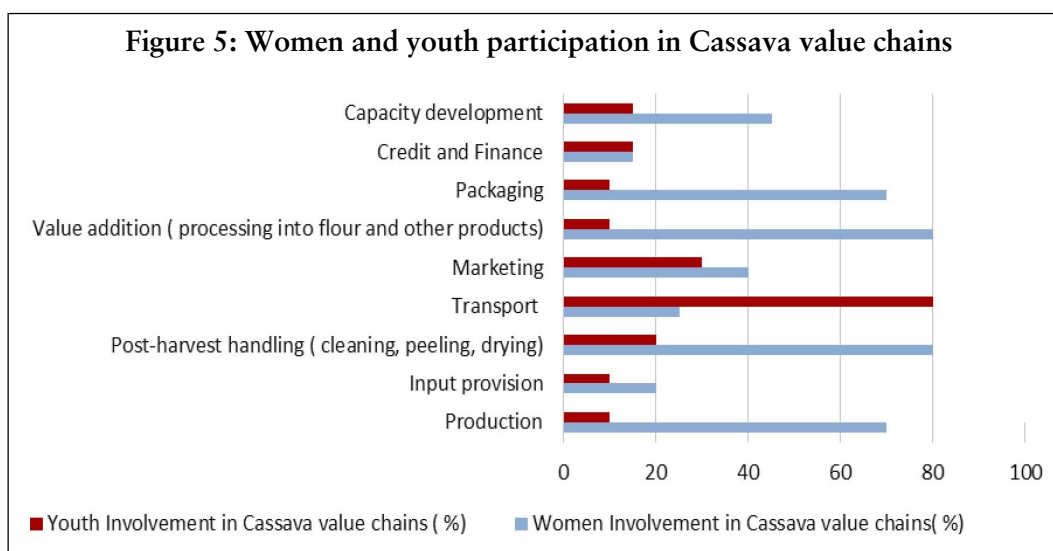
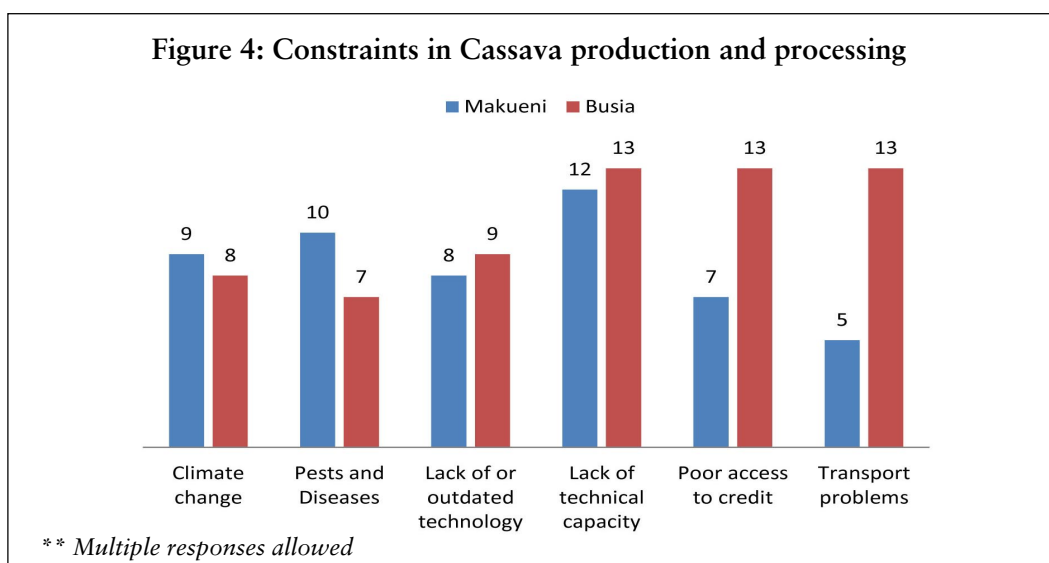
Key informant interviews reveal a wide range of constraints, some related to production, technology, technical capacity, and others related to access to financial services and markets. A summary of the constraints is given in Figure 4.

Key informants from the county governments also mentioned that the potential for processed cassava products is high and underexploited, as current production does not meet the demand in the country. If cassava processing is expanded through larger scale projects through diversification into industrial cassava processing, this will have a positive impact on livelihoods and poverty in these two counties. Key informants also mentioned that there is a need

for greater involvement of universities in research and innovation to support agro-industrialisation in the sector. Private sector investment in the sector is low, and county governments need to attract investments into large-scale products that will have greater impact in terms of employment and economic development.

4.1.5 Women and Youth Participation in Cassava Value Chains

An analysis of the cassava value chain in both counties reveal that women’s participation in the cassava value chain is very high, particularly when they are involved in value addition at the local level. Women are involved in cassava production, its related crop-husbandry practices, as well as processing, packaging, and marketing (Figure 5). Key informants from both counties



revealed that when it comes to financing, only 10 percent of women are involved in activities related to financing and credit. This is largely cultural, as women in these communities often do not have access to assets which they can use as collateral to access credit. In order to increase the participation of women in these value chains, improving their access to credit and financing can be a positive step towards ensuring their participation.

Youth involvement is minimal. They are predominantly involved in offering transport services from farms to processing plants or from processing plants to the market, as motorcycle riders commonly known as Boda Bodas. The youth also do not have access to financing, which explains their minimal involvement in value chain activities. Youth involvement in agro-processing can therefore be increased through the use of innovative and technologically-intensive methods of production that are likely to interest their participation. Capacity-building specifically targeted for youth is also another way of ensuring their participation.

4.2 Case Study 2: Banana Value Chains and Agro-processing in Meru and Kisii Counties

4.2.1 Banana Farming in Kenya.

Banana (*Musa spp.*) is one of the most important food and cash crops in Kenya. There are currently over 165 banana cultivars in Kenya. However, most of the cultivars grown, particularly the local ones, are low yielders and are not very suitable for commercial production. As a result, Kenya is yet to achieve its potential in banana production. Banana production in Kenya has increased over the past 15 years. This is mainly owing to improved production practices and the introduction of improved banana varieties, including tissue culture banana. The market for banana has also changed with the emergence of the middle class demanding a continuous supply of particular varieties both for cooking and dessert purposes. Figure 6 illustrates the annual acreage under banana production, as well as volume yield. It is evident from the graph that

although the acreages have not grown overtime, the volumes have increased almost proportionately.

Banana is the most popular fruit in Kenya, and is often consumed as a dessert whereas the cooking variety also serves as a staple food. Bananas are grown in a mixed farming system and are often seen as a household food security crop, which provides continuous household income under a low input regime (Qaim, 1999). Banana production, however, is often neglected in terms of supplying input factors such as fertiliser, which is normally done through the central governments' National Cereals and Produce Board. Water is primarily managed by women, who have limited amounts of education and are also responsible for domestic activities such as raising children and providing for other family needs. Banana has contributed immensely in improving household food security in the country. While a significant proportion of bananas produced are eaten at the household level, especially by the smallholder producers, a larger percentage goes to various markets as marketable surplus. The revenue collected is reinvested to further improve production and household food security.

Bananas are highly sensitive to climate change, as an increase in temperatures by 2 degrees could reduce the banana productivity by 10 percent. However, banana crops offer more incentives⁶ for agro-processing, yet the country has done very little so far to tap into these opportunities. In terms of trade, banana is a crop that is traded nationally. Bananas from Meru find their way easily to other counties like Nairobi, Kwale, Mombasa, and the case is the same with crops from Kisii. While over 90 percent of land is owned by men, women tend to be the largest participants and beneficiaries in the banana value chain. They are also the hardest hit with losses before and after harvesting. According to Kenya's 2016 economic survey, Kenya produced 1,809 million tonnes of bananas while importing 1 million tonnes, largely from Uganda.

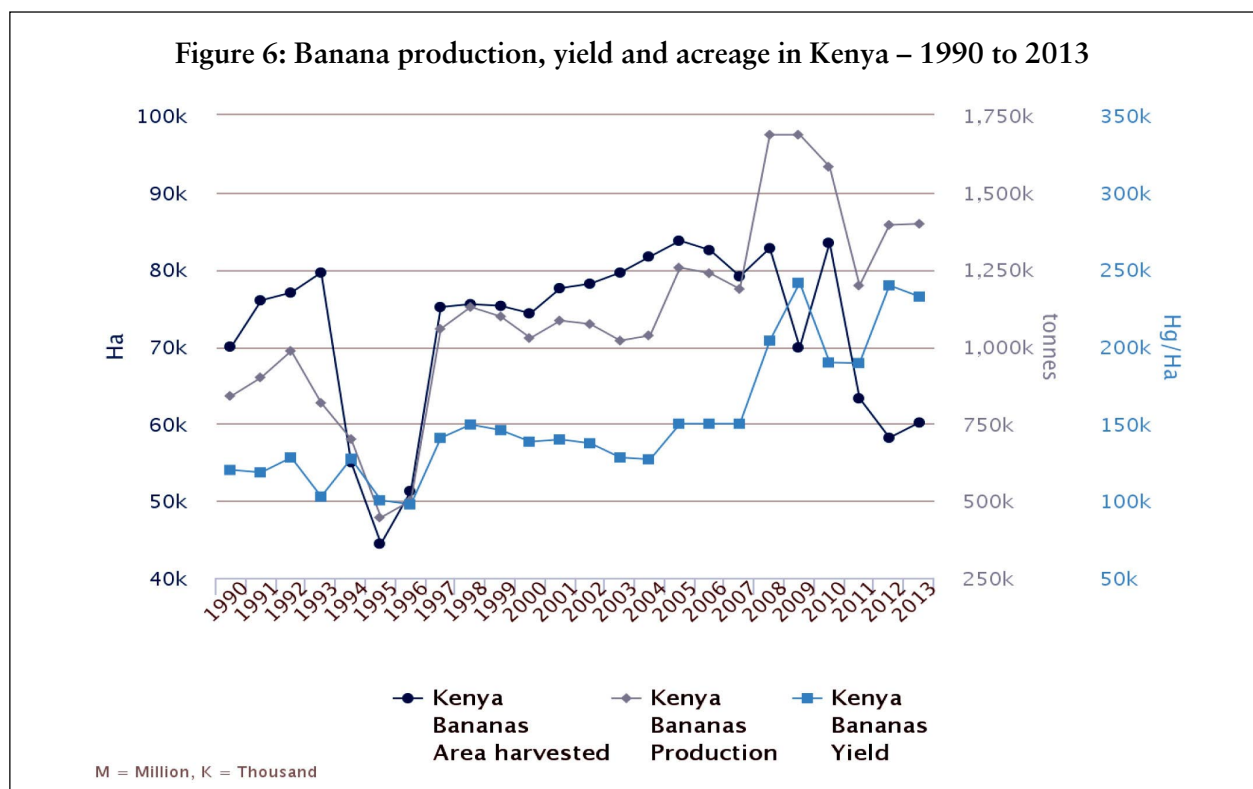
Climate change in Kenya, as in the rest of Africa, is expected to worsen, possibly costing as much

as 2.6 percent of GDP each year by 2030, according to a study by the Stockholm Environment Institute. Overall rainfall is expected to increase, become more erratic, and higher temperatures will speed evaporation which will have substantial negative effects on banana production. In the two counties, climate has caused its fair share of trouble in the production of bananas. There have been seasons where rainfall has been above normal, as well as the tendency toward higher prevalence of droughts or much below normal precipitation. In most cases, farmers have not switched to other crops in totality in the wake of these climate vagaries, but have reduced the size of their banana production. Both Kisii and Meru have resorted to planting bananas in the highlands, and switched to drought-resilient crops like cassava in the lowlands.

Figure 6 represents banana yield, acreage and production in Kenya since 1990. Trends show that production yield and acreage have been increasing over the past 25 years. Small scale farming dominates the banana sub-sector in Kenya. The majority of small-scale farmers are women, 500,000 of which are believed to be directly involved in the business. Bananas occupy

an average 0.21 hectares under a mixed cropping pattern. Many Kenyan families in the two counties of Meru and Kisii own less than an acre of land, but use it extensively for growing bananas as the main crop. Bananas are a major source of income for most farmers who engage in its production, generating up to USD \$1500 per hectare per year from fresh banana sales. The banana supply chain in the country is complex and inefficient, and it is estimated that 95 percent of the bananas sold are grade two bananas, handled by street vendors and retailers in residential areas with only 5 percent sold to supermarkets and other institutions (Kinyua 2008).

Currently, national banana production is estimated at 100,000⁷ tonnes annually, raking in about Kshs 23 billion of the total horticulture income, yet it is argued that the crop has potential to grow into a multi-billion shilling industry. Less investment to improve inputs and dependency on rain-fed production have reduced the productivity and longevity of banana plantations. However, the sub-sector is fast growing and is propelled by the interest and investments of a wide range of actors, especially those involved in agro-processing.



4.2.2 Banana Value Chain and Agro-processing in Meru and Kisii Counties

Banana Production and Agro-processing in Meru

Meru county is believed to be one of the biggest producers of bananas in Kenya. According to statistics from the Central Ministry of Agriculture, Meru county has topped Kisii county from their first place position in banana production. The county now boasts of Kshs 3 billion annually from banana sales, even though much of this is attributed to the freshly ripened banana consumption than from processed banana products. A number of factors have been responsible for the growth of banana farming in the county. Improved banana varieties, like tissue culture bananas; good climatic conditions, coupled with small-scale irrigation in some areas; improved road networks; ready markets; numerous capacity-building by various non-governmental organisations; and interventions from the county government have been responsible for the impressive growth of banana statistics in this county.

About 400,000⁸ smallholder farmers, mostly women, are now involved in banana farming in the county. Of this number, only a few of them have already adopted high yielding varieties. Production potential is still pegged on the few farmers who have invested in these high yielding

varieties. The county government of Meru has understood the potential in this sub-sector, and has rightly moved to encourage improved banana farming and value addition to help farmers increase their revenues. Interviews with county officials in Meru reveal that the county government has an elaborate plan to build banana cold storage facilities at Kariene market and other six fresh produce markets in the county, including Nkubu and Meru Town. This plan intends to spur value addition, market access by farmers and other value chain agents, and drastically reduce post-harvest losses. The county obtains banana planting materials from Jomo Kenyatta University, although quite a number of farmers also share planting materials among themselves.

Meru has registered a cooperative society for the collective marketing of banana produce. The cooperative also acquired a trading license to process bananas into wine. Instead of taking the opportunity to fast track the commencement of the processing, Meru county is still debating on where the acquired processing machineries would be installed and commissioned. One lady has already decided to go on her own and process her produce into flour. From ten kilograms of fresh bananas, she produces a kilogram of banana flour. Her market channels are still very limited, and occasionally she gets a chance to supply

Box 3: Agro-processing bananas by Meru Banana Farmers' Cooperative Society

Meru Banana Farmers' Cooperative Society was established in 2012 with the core mandate of banana marketing and agro-processing. The cooperative membership is comprised of 60 percent women, who are also very actively involved not only in agro-processing but also production. They are processing banana crisps and have also obtained a licence to produce banana wine, which they intend to start at the end of 2016.

The cooperative has managed to purchase and install weighing machines for the standardisation of banana sales. A number of producers have not embraced the idea, even as brokers persuade them to sell through 'eye balling', a fact that has escalated side-selling. The cooperative's biggest challenge is bringing the farmers together for the sake of collective processing and marketing. A lack of understanding has seen many members deviate from the rules and regulations that they negotiated.

The cooperative believes that once they begin processing, there will be a market for their produce. They envisage that this will positively influence their cohesiveness.

Nairobi's Kirinyaga millers. Her banana flour can be used in a number of cooking activities like composite flour for baking bread and other confectioneries, porridge, and ugali. Agro-processing is done on a small-scale basis by groups of farmers and cooperatives. One such cooperative is the Meru Banana Farmers' Cooperative Society.

Agro-processing and Value Addition in Kisii County

The agricultural sector is considered a key sector in the socio-economic development for Kisii county. The sector is important in ensuring food security, creating employment and income, and enhancing the development of agro-based industries through the provision of raw materials in the county. It also contributes towards conserving the environment through appropriate agricultural practices, such as agro-forestry. The main crops produced in Kisii county are maize, bananas, beans, potatoes, tea, sugarcane, coffee,

and other horticultural crops. According to recent statistics, Kisii County has a total population of 1,152,282. This in itself is a big market, especially for food items like those emerging from banana processing. Approximately 51 percent of Kenyans live below the poverty line in Kisii county. The major economic activities or industries in the county include subsistence agriculture, with banana as a dominant crop for food security and livelihoods; vegetable farming; small-scale trade; dairy farming; tea and coffee growing; various commercial businesses; and soapstone carvings. According to the 2016 economic survey, Kisii produced 66,889 million tonnes of bananas in 2015, valued at a total of Kshs 1,484,900.

The size of farm holdings in Kisii county is typically small, ranging from 0.5 to 1.5 acres of land. The prevalence of smallholdings are as a result of high population pressures on land, which resulted in subdivisions and land fragmentation. The number of land holdings in the county are

Box 4: Women in Agro-processing in Kisii County

Kenyuni women group was established 2006 with the help of the then Kenya Agricultural Research Institute, now KALRO. This women group is composed of 60 percent women. The group received production training from KALRO and processing training from KIRDI. The group is now involved in producing banana crisps and biscuits made from banana flour.

The group has faced many challenges over the years. Their oven for the production of scones and bread broke down and they were in the process of acquiring new ones. The group is also affected by effects of climate change, and even though they have not switched to other crops, they have instead reduced acreage under the fruit. Currently the main challenge is the lack of modern and environmental-friendly machinery to process bananas. The group currently employs 90 percent of women in banana production, 40 percent of women in banana transportation, and 70 percent of women in agro-processing. The same organisation employs 30 percent of youth in production, 70 percent in marketing and transport. In agro-processing, the rates of youth participation fall to 30 percent. This indeed is an indication that women take leading role in agro-processing.

The groups' main challenge is bringing people to form a group and ensuring that the group stays intact. The lack of funds and skills for better agro-processing has been a major stumbling block.

The group sells their products locally within Kisii town. They have not undergone KEBS certification and therefore could not access better markets. Their future goals are to infuse more youth into the group, acquire certification, and increase their production and market coverage.

estimated at over 135,000, which consist of households who engage in mixed farming. The subdivisions have negatively affected agriculture, as mechanisation becomes a pipedream. The number of people holding title deeds in Kisii county is estimated at about 40 percent. The county has an ancestral land holding system and therefore many people do not have legal proof of their ownership which is problematic as they cannot use their land as security to secure loans from financial institutions. This has serious implications in the county's development, as only a small percentage of the county's population can access loans for agro-processing purposes.

In Kisii county, the Kenya Industrial Research and Development in Industries has partnered with a number of groups to train and begin processing crisps, flour, and bakery products. The groups, which constitute over 90 percent women and over 50 percent youth, are already thriving in business. An example is the Kenyuni women group, described in Box 4. With the help of KALRO and KIRDI, the group has been able to receive technical support and capacity-building to process various agro-processed products made from bananas.

4.2.3 Banana Value Chain Processes and Actors

Agro-processing of banana seems to be still in its infant stages in both counties, though it is evident that significant potential for expansion exists. Kenya needs big players to venture into banana wine, and make use of banana wastes for other processed products such as animal feed and textiles. While Figure 7 shows the ideal situation, the processing companies may also be able to obtain their raw materials directly from either farmer cooperatives or the assemblers. Both Meru and Kisii counties depict the same agro-processing channels. Both have only ventured into banana flour and banana crisp production. Figure 7 also illustrates the potential agro-processing value chain for banana in both counties. Flour and baked goods are also well developed in both the counties. Meru has gotten a green light for wine manufacturing, but this is yet to be actualised on the ground. Animal feed and textile industries are unexploited, yet they

represent great opportunities for the expansion of agro-processing industry.

Agro-processing in both counties is conducted at the small-scale level. Some are located within homesteads, qualifying as cottages, while others have separate locations with vast room for expansion. All of these small-scale industries are managed by a farmer or a group of farmers. Their farm produce are given first priority for processing, but they must meet their own processing quality standards. They then procure agricultural inputs from other farmers should they face production deficits. They sell their products locally, while only about 11 percent have the ability to sell to supermarkets, having undergone KEBS certification. Women are the larger majority in production and agro-processing.

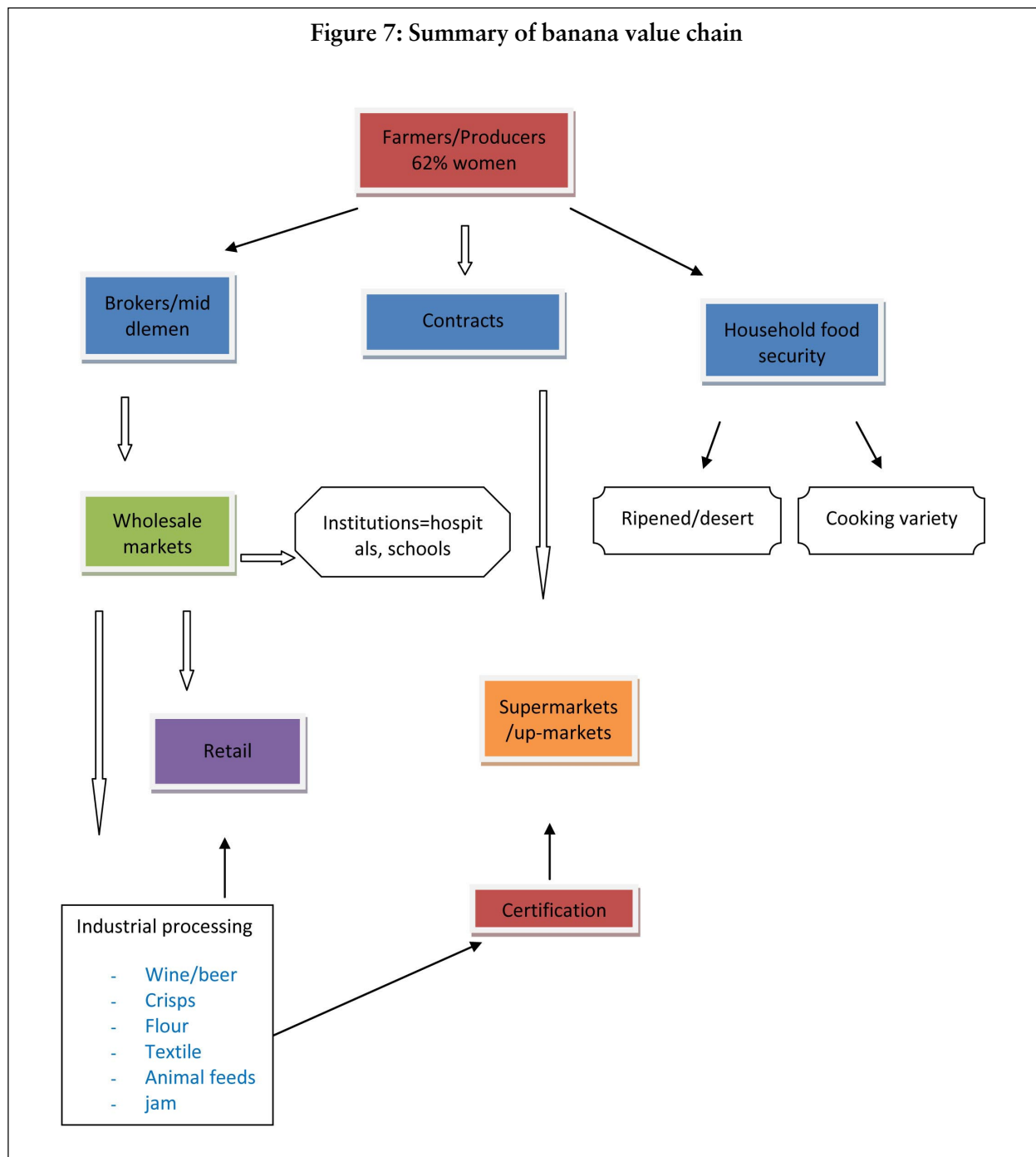
Even though both Kisii and Meru counties have already ventured into banana agro-processing, the aggregate level is still very low and producers still worry about the banana market. While the two county governments are keen to promote agro-processing, there is a need to continue to promote production after the markets have been secured. Processors also need to liaise with producers, as does the government and the private sector on the varieties they require for processing. They also need to communicate in clear terms the quantities they need annually. This kind of backward and forward communication can be achieved through multi-stakeholder fora comprising of all the value chain actors. The county government can take a leading role to facilitate this communication.

Transporting production inputs from the farm to the primary collection point is the first commercial interface for the smallholder farmer. This segment is referred to as the "First Mile", and typically consists of the unclassified network of tracks linking farms to the classified rural road network. Motorised transport is limited and operates with great difficulty, especially during the rainy seasons. Both Kisii and Meru counties suffer from poor rural 'feeder' road networks. At times, this brings heavy losses to the producer or the trader, especially when such transport

services coincides with heavy rains. The intermediate transport stage consists of the movement from collection points to local storage depots, and in some cases, secondary markets. Transport here is conducted mainly on classified rural or district level roads. Pick-up trucks and motorbikes are largely used in both Kisii and Meru to offer transport at this stage, employing many youth. Transport to terminal destinations consisting of national and international markets

is conducted along national roads using high-capacity vehicles. Bananas from Kisii are transported to big markets like Nairobi and Mombasa, which are located several kilometres away. Initially there was multiplication of cess tax⁹ as produce crosses from one county to another, but this had been resolved with the transporter only paying cess tax at the county of origin.

Figure 7: Summary of banana value chain



4.2.4 Institutional Landscapes of Banana Value Chains in Meru and Kisii Counties

There are a number of actors along the banana value chain in both Kisii and Meru counties. A number of organisations hold duplicate roles in some regions, while other organisations are the sole agents. There is a growing presence of a number of NGOs in both the counties providing funding in the banana sub-sector. Research organisations exist and are providing critical assistance to advance the value chain, while the county governments are also at the forefront in setting priorities, forging partnerships, and formulating and implementing supportive policies. The producers themselves are also very active and vibrant. They have formed various organisations, like CBOs, from which trainings, funding, and collective marketing can be done in a meaningful and sustainable manner.

4.2.5 Constraints and County Government Interventions in Banana Production and Agro-processing in Kisii and Meru

Bananas' greatest threat lies with the diseases. Banana diseases (Banana Xanthomonas wilt, Black Sigatoka, Fusarium wilt, Banana streak virus) contribute to yield losses of 40 to 100 percent of production. Likewise, banana pests (banana weevil and burrowing nematodes) contribute to yield losses of up to 50 percent. Apart from lowering yields that could sustain agro-processing all year, such pests and diseases also affects the quality of produce to be processed. Continuous use of pesticides has negative effects on human life, and curtails the possibility of trade within certain parts of the world. Moreover, their continued use can lead to the decline in soil fertility, leading to lower productivity and poorer banana quality. These

Table 4: Institutions in banana value chains and agro-processing

Name of partner	Nature of institution (NGO, CBO, Financial, Research, capacity Development, Donor agency)	Nature of contribution (Policy development, implementation, Financial, Research, capacity Development, project or program implementation)	Meru	Kisii
KALRO	Research	Research, provision of technologies, capacity building & technical backstopping	☐	☐
USAID/KAVES	NGO	Capacity Development – implementation of banana value chain activities/provision of funds	☐	☐
KAPAP	GoK, Financed by donors	Research, development of banana value chain, provision of funds, training of farmers	☐	☐
KIRDI	GoK	Research and training	☐	☐
KEPHIS	Regulator	Policy Development	☐	☐
County Government	Devolved government	Mobilisation, Capacity development, program implementation	☐	☐
BGAK	NGO	Capacity development	☐	☐
Kisii University	Research	Research and Training		☐
ASDSP	Agriculture national program	Coordination & implementation of banana value chain activities	☐	☐
Jomo Kenyatta University	University/Research	Research and supplier of planting materials	☐	☐
Africa Harvest	NGO	Research and training, provision of funds	☐	☐
ASERECA	Donor	Provision of funds	☐	☐
KENAFF	NGO	Capacity development, advocacy	☐	☐

concerns have also been mentioned in both the counties, acknowledging the low composition of organic and inorganic inputs.

Finance was also mentioned as a major challenge in the production of bananas in Meru and Kisii counties. A number of organisations support banana value chains in different stages in both counties, but the lack of long-term funding mechanisms for the banana sub-sector leads to dependency on short-term donor-supported projects. KALRO, as the major government research body, suffers from systemic underfunding which negatively affects the development of the banana value chain. Youth and women in these two counties mentioned the fact that they do not have collateral to acquire loans. This creates obstacles for them to access youth and women entrepreneur funds.

Most farmers and would-be-entrepreneurs in both the two counties lack structures to promote value addition in terms of agro-processing. The lack of capital also means that these farmers and other agents are not able to acquire the equipment needed for processing. Even so, the Kenya Bureau of Standards' requirements for handling and processing food creates a barrier for poorer farmers, as they cannot be lowered for the sake of admitting more entrepreneurs to the value chain. KEBS must provide training to groups intending to venture into agro-processing so that they can have the understanding, knowledge, and skills before actual processing begins.

The lack of standardisation in the sale of bananas only seems to benefit brokers rather than producers. In cases of good harvest, storage becomes a problem and this invites heavy post-harvest losses and lowers banana revenues. The lack of sufficient quantities of bananas for processing was mentioned as one of the major problems in agro-processing in Kisii. The farmers have not been able to produce sustainably for the processors. KIRDI received an offer to supply the Netherlands with 300 tonnes of bananas per month, but could not supply owing to inadequate and unpredictable banana supply.

Current Interventions to Improve Banana Value Chains and Agro-processing

- *Research:* Kenya Agricultural and Livestock Research Organisation, in close collaboration with KAPAP, ASDSP and farmers, are conducting various research to develop banana genotypes with improved resistance to pests, diseases, and drought; increase yields; improve culinary qualities; and enhanced nutrient content.
- *Improvement of banana value chains:* The donor funded Agricultural Sector Development Support Programme, Jomo Kenyatta University and Kenya Agricultural Productivity and Agribusiness Programme are doing excellent work in improving the banana value chain in both counties. Farmers are now able to produce improved quality crops and access better markets.
- *Seed multiplication and distribution:* Jomo Kenyatta University of Agriculture and Technology (JKUAT), Kenya Agricultural and Livestock Research Organisation, and Aberdare Technologies, amongst others, are at the forefront of producing reliable planting materials and distribution systems with quality assurance mechanisms.
- Both county governments are harnessing partnerships by working very closely with the private sector to advance the banana value chain by establishing private-public, inter-team work platforms within the sub-sector. There is a need for the counties to work in close collaboration with the National Government to set up agro-processing parks in the counties and use the expertise of KALRO, KIRDI, and national universities to encourage and train women and youth in agro-processing.
- *Institutional and policy support:* Institutional arrangements that favour agro-processing and inter-team cooperation within the chain. Kisii already has a bill that aims to address food security

and nutrition, linkages, and value addition, while Meru county has set up a team to begin the process of drafting a similar bill.

- Improved infrastructure and human capacity developed for the banana sub-sector: Both county governments are improving rural feeder roads, which are critical to the logistics of agricultural produce transformation. Farmers and middlemen/brokers are now finding it easy and cheaper to transport banana produce from the farm gate to either assembling points or markets, both locally and nationally. Even though the physical infrastructure is still under development, more still needs to be done to facilitate and entice greater investment in banana production and processing.

4.2.6 Women and Youth in Banana Value Chain and Agro-processing

The study recorded very distinct gender roles across all the enterprise value-chains studied. From farm to market, women tend to take on the tasks that need precision and great patience, particularly planting, weeding, harvesting, sorting and grading, and packing, as men take on the tasks needing physical strength or those that tend to be mechanised (ploughing, spraying, transport loading, and driving). Men prefer bulk transactions where financial transactions are larger and of higher value. Women are willing to stand the whole day for a meagre daily or casual weekly wages. In Meru county, one woman has taken the lead to set up her own processing cottage that produces banana flour. 91 percent of her employees are women. Generally, women are the majority in banana production and processing, accounting for over 76 percent of total involvement. Unfortunately these women do not own collateral to access loans. However, in a few cases, some women in both counties own one or two dairy cows and supply milk to milk cooperatives, something that earns them a little finance against their monthly milk cooperative records. In both Kisii and Meru counties, 21 percent of women were able to access loans while 17 percent were able to access

financial credit through their common interest groups.

Youth are also involved, but only in some segments of the value chain. 32 percent of those who are involved in dispensing agro-inputs to the two counties are youth, while over 61 percent of youth are involved in transportation, either through vehicles, bicycles, or motorbikes. In Kisii, the number of youth involved in agro-processing stood at 44 percent as opposed to Meru that only had 27 percent. While these figures are not entirely encouraging, youth participation in banana agro-processing can be enhanced through the use of modern technologies, like price discovery mechanisms through the use of high-end mobile phones and computers. Through the use of modern technologies and equipment in agro-processing can lure their participation, increasing access to financial services can also be another way to entice them to invest in agro-processing. Information and communication technology is an attractive, subject to youths in the country and offers a great platform for them to engage in the banana sub-sector. ICTs have recorded the potential to attract the younger generation to join the agricultural sector where they are able to provide white-collar services and engage in business ventures. There is a need to change the mind-set common in youth who are yet to relate ICT to agricultural production, agro-processing, and marketing opportunities.

4.2.7 Policy Issues for Consideration in the Banana Sub-sector

Kinyua (2008a) identified the following causes of inefficiency in the banana value chain: a large number of intermediaries; a lack of comprehensive knowledge of the market by all value chain players; policy and institutional failures (e.g., no agreed upon grades and standards); low technical capacity for ripening; high costs in the chain (e.g., for transportation, transactions, and intermediaries); lack of consistency in supply; and difficulties in changing the mind-set of farmers from subsistence to commercial farming. These challenges exist to date.

The need to upscale agro-processing is felt in both counties, as this will ensure a year-round market for producers. However, producers need to be trained on improving the quality of produce needed before production can be effectively enhanced to meet processing demands. In terms of storage and agro-processing, there is a need for county governments to work closely with national bodies like the Kenya Bureau of Standards, KIRDI, KALRO, and the private sector in order to upscale agro-processing of agricultural produce to absorb banana produce, thereby creating better markets. It is through processing that production will be enhanced, losses reduced, and revenues increased. The small functioning cottages should be supported and up-scaled, while the creation and multiplication of small cottages should be encouraged and supported as well.

Poor information flow within the value chain makes it easy for intermediaries to take advantage of poor rural producers who often lack market information. This is a general problem in Kenya, where formal market information services like radio broadcasts are present but lack local specificity¹⁰. This is a clear intervention point for market policies. Efforts that promote forward

and backward linkages within the value chains are important in enabling actors to embrace market dynamism and improve their understanding of consumer preferences. Embracing ICT in marketing would be a great option to solve these challenges, while at the same time enticing youth to get more involved. In addition, the strengthening of linkages with other value chain actors, such as input delivery systems, business advisory services and market information systems would improve the efficiency of such chains.

Transaction costs, including marketing, handling, and other operational costs, were shown to be high, comprising a high proportion of the retail prices both for fresh bananas as well as banana crisps. These can be reduced through the promotion of collective action through producer groups in order to economise on transaction costs as well as achieving some market power and representation in national policy fora. In some cases, producer groups exist but may require some level of empowerment through capacity-building efforts.

Meru county does not have food security policy, and as such uses the national food and nutrition

Table 5: Proposed Action for improving policy implementation in the banana sub-sector

Which problem	Needs which solution	Who should act on it
Banana marketing is highly taxed	Policy	MoALF & County Government
Bananas sold in different sizes	Standardisation	MoALF, KEBS
Cess prone to corruption	Policy	MoALF & County government
Markets lack transparency and suffer from cartels	Competition	Traders, county and national governments and the Competition Authority of Kenya
Little bargaining powers for producers	Collective action	Farmers, cooperatives
Little upscale on value addition	Policy & training	All levels of government; National and County
Little uptake on agro-processing	Policy & training	KEBS, KIRDI, all levels of government
<i>Source: Authors' compilation</i>		

security policy to manage its horticultural sectors. In contrast, Kisii county has a draft food security bill that is currently being processed to become law. While the document covers wide areas of food security like the right to food, realisation of the right to freedom from hunger, elimination and prevention of discrimination of marginalised groups in the access to food, promotion of food production, self-sustenance, and food security, the establishment of institutions for the advancement of cooperative governance and procedures of coordination of food security issues, amongst other things, could facilitate value addition and agro-industrialisation of the sector. Perhaps this is an area both counties, and indeed the country at large, need to seriously consider. Such a policy would be instrumental in developing and industrialising the banana sub-sector. Besides, a banana-specific policy would easily enhance and possibly sustain food security, not only to the producing households, but also to those who trade in it as well as those who consume it in its different forms.

4.3 Synthesis of Case Studies: Lessons Learnt

An interrogation of the two subsectors reveal that although they have huge potential for agro-processing, it is still conducted on a small-scale basis and at a very low capacity levels owing to a number of constraints, which include the lack of finance for up-scaling production; low technical and technological capacity to upgrade production; and low investments by the government in various sub-sectors. Climate change and pests and diseases are major challenges to productivity and these may negatively affect the availability of raw materials for processing. As such, agricultural research organisations need to embark on climate smart agriculture and work towards providing varieties that are resilient to the effects of climate change, pests, and diseases through breeding. Although KALRO has made major strides towards providing improved varieties of both banana and cassava, there is still a considerable amount of involved to ensure that existing varieties are suitable for changing climate patterns in different agro-ecological zones.

In both value chains, women play a key role in value addition activities. Over 80 percent of value-adding activities are done by women in both value chains. It is obvious that in order for meaningful agro-industrial development to take place, the involvement of women in agricultural value chains must be supported. Youth are not very involved in agro-processing, except in the provision of auxiliary services like transport. The potential of youth in agro-processing could be leveraged by facilitating their participation in innovation development, technology, ICT, or marketing that could improve efficiency in agro-processing and value addition.

The map of stakeholders in both value chains reveal that most agro-processing and value addition is done by CBOs, producer groups, and women's groups through collective action, which enables them to access credit from SACCOS, banks, and other financial institutions. NGOs play a critical role in providing capacity-building, training, and finance for the development of value chains. NGOs also act as intermediaries that link farmers to markets or link agro-processors to credit and finance. Research organisations play a critical role in providing new technologies both at production and processing levels, and identify value chain activities that require intervention. Private sector actors in these value chains provide inputs, or provide markets for raw materials, intermediate, and finished products. The private sector also engages in agro-processing and value addition activities, although they also face challenges in accessing technology and technical capacity. Agro-processing requires huge investments and a large capital base which most people cannot access, therefore financial institutions have continued to play a critical role in providing the credit necessary for up-grading, although interest rates in Kenya are very high at the moment and would need to be reduced so as to encourage investments in agro-processing.

The government's responsibility is to create an enabling environment for agro-processing and marketing through various policies and strategies implemented at the county and national level. A look at policies within these four counties reveal

that counties pursue their policies, some of which are not in line with government-related policies on agro-industrialisation, trade, and climate change. There is a clear lack of policy coherence in agro-processing and this needs to be dealt with by engaging stakeholders through multi-functional platforms of policy actors, implementers, value chain actors, and agro-processors, including private sector.

Chapter 5

Conclusions and Policy Recommendations

Agro-processing and agro-industrialisation is a key element of Kenya's economic growth transformation and development as outlined in Kenya's Vision 2030. Kenya's industrial policies and strategies have identified agro-processing as a key element of industrialisation because of its backward-forward linkages and its potential to reduce poverty, improve livelihoods, and food security for millions of Kenyans. In this paper, the current policy framework for agro-industrialisation is analysed in the context of climate change, food security, and trade.

Agro-industrialisation is adversely affected by climate change and vice versa; yet, the policy framework has not taken into consideration issues that may be addressed through climate change policies, trade policies or agro-industrial policies. The policies are not well integrated and there is a need therefore to ensure that climate change policies take into consideration agro-industrial processes and the effects of GHG emissions on climate change which could also affect agricultural productivity. There is also a need to develop more climate smart agricultural technologies, either through seed systems or through other technological innovations to deal with effects of climate change on productivity and to ensure that there is constant supply of raw materials to sustain agro-industry.

The lack of finances and low levels of investment in agro-processing, coupled with a lack of or poor technology, is a key issue of concern for many stakeholders, as such there is need for resource mobilisation to up-scale production and upgrade existing firms so as to ensure that the

potential for the industry is fully utilised, especially in the banana and cassava sub-sectors.

There is also need to make credit more accessible to SMEs, producer groups, or women's groups engaged in agro-processing. This can be achieved by lowering interest rates and providing innovative loan packages for entrepreneurs, specifically those working in groups or cooperative societies. Low capacity utilisation in the sector is a symptom of the inherent lack of technical capacity. It is therefore important to engage research and development to come up with new innovations in technology, as well as build technical capacity of individuals in agro-processing or groups of farmers so that they can be able to up-grade and increase their productivity.

The study further reveals that there are existing structural inefficiencies with respect to the functioning of value chains, specifically the way the sectors and ancillary support sectors such as packaging, labelling, branding, and marketing support agro-processing. Taking cognizance of the backward-forward linkages and ancillary sectors, such as irrigation, post-harvest handling, packaging, and waste management, it is important to create multi-stakeholder platforms which link SMEs who would provide ancillary services with agro-processing firms and other entrepreneurs.

Cross-cutting issues concerning the involvement of women and youth in agro-processing should be considered as a key issue of policy concern. This is because women are more involved in

value-adding activities and are interconnected with the various forward-backward linkages of many value chains. Women's participation in value chains can be enhanced by working with women's groups and organisations that support women to provide capacity development for skills, technical advice, and improve capacity for processing, by investing in technology and innovative practices in packaging, marketing, and business management to make women's activities more efficient and profitable. The Women's Fund could target agro-processing firms that largely involve women's value addition, and this can be directly channelled to counties where women are already involved in agro-processing.

Although youth involvement in agriculture is low, this can be remedied by channelling the Youth Fund to agricultural and processing activities at county level. Youth need support with an innovations hub, technology transfer centres, and polytechnics, where youths gain skills-training, and are able to develop new innovations in processing or value addition with financial and technical support to develop and commercialize their innovations through partnerships with research organisations, universities, and KIRDI. Youth can also be engaged in the value chains by providing ancillary services such as transport, marketing, packaging, and branding.

Annexures

Annex 1: List of Key Policies, Strategies and Legislation

1. Agriculture Sector Development Strategy 2010-2020
2. Kenya Industrial Transformation Programme 2015
3. Kenya Vision 2030
4. National Agri-business Strategy
5. Climate Change Bill 2014
6. Kenya Draft Cassava Policy
7. National Food and Nutrition Security 2011
8. National Policy on Irrigation and Drainage Development
9. Kenya Trade Policy (2015 Draft)
10. Kenya National Adaptation Plan of Action (NAPA)
11. Kenya National Appropriate Mitigation Actions (NAMA)
12. Kenya Climate Change Action Plan 2013-2017
13. National Horticulture Policy
14. Strategy for Revitalising Agriculture (SRA)
15. Kenya National Industrialisation Policy Framework

Annex 2: List of Key Informants

Name of Organisation	Name of interviewee	Location and Contact	Confirmed interview Date
Ministry of Industry, Trade and Cooperatives	State Department of Trade	Productive and Competitiveness KEPLOTRADE II PROGRAMME Office Deputy Prime Minister and Minister for Trade Teleposta Towers, 15 th Flr., Kenyatta Avenue PO Box 43137-00100,Nairobi Telephone-315001 Mobile-+254 724 623 386, Fax-240681 Email-kingateam@yahoo.com	
Ministry of Environment	1. Kenya Meteorological Department, Ministry of Environment and Mineral Resources 2. Climate Change Directorate		
Ministry of Industrialisation and Investments	Director of Industrialisation and Investments	Ministry of Industrialisation and Enterprise Development NSSF BUILDING "A" Telephone: +254-020-2731531-44 , Fascimile: +254-020-2731511, P.o Box 30547-00100, E-mail: ps@industrialisation.go.ke, NSSF, Nairobi	
Ministry of Agriculture	1. Director of Agro-Processing/value Addition/ Agribusiness 2. Climate Change Secretariat 3. Livestock and Fisheries Department 4. State Department of Agriculture	Ministry of Agriculture, Livestock and Fisheries Cathedral Road, Nairobi P. O. Box 34188-00100 Kenya E-mail:info@kilimo.go.ke Telephone: +254-20-2718870 http://www.kilimo.go.ke	
Kenya Investment Authority		General Manager, Research Policy Advocacy & Planning (RPAP) Kenya Railways Headquarters, Block D, 4th Floor Workshop Road, off Haile Selasie Avenue P.O. Box 55704 - 00200 City Square, Nairobi, Kenya. Pilot Lines: +254 (730) 104-200 +254 (730) 104-210 Email: info@investmentkenya.com Website: www.investmentkenya.com	
KALRO		Deputy Director General (Crops) Kenya Agricultural and Livestock Research Organisation, Location: Kaptagat Rd, Loresho Nairobi Kenya Post Office: P.O.Box 57811, City Square, NAIROBI, 00200, Kenya Email: info@kalro.org Fax: +254-020-4183344 Safaricom: 0722-206-986/0722-206-988 Airtel: 0733-333-223/0733-333-224/0733-333-294/0733-333-299/0736-333-294	
World Bank		Main Office Contact: +254-20-293-6000 Delta Center Menengai Road, Upper Hill PO Box 30577-00100 Nairobi, Kenya Email	

Name of Organisation	Name of interviewee	Location and Contact	Confirmed interview Date
USAID		USAID/Kenya, PO Box 629 Village Market 00621, Nairobi Kenya Phone: +254 20 862 2000, Fax: +254 20 862 2680 / 2682 Email: usaidke@usaid.gov	
DANIDA		Royal Danish Embassy 13 Runda Drive, Runda P.O. Box 40412-00100 Gpo, Nairobi Tel: +254 20 7122848/ 7122849/7122850/7122851 Fax: +254 20 7120638 Email: nboamb@um.dk	
SIDA		Embassy of Sweden, PO Box 30600 00100 Nairobi, Kenya PHONE: +254 (0)20 423 4000. Alternative numbers: +254 (0)726-089300/+254 (0)728-961976/+254 (0)734-543333 FAX: +254 (0)20 423 4339 Email: embassy.nairobi@gov.se	
GIZ		Country Director GIZ Office Nairobi Riverside Drive, Riverside Mews Building, opp. Prime Bank Headquarters Phone: +254 20 4228 000, Fax: +254 20 4228 999 Email: giz-kenia@giz.de	
DFID		Head of DFID Kenya British High Commission, Upper Hill Road PO Box 30465 – 00100, Nairobi, Kenya Email: enquiry@dfid.gov.uk Tel:+254 (0)20 287 3000, Fax:+254 (0)20 287 3102	
Exports Promotion Council		Research and Planning division 1st and 16th Floor Anniversary Towers, University Way P.O. Box 40247 00100 GPO, Nairobi, Kenya. Tel. +254 20 222 8534-8 Cellphone: +254 722 205 875 or 734 228 534 Fax: +254 20 222 8539 or 221 8013	
Banana Growers Association of Kenya		Family Health Plaza, Mbagathi Way, Off Langata Road, P O. Box 43148-00100 Nairobi Kenya Phone: +254-2-6008324, Fax: +254-2-6008325 Email: producers@kenfap.org Website: Social Links Profile	
African Women Agribusiness Network EA		Regional Chair Phone: +254 739281820 felicia@awanea.com	
Kenya Agro-business and Agro-industry Alliance		ceo@kaaa.co.ke pmwangi@kaaa.co.ke 0722763188 The Mirage Building, Rooms 9/10, Mezzanine 1, Tower 2, Chiromo Lane, Nairobi	
Honey Care Africa (Agro-processor)		ASK showgrounds, Jamuhuri Park Muringa Avenue. P.O.BOX 2448-00502 Nairobi, Kenya Tel: +254 735 574 448/ 020 4400871 P.O.Box 38699-00623 Nairobi	
Orchard Juice LTD (Agro-processor)		info@orchardjuice.com +254 722843303 http://orchardjuice.kbo.co.ke/home	

Annex 3: Guiding Questions

Name of Respondent _____

Position _____

Cell Phone _____ Email _____

Organisation/group _____

Date _____ Time (45mins -1hr) _____

1. What role do you play in the agricultural sector/agro-industrialisation?

2. Which specific value chain are you involved in?

Banana

Cassava

or_both

Other _____

3. What is the coverage of your activities

a. National

b. Regional

c. County

d. District

i. Specify _____

4. What part (s) of the value chain are you involved?

a. Production

b. Input provision

c. Post-harvest handling

d. Transport

e. Marketing

f. Value addition (specify) _____

g. Packaging

h. Credit and Finance

i. Capacity development

j. Others (specify) _____

5. In your own observation has climate change affected any aspects of the value chain?

Specify _____

6. Has climate change led you to switch production form certain crops to other crops? Is cassava or banana one of them?

7. In your opinion how much does this crop contribute the following(very much, slightly, not very much):
- a. Household food security _____
 - b. Coping with effects of climate change _____
 - c. Potential for value addition and agro-processing _____
 - d. Livelihoods of women _____
 - e. Trade (local or international) _____

8. Who are your partners and what do they contribute to your organisation or group?

9. How do the partners contribute?

Name of partner	Nature of institution (NGO, CBO, Financial, Research, capacity Development)	Nature of contribution (Post-harvest, Input Provision, Transport, Link to Market, Financial, Research, Capacity Development)

10. What are key constraints do you face in the execution of your activities?

11. Are there specific challenges that you consider limiting for your value chain's development into viable agro-processing and value addition?

12. What are the key agro-processing & business opportunities do you consider viable for you value chain?

13. If you were to be responsible in shaping agro-processing & agribusiness of this specific crop in Kenya, what would you consider critical elements for transformation?

14. Are there any specific policies, laws or regulations that positively or negatively affect the agro-industrialisation and value addition of this specific sector? Specify

15. What Measures has the government taken to promote agro-processing I this particular sector?

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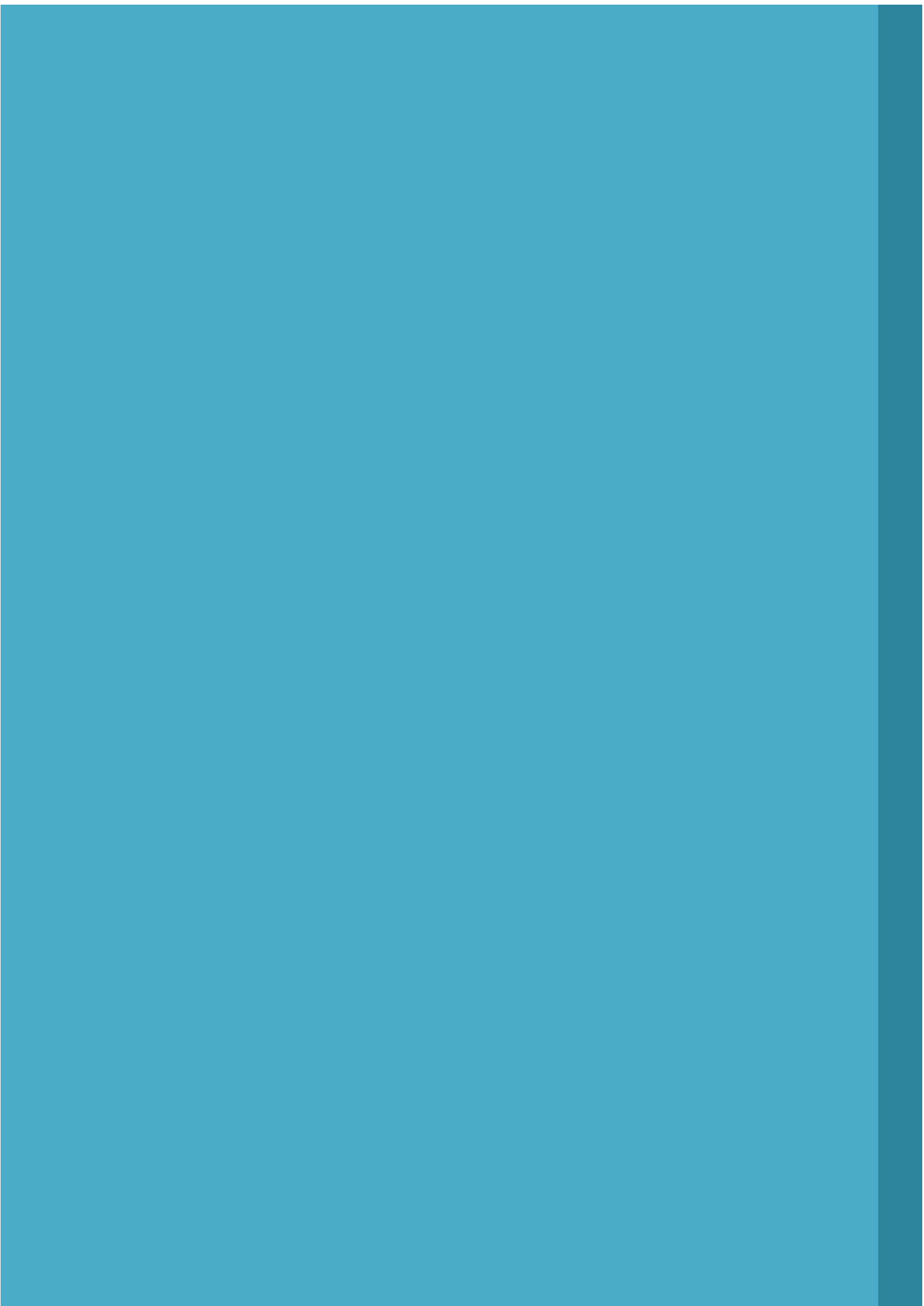
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Endnotes

- 1 This scenario family describes a future world of very rapid economic growth, global population that peaks in mid-century and declines thereafter, and the rapid introduction of new and more efficient technologies. A convergent world with the same global population, that peaks in mid-century and declines thereafter, but with rapid change in economic structures toward a service and information economy, with reductions in material intensity and the introduction of clean and resource-efficient technologies. The emphasis is on global solutions to economic, social and environmental sustainability, including improved equity, but without additional climate initiatives.
- 2 CMIP3 a framework and the analog of the Atmospheric Model Intercomparison Project (AMIP) for global coupled ocean-atmosphere general circulation models (GCMs). CMIP has received model output from the pre-industrial climate simulations (“control runs”) and 1% per year increasing-CO2 simulations of about 30 coupled GCMs. More recent phases of the project include more realistic scenarios of climate forcing for both historical, paleoclimate and future scenarios.
- 3 *EU (Netherlands, UK, Germany, Belgium and Italy), USA, EAC (Uganda, Tanzania and Rwanda) and COMESA (DRC, Egypt and South Sudan)*
- 4 *These products include: horticulture, tea, clothing and apparel, coffee (unroasted) and tobacco*
- 5 Strategic industries identified in the EAC are agro-processing; energy and bio-fuels; petro-chemicals; pharmaceuticals; fertilisers and agrochemicals; iron ore and other mineral processing
- 6 Beer & wine processing, textile & animal feed production, crisps and chips
- 7 KALRO Nairobi
- 8 Banana orchard management manual, guidelines for rehabilitating an old banana orchard in Meru
- 9 It is a tax on the movement of agricultural produce raised by county governments in Kenya
- 10 These media houses exist but they are more concerned with profits. Their area of coverage is expansive and different wards/regions have different information needs. Their attempt to address these different needs in same platform erodes the utmost local specificity.



Agro-industrial Development Policies: What Nexus to Climate, Food Security, and Trade?

How can agro-processing development in Kenya become more climate-aware, trade-driven and food security-enhancing? This study explores this question and provides policy options for coherently harnessing the full potential of Kenya's still nascent agro-industry despite climate change.

In an ideal scenario, trade policies should ensure the availability of inputs despite climate change, markets for the processed products and access to cleaner technologies; while climate change policies support this effort through targeted adaptation and mitigation initiatives. The role of international trade and climate negotiations in framing the policy space for such policies should not be overlooked.

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