FINAL REPORT

HOW NATIONAL PUBLIC POLICIES ENCOURAGE OR IMPEDE AGRIBUSINESS INNOVATION: CASES OF MAIZE, TOMATO AND DAIRY IN KENYA

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A component of the World Bank Institute and the Governments of Denmark and Ireland study on How National Public Policies Encourage or Impede Agribusiness Innovations

May 2008

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Acknowledgements

We thank the World Bank Institute especially Mr. Kurt Larsen and Mr. Ron Kim for entrusting us with this assignment and for their administrative and technical support throughout the assignment. We thank Dr. John Lynam and other colleagues for their insights and thoughts on draft report during the Addis meeting. We appreciate the interest and engagement of representatives of the agribusiness firms in maize, tomato and dairy sub-sectors, persons in-charge of key NGOs and public policy agencies for their reflections. We also recognise the support given by the World Bank Kenya Country office, especially Ms. Esther Kang'ethe, farmers organizations and individual farmers.

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List of Acronyms

- AAK Agro-chemicals Association of Kenya
- ABS-TCM American Breeders Society Total Cattle Management
- AFC: Agricultural Finance Corporation
- AGMAK Agricultural Marketing Association of Kenya
- AI: Artificial Insemination
- ASK Agricultural Society of Kenya
- BMC: Bayer Medium Cereals (BMC)
- BTC Bayer tomato club (BTC).
- CAIS, Central Artificial Insemination Station
- CGD Centre for Good Governance
- DVS Department of Veterinary system
- EAGC Eastern Africa Grain Council
- EMCA: Environmental Management and Conservation
- EMS: Express Mail Service
- ESADA East and Southern Africa Dairy Association
- ESR-WEC: Economic Recovery Strategy for Wealth and Employment Creation
- EU: European Union
- GDP: Gross Domestic Product
- HCDA: The Horticultural Crops Development Authority
- ICTs -- Information Communication Technologies
- ILRI International Livestock Research Institute
- IPM Integrated Pest Management (IPM). “
- JKUAT Jomo Kenyatta University of Agriculture and Technology
- KAM Kenya Association of \Manufacturers
- KARI: Kenya Agricultural Research Institute
- KBA Kenya Banking Association
- KCC: Kenya Co-operative Creameries
- KDB: Kenya Dairy Board (KDB)
- KEBS Kenya Bureau of Standards
- KEPHIS Kenya Plants Health Inspectorate Services
- KIOF Kenya Institute of Organic Farming
- KUSCO Kenya Union of Societies and Co-operatives Organization
- MoTI Ministry of Trade in the Ministry of Trade and Industry
- NALEP National Agriculture and Livestock Extension Programme
- NCPB: National Cereals and Produce Board (NCPB)
- NEMA National Environmental Management Authority
- NGOs Non-Governmental Government
- SAPs: Structural Adjustment Programmes
- SRA: Strategy for Revitalizing Agriculture
- STAK Seed Traders Association of Kenya
- UHT: Ultra Heat Treated
- WTO: World Trade Organization

Executive Summary

Policies can encourage or impede agribusiness innovation. This is explained by case studies of maize, tomato and dairy sub-sectors in Kenya. Since the country's market liberalization in the early 1990s, there have been various innovative undertakings in raising and processing of the three enterprises that require more deepening and much spread. Maize and tomato farming has seen new inputs and production measures where new seed varieties, fertilizer blending and soil fertility analyses technologies, biopesticides, new production methods like plastic 'green' house have contributed to increased production. In processing there has been promotion of moisture meters, diversification into new products and proliferation of posho mills in the rural and urban areas. Marketing has witnessed intense outreach innovations like packaging into smaller sizes and branding that make goods acceptable to a wide range of people.

There have also been organizational innovations like farmer clustering, agro-dealers and stockists training, Information Communication Technology (ICT) usage, warehouse receipt system, service diversification and strategic planning. In the dairy sub-sector innovations have been seen at production and input levels with creation of milk collection centres, pelletising of animal feed and input packaging. Processing and marketing value addition innovations like coming up with new milk products, packaging of products and new packaging materials, batch numbering in the dairy cottage industry, market promotions have brought to the fore what knowledge and modernization can achieve. Organizational innovations include dairy cooperatives, contractual arrangements for inputs and service provision, for instance "the Artificial Insemination (AI) service provision Hubs", AI storage site change.

There have been innovations in financing the dairy sector and this is exemplified by contractual models of financial service delivery like the one between New KCC, Equity bank and the farmers with Kenya Diary Boards as guarantor. New banking products favourable to small-scale producers like Nafaka loan by Family Bank are some of the innovative ways of making agriculture grow. These also include simplified finance operational procedures, cheap security/collateral to financial credit and loan. The "village banks"—where K-rep Bank has moved from the traditional in-house banking operations to embrace outside local group working principles and youth and women fund by the Government of Kenya at low interest rates or no collateral are some of modernizations that revolutionize agriculture for increased production.

The main sources and drivers of innovation in Kenya include R&D within firms, customer feedbacks, market intelligence, trade shows and networks. The drivers are the search and arbitrage attributes of entrepreneurs, market demand of milk products, seeds, input and output prices, corporate social responsibility (CSR), value chain clustering that includes production, processing, bank contracts, markets, regulations, business and collective associations. However, output market remains as the main driver of innovations in the country. There is also the existence of interactions and linkages like company to company, public to private partnerships, company to intermediaries, company to farmers/ farmer organizations/ associations, company to knowledge organisations. In maize, partnerships were higher in company to company given the large number of input suppliers and millers; in tomatoes company intermediating agencies such as NGOs were highest owing to the self-regulating characteristics of the industry. In the dairy sub-sector, partnership is high in the company to farmer/farmer organizations/associations and banks because of the integrated value chain systems. However, there were weak interactions and linkages between universities/agricultural

research institutes and agribusiness firms. This is partly attributed to mistrust associated with different modes operation in the public and private sectors and weak apprenticeship programme which undermine sector-wide innovation capacity building.

Trade policies such as import, export and exchange rates are crucial for agribusiness to innovate. Policies on taxation like the zero rating of agricultural inputs, quality standards are good but bureaucracy is causing delays. Exchange rates fluctuations, the punitive local government cess are hurting the sector. Financial liberalization has enabled access to loans and credit but the cost of borrowing is still high. The need for harmonization of agricultural and related policies like land, water, input, extension research to increase productivity is imperative. There is also the need for market orientated extension policy. Public policies that need to be harmonized include the land, fertilizer and seed policies in order to enhance agricultural productivity. Other related policies that significantly influence agriculture and require reform include the ICT policy which is facilitating agribusiness through information on finance and markets like SMS and Mobile Money transfer channels. Despite the efforts to improve on infrastructure, the roads, railway and telecommunication and network is still poor resulting in market access --with poor returns.

In conclusion the study reveals the existence of several innovative ways within and across different value chains of the three enterprises, maize, tomato and dairy. The dairy and financial services sub-sectors have the highest number of innovative ways. The media platforms (especially mobile phones are facilitating access to finance and markets but these need more and much spread in the rural areas. The current policy drafts include innovation concept but are not well articulated in a systemic way. Within a government policy there are elements; policy documents, legal and institutional frameworks which support while others impede agribusiness innovation. The policy elements indirectly influence innovation through the operational environment of value chain actors and their attributes. The collective or business associations play an important role of coordinating linkages between policymakers and agribusiness firms. For this reason, there is need to pay attention to the direct influence of agencies which coordinate linkages of actors in the value chain of the three case studies and the entire agriculture sector. These include coordinating agencies in the government, private sector and the civil society organizations.

1. Introduction

Like in any other developing country, Kenyan Economy is largely agro-based. The agriculture sector accounts for 26% of the Gross Domestic Product (GDP) and 60% of the export earnings. The sector also employs more than 80% of the population directly and indirectly. The sector is small-holder dominated with 75% of the total agricultural output and 70% of the marketed agricultural output coming from the small holders.

Kenya's overall agricultural development has been guided by policy frameworks that have evolved over the import substitution era to the post liberalization era. While in the pre-liberalization (import substitution) period the economy was protected to enhance domestic industry growth, the sector was characterised by government involvement and controls that saw emergence and dominance by strong monopolies. The challenges of protected economy forced the government to embrace the Structural Adjustment Programmes (SAPs) in early 1980s. Although the SAPs implementation started as early as 1980s, in earnest government commitment to opening agriculture was witnessed in 1986 with the publishing of the Sessional Paper No. 4 of 1986 on *Economic Management for Renewed Growth*. This formed the pivot point besides putting forward the framework of liberalization of the economy. Gradual government divestiture from agricultural sector culminated into economic opening up by 1992 and Kenya was pronounced 'open' by World Bank in 1993. Following the opening up of the economy, the government published the Sessional Paper No. 1 of 1992 on Development and Employment in Kenya, which sought to improve economic management, accelerate national development, reduce poverty and increase food security.

The post liberalization policy documents that have had impact on agricultural development include the Poverty Reduction Strategy Paper (PRSP) of 2000, which formed the basis of Economic Recovery Strategy for Wealth and Employment Creation (ERS-WEC). The latter emphasised on the government commitment to reviving and revamping agriculture, sentiments echoed in the more specific Strategy for Revitalizing Agriculture (SRA). In the SRA, the government role in agriculture is clearly left as policy making. The SRA forms the overall agricultural development framework with sector specific policies and strategies being development within the framework locus.

1.1 Rationale and objectives of the study

The shift in Kenya's policy towards market liberalization has profoundly affected the environment for agricultural innovation along the value chain (World Bank 2006). Evidence from Schreiber, 2002, study shows that the innovations chosen by farmers depend on a combination of the natural, economic, and institutional components of this environment. However, the innovation system appears to be evolving not just at different speeds. The overall objective of this project was to assess the factors that influence innovation in agricultural sector in Kenya. The project is mainly focused in identifying and evaluating the main elements of public policies, and of institutional cultures within public organizations, which facilitate or impede innovation within the cereal, horticultural and livestock sub-sectors of agribusiness, and present the research findings in a written analytical report. Within each sub-sector one enterprise was chosen; cereals-maize, horticulture-tomatoes and livestock-dairy.

Study approach

1.2 Conceptual framework

Innovations in agricultural sectors can emanate from all the actors in the value chain. The actors/players operate in an environment which is influenced by policy put in place by the governance for efficient coordination. Policy framework constitutes the legal, institutional framework and the policy statements. Institutional framework is created within the policy framework and functions in regulating and coordinating the sector. The legal mandate and operations of the institutions for efficient execution of responsibilities is given by the legal framework which constitute the various government Acts of Laws and Legal Notices. While policy is intent, its execution is through the various action plans or strategic policy documents which describe the activities to be undertaken over a specified period of time.

The policy, institutional and legal frameworks all interact coherently or incoherently to influence the operational environment of the value chain actors of any agricultural sector. The operational environment defines the market towards which the actors work either to minimize costs or maximize return. This gives an incentive for market led innovative ventures. The environment is also characterized by knowledge led innovations. These come up to create new market niches especially if they are geared towards giving new products that did not previously exist in the market, for example, new seed varieties, etc. They can also be geared towards easing constraints in the production processes.

In this study, a review of various policies, institutions and legal frameworks that impact on the maize, tomato and dairy sectors are taken into consideration. Various policy elements that facilitate and impede innovations are highlighted. The study plausibly assumes that policy does not influence innovations directly but indirectly by influencing the operational environment through which the different agents of innovation come up with different ways of manoeuvring and sustaining their operations. The various characteristics of the operational environment (including political support, enforceable quality standards, stable regulatory framework, rich formal and informal institutional and organizational framework, information access, accessible input markets, competitive output markets, etc) are influenced by the different elements of policies. In turn the operational environment influences the response of the innovation agents (actors along the value chain and the institutions created within public policies including their roles, cultures and organizational structures). Further consideration is given to the various attributes of the agents of innovations which capacitate their innovative response. The attributes include: level of specialized knowledge, tools and skills, level of networking and linkages with other institutions, attitudes of actors and the institutions with which it interacts; and learning opportunities. Of particular importance is how these attributes interface to generate new ideas/ innovations.

Research methodology

The study used both literature review and personal interviews to collect the necessary information. The first stage involved interviews with key informants from the identified agribusiness firms along the value chains (viz. production, processing, marketing and service provision) of the target commodities (see Table 1).

Table 1: Value chain and innovation Systems

Enterprise	Production		Processing	Marketing	Services		Total
	Producers	Input suppliers	Processing	Buying & selling	Financing	Coordination	
Maize	2	4	3	1	1		11
Tomato	1	3	2	1	1		8
Dairy	2	3	3		2	1	11
Total	5	10	7	2	4	1	30

Source: Field data

The second stage involved cross checking this initial list of identified policies by interviewing at least three key representatives of NGOs, business associations, and applied research centers in each of sub-sector for their opinions on the innovation and policy issues. Thereafter, the results of the two sets of interviews were combined to assess the overall policy environment for influencing agribusiness innovation, and to identify policy improvements that would enhance the prospects for innovation. An analysis of available documentation pertaining to the final list of key policies was conducted. Such documents include the Strategy for Revitalising Agriculture (SRA), Vision 2030, Draft dairy bill 2007, Draft National Livestock Policy, Environmental Management and Conservation Act (EMCA) 1999, Draft Land Policy 2007, Draft Science, Technology and Innovation Policy 2008, Draft Food Security and Nutritional Policy 2007, Draft Sessional Paper No of 2006 on Dairy Industry Development.

The last stage involved interviewing government officials from each ministry or public agency with primary responsibility for the area covered by the selected policy. These interviews attempted to ascertain the extent to which the institutional culture of the agency supports or constrains innovation, and identify possible discrepancies between the written policy and public officials' verbal interpretation of it (i.e., "theory versus practice"). During this phase, insights were on the agency's organizational culture, its understanding of innovation processes, staff attitudes towards innovation, and its existing capacity to support innovation within the country. An analytical framework was developed to help conceptualize the ideas and guide the whole process.

1.3 Organization of report

The report is organized in six main sections. Section 1 introduces the study policy context, rationale, objectives and study approach (viz. research methodology and conceptual framework). This is followed by an overview of the three sub-sectors, maize, tomato and dairy in Section 2. Section 3 discusses the innovations observed in the value chains of the three sub-sectors. The section also highlights sources and drivers of the observed innovations. The interactions and linkages and their mechanisms within the sub-sectors are discussed in Section 4. The section also highlights the key ccollective or business associations which coordinate linkages between policymakers and agribusiness firms. The influence of national public policies on agribusiness innovation is discussed in Section 5. Section 6 concludes the report.

2. Overview of sub-sectors

2.1 Maize

Maize is a major staple food crop in Kenya that originated from Central America and was introduced here by the Portuguese in 16th and 17th century (Miracle 1966). It is taken to be synonymous to food security since about 90% of Kenya s population depends on it as an income-generating commodity (Nyangito & Nyameino et al 2002). Maize is both a subsistence and commercial crop, grown on an estimated 1.4 million hectares by large scale farmers and smallholders which is more than 30% of arable land. More than two thirds of the maize produced comes from small scale producers (approximately 3.5million) producing on farms less than two hectares in size. The other portion is produced by approximately 1000 large-scale farmers who own large tracts of land mainly in Trans-Nzoia and Uasin Gishu districts of the Rift Valley. (Kenya Maize Handbook).

Maize is produced in almost all parts of the country for home consumption while the surplus is marketed to meet the household cash needs. The average production for the last 5 years is 2.4 million tons for a population of 31 million people. It constitutes 3% of Gross Domestic Product (GDP). According to the Ministry of Agriculture (MOA), National Cereals and Produce Board (NCPB) and other sources, maize consumption in the country is currently estimated at around 30 million bags per year (See Table 2). Most of the produce is retained for their own consumption.

Table 2 Table 1: Maize production and consumption

Season	Production (Bags)	Production (MT)	Consumption (Bags)	Consumption (MT)	Surplus/ Deficit (Bags)	Surplus/ Deficit (MT)
1997/98	24,416,566	2,197,491	26,845,444	2,506,872	-2,428,878	-309,381
1998/99	27,378,898	2,464,101	27,382,352	2,556,195	-3,454	-92,095
1999/2000	25,176,814	2,265,913	27,930,000	2,610,261	-2,753,186	-344,348
2000/2001	24,830,640	2,234,758	28,488,600	2,656,856	-3,657,960	-422,098
2001/2002	30,843,621	2,775,926	29,058,372	2,708,193	1,785,249	67,733

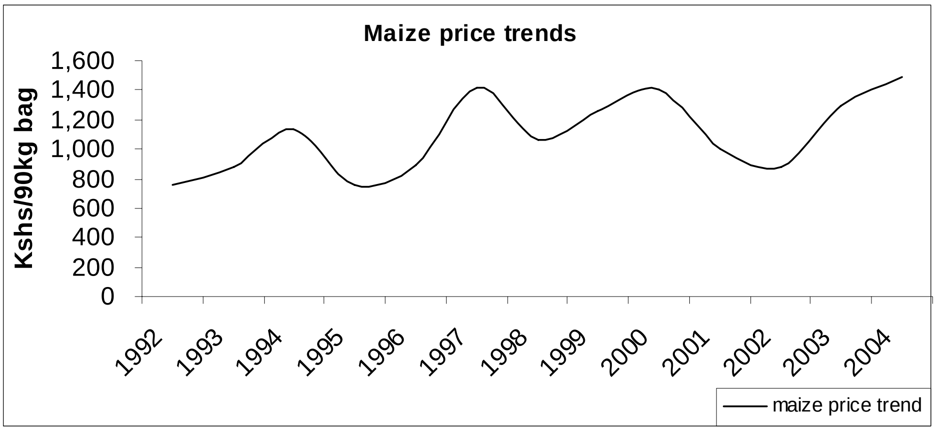
Source: Nyameino et al., 2003

Maize production is usually characterised by high costs of inputs and low yields. On average the production cost amounts to Kshs 11,774/ha and yield rate to 1,334 Kg/ha. Agricultural inputs, primarily seed, fertilizer and agrochemicals, have an enormous potential to leverage the efforts of farmers. Used appropriately, they can mean the difference between a good harvest and starvation. The most obvious result of improved inputs such as a new fertilizer or disease-resistant seed variety is dramatic increase in production and a greater profit.

The review of maize-related policies shows that it is critical that Kenya increases in maize production and in order to do so, farmers ought to increase yields on existing maize areas. Improved technologies, improved varieties, increased fertilizer use and application of new management are needed through improved policy elements.

Liberalization of maize market was realized in December 1993. This was implemented to phase out the monopoly in maize market that was controlled by National Cereals and Produce Board (NCPB) and subsequently reduce milling costs. NCPB previously controlled the marketing and physical movement of maize in Kenya. It was legally empowered to purchase strategic grain reserves and famine relief stocks which often led to distorted market prices for farmers. Farmers were only able to sell their maize by prices recommended by NCPB and this was usually low. This kind of involvement undermined efficiency in production and market development. It also induced uncertainty and curtailed development of maize and its entire value chain of production, processing and marketing. The partial opening of the maize sub-sector has continued experience output price fluctuations (see Figure 1).

Figure 1: Maize price trends



Source: Ministry of Agriculture, 2005

Under the liberalized market regime, there are many different ways in which maize reaches the consumer. These "marketing channels" vary depending on location. The main actors along the maize value chain include: small-scale maize traders (15%), medium agents/lorry traders (40%) NCPB (25%) and other large scale maize traders (40%) and maize millers (10%) (Nyameino et al., 2003*).*

Milling is the main component in value adding to maize, the main staple diet for most Kenyans. There are two types of millers serving the maize sector (see Table 3). These are the hammer/posho miller and sifted maize miller. Maize milling industry is divided into three categories namely: (i) Large scale sifted maize millers; (ii) Small scale granulated maize millers and (iii) Hammer/posho millers (whole meal maize millers).

Table 3 Key innovations by millers

Characteristics	**Large scale sifted maize miller**	**Small-scale granulated maize miller**	**Hammer/posho Miller**
Capacity(tons/month)	900 – 10,800	270 – 1,800	<100
No. of Employees	.>20	4 -10	3 - 5
Main products	Sifted maize meal	Partially de-germed maize meal	Whole meal
Extraction Rate	74 -84%	65 -70%	99%
By products	Germ, bran & waste	Mixed germ	None
Source of Maize	Framers, Private, traders, NCPB, Imports	Farmers, Private traders	Service providers
Shelf-life of Products	2 years	1 -2 years	2 -5 months
Mills For	Urban consumers	Institutions and traders	Individuals and institutions
Type of Mill Technology	Roller	Huller	Hammer

Source: Nyameino et al., 2003

Large scale sifted maize millers include Unga Ltd, Mombasa Maize Millers, Pembe Flour Mills, United Millers Ltd, Kenya Milling Co. Ltd located in Eldoret, Kitui millers, TSS, Premier, Swan and Kabansora. Although it was not possible to establish their exact number, posho mills play an important function in the maize chain with every market centre having more than one. Simba Posho Mills, located in Eldoret, is the main granulated maize millers in the area and plays a pivotal role in the maize chain. The actors and roles of the players in the maize sub-sector are illustrated below (see Table 4).

Table 4: Actors in the Maize industry and their roles

Organization	**Type of organization**	**Role**
Farmers and farmer groups	Private	Maize production
Pest Control and Produce Board	Government	Quality assurance and registration
Kenya Plant Health Inspectorate Services (KEPHIS)	Government	Seed quality Assurance
Kenya Agricultural Research Institute (KARI)	Research	Relevant research
Ministry of Agriculture	Government	Policy making
Agrochemicals Association of Kenya (AAK)	Business Association	Lobbying policy issues
Agro dealers /stockists	Private	Input supply
Maize millers	Private	Add value to through milling
Supermarkets	Private	Retail outlets
ACDI-VOCA	NGO	Coordination of maize production and market linkages
KEBS (Kenya Bureau of Standards)	Government	Regulating quality standards
National Cereal and Produce Board	Government Parastatal	Promotion of development of the industry, disseminating information on marketing.
Kenya Millers Association (KMA)	Business Association	Lobbying policy issues
Cereal Grain Growers (CGA)	Collective Association	Lobbying policy issues
East African Grain Council (EAGA)	Collective Association	Promoting regional trade

Source: Authors Compilation, 2007

2.2Tomato

Tomato is a popular vegetable extensively grown in Kenya for the fresh market. It is nutritious and provides good quantities of vitamins A and C. In Kenya national food basket, the weight attributed to tomato is 2.95, 2.30 and 2.75 for the low income, medium income and other urban households' (GoK 2002). The crop also has potential for creating rural employment and as Minot and Roy (2007) aver, compared to maize, tomato production requires 122 days of labour per hectare. Maize on the other hand require only 29 days per hectare. Tomato is believed to have originated in Central America. Like the other horticultural crops, it was introduced in Kenya by the early European settlers in the 1900s. The crop can grow in different agro-ecological zones either under irrigation or rain-fed. Tomato is an important enterprise for the low income household for income generation (Minot and Ngigi, 2003). The value of tomato produced in Kenya in 2007 was Ksh 14 billion with Nyanza, Rift Valley and Central Provinces contributing about 80 per cent as table 5 below shows.

Table 5: Trend of tomato production in Kenya in the last three years

Province	Area (ha)			Production (MT)			Value (Ksh. 000)		
	2005	2006	2007	2005	2006	2007	2005	2006	2007
Coast	864	1,096	902	25,920	32,880	27,060	648,000	822,000	676,500
East	1,968	1,532	1,205	59,040	45,960	36,150	1,476,000	1,149,000	903,750
Central	4,362	3,700	3,477	130,860	111,000	104,310	3,271,500	2,775,000	2,607,750
Nyanza	6,132	7,074	6,495	122,640	141,480	194,850	3,066,000	3,537,500	4,871,250
Western	1,803	1,179	1,213	36,060	23,580	36,390	901,500	589,500	909,750
R. Valley	5,012	4,509	5,159	150,360	135,270	154,770	3,759,000	3,381,750	3,869,250
Nairobi	62	68	125	1,860	2,040	3,750	46,500	51,000	93,750
N Eastern	540	384	350	16,200	11,520	10,500	405,000	288,000	262,500
Total	20,743	19,542	18,926	542,940	503,730	567,780	13,573,500	12,593,250	14,194,500

Source: Horticulture Division, Ministryof Agriculture

Though the area under production of tomato has been decreasing in the last three years as the table shows, overall production has been increasing. Between 2005 and 2007, the area under tomato reduced from 20,743 ha to 18,926 ha, a 9 % reduction. During the same period, the total volume produced increased by about 5 % from 542,940 MT to 567,573 MT. The increase in production is attributed to the extensive adoption of high yielding varieties and other modern technologies by farmers. Previously the national average yield of tomatoes was estimated to be only 16.7 MT/Ha (Muendo, Tschirley and Weber, 2004) compared to yields of up to 60Mt/Ha which have been recorded in recent times.

Seed providers are important actors along the tomato value chain. While some only import seed for distribution and marketing locally, others are also involved in research and development of new varieties. However, research often is out of sync with the market. Kimani (2000) identifies a case where tomato breeders carrying out varietal trials only screened a few attributes such as yield while farmers' selection criteria for tomatoes included about 16 attributes. These include, in ranked order, seed purity, disease tolerance, pest tolerance, yield, marketability, labour costs, harvesting period, drought tolerance, storability, fruit shape, fruit size, taste and colour. Some of the most successful seed providers are now carrying out market based research. Table 6 shows the major tomato growing areas in Kenya.

Table 6: Major tomato growing areas in Kenya

Production Area	Altitude	Type of production	Major Market
Embu, Meru, Nyeri Muran'ga, Kirinyaga	800 – 2500 meters	1200 – 2500 mm Rain-fed	Domestic
Kisii, South Nyanza	1100 – 2200 meters	1200 – 2100 mm Rain-fed 700 – 1800 mm Irrigated	Domestic
Busia, Siaya, Kakamega, Bungoma, Kisumu	110 – 1500 meters 1200 – 2000 meters	700 – 1800 mm Irrigated 1100 – 2000 mm Rain-fed	Domestic
Trans Nzoia	1600 – 2200 meters	900 – 1400 mm Rain-fed and Irrigated	Domestic
Kilifi, Kwale	0 – 500 meters	400 – 1400 mm Rain-fed	Domestic
Taita, Taveta	600 – 1000 meters	400 – 600 mm Irrigated	Domestic
Oloitoktok	200 – 1800 meters	600 – 800 mm Irrigated	Domestic
Garissa	200 – 300 meter	250 – 500 mm Irrigated	Domestic

Source: EPC

Tomato is mainly produced under irrigation agriculture by small scale producers. It is estimated that about 30 per cent of households grow the crop for domestic consumption or for cash (Minot & Ngigi, 2003) throughout the country. Cases of farmers growing tomatoes on contract also exist. An emerging production system involved the use of plastic "green" house for production. It is estimated that 70 per cent of the household tomato production is sold in the domestic market (Muendo, Tschirley and Weber, 2004). The product is mainly marketed in the fresh market to processors and consumers. The main market channels include:

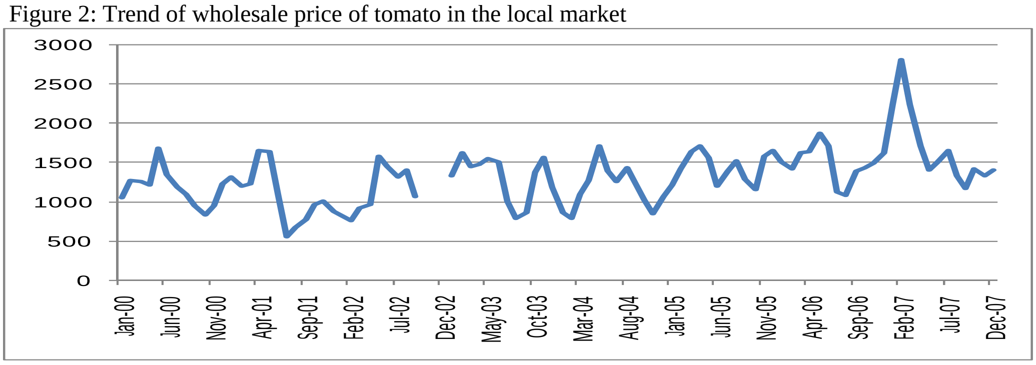
1. Producer – Broker – Wholesaler – Retailer – Consumer
2. Producer – Agro-Processor
3. Producer – Middleman – Agro-Processor

Wholesale markets are located in the major towns and cities of the country including Nairobi, Mombasa, Kisumu, Nakuru, Eldoret, and Kitale among others. Although produced in nearly all the regions of the country, major sources include Kirinyaga district (Mwea area), Meru central district (Mitunguu area and Isiolo region), Nyeri District, Nakuru district (Bahati and Kabazi region) and Taita Taveta District.

Retailers particularly supermarkets have segmented the tomato market such that different products are sold in different markets. The high quality green house produced tomatoes are retailed in the up market outlets at a premium, about Ksh 60 per kg compared to the price in other outlets, about Ksh 40 per kg. Nevertheless, to ensure value for consumers, the supermarkets regularly test their products for chemical residue levels.

In the last eight years, the average wholesale price of a 64 kg crate of tomato averaged Ksh 1,300. However, the highest recorded average wholesale price was Ksh 2,800 in February 2007 (figure 2). This coincides with the period when there were processors and supermarkets started intensifying efforts to from relationships with farmers to manage their raw material supplies.

Figure 2: Trend of wholesale price of tomato in the local market



Source: Market Research and Information, Ministry of Agriculture

Tomato processing in Kenya is carried out by both large industries and small enterprises. Farmers have also in the recent past increased value addition of tomato by processing. Tomato processing industries fall in two main categories of the International Standard of Industrial Code – ISIC 3113. Canning and preserving of fruits and vegetable and ISIC 3114 caning, preserving and processing of fish and vegetable. Currently there are less than twenty large scale processors of tomatoes. Over 30 enterprises are engaged in tomato processing. Njoroge (2004) noted that together with the numerous informal operators, “Jua Kali”, the level of competition in the sub-sector is high. The large tomato processors identify high cost of raw materials, seasonality of production and competition from cheaper imports as the main constraints. The processed products are mainly marketed locally though the large producers also export a substantial amount in the COMESA region. The main actors in the tomato industry are summarized in Table 7.

Table 7: Actors in the tomato industry and their roles

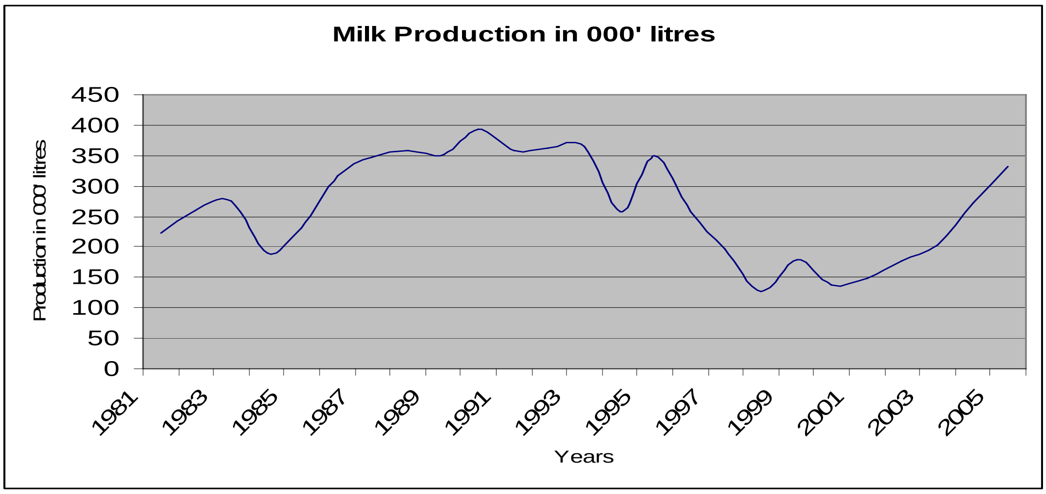
Organization	Type of organization	Role
Farmers and farmer groups (e.g. Kyevaluki Self Help Group)	Private	Tomato production and some processing
Pest Control and Produce Board	Government	Quality assurance and registration
Kenya Plant Health Inspectorate Services	Government	Quality Assurance
KARI (Kenya Agricultural Research Institute)	Research	Relevant Research
Ministry of Agriculture	Government	Policy making
Agrochemicals Association of Kenya	Business Association	Lobbying policy issues
Agro dealers (e.g. seed and agrochemical suppliers)	Private	Input supply
Processors (e.g. Trufoods, Premier foods)	Private	Add value to tomato through processing
Supermarkets (e.g. Uchumi, Nakumatt)	Private	Retail outlets
Kenya Organic Agriculture Network	NGO	Coordination of organic tomato production and market linkages
KEBS (Kenya Bureau of Standards)	Government	Regulating quality standards
Horticultural Crop Development Authority (HCDA)	Government Parastatal	Regulation of industry, promotion of development of the industry, disseminating information on marketing.

Source: Authors Compilation, 2007

2.3 Dairy

The dairy cattle farming in Kenya is a dynamic enterprise with a mean animal milk production growth rate of 4.1% and accounting for about 3.5% of the GDP. Smallholder dairy production accounts for over 70% of the total milk production and supports more than 600,000 smallholder dairy farmers. The total milk production in 2005 was about 3.2 billion litres, but there is potential for even higher production in subsequent years. The country is broadly self-sufficient in milk and milk products, with an annual consumption of about 1.92 billion litres. The overall supply outstrips the demand since consumption is estimated at 72 litres per capita per month against a production of 82 litres per capita per month (Karanja 2003). The production trend of milk is shown in figure 3.

Figure 3 Milk Production trend in Kenya



Source: CBS (various Economic Surveys)

The fluctuation in the late 1990 was as a result of collapse of the monopolistic KCC. However recent evidence indicates that milk production is increasing owing to implementation of ERS-WEC, SRA and the reforms being undertaken in the industry.

Milk consumption is partly dependent upon the level of household incomes and, therefore, Kenya's growing economy will affect the overall effective demand for milk. Of the total dairy cattle milk production, about 55% is marketed through traders, cooperatives, hotels and shops. An estimated 84% of the total milk production is sold in the raw form, while 16% is processed. According to Karanja, 2003 dairy producer prices have been declining while the consumer prices have been increasing. This exhibits distortion in the market which indicates that there is exploitation of the producers and consumers by the middle chain players. This is the reason why following liberalization, several players have come in to the industry and there has also been witnessed some degree of vertical integration especially with cooperatives engaging in activities higher up the value chain.

Prior to liberalization in 1992, the Dairy Industry was guided by protectionist policies since independence. Earlier before independence, the Dairy Industry Act was enacted in 1958, which saw the establishment of the Kenya Dairy Board (KDB) to regulate the dairy industry. The Kenya Cooperative Creameries (KCC) had been formed in 1925 and its main focus was on processing and marketing. With the act, KCC established its monopoly in the collection, processing and marketing of milk. These bodies (KDB and KCC) were heavily subsidised and, particularly following independence, were seen as central to encouraging a transformation of ownership, control and production systems in the core farming areas of the Kenyan highlands. Following independence, land adjudication and subdivision saw the emergence of a strong small-scale dairy industry against the large-scale. The growing economy and the inability of the dominant small-scale dairy industry to access markets and lack of alternative markets became a matter of political and policy concern. This was seen as lack of access to KCC (Ngigi 2005). Strong political support, together with a commitment to the smallholder sector, meant that for three decades a commercial smallholder dairy focus was at the centre of Kenya's agricultural policy. The government supported the expansion of the dairy sector through provision of highly subsidised services to the sector. The growth of economy posed challenges which necessitated the review of the roles of KDB and the encouragement of the private sector participation in the industry, and by early 1980s the implementation of Structural Adjustment Programs which sought to liberalize the markets were initiated. The pace of implementation was gradual and until 1992, the dairy sector had not been full liberalized.

Following the Dairy Development Master Plan of 1991, the liberalization of the dairy industry in 1992 saw the end of KCC monopoly in the dairy processing and marketing, new institutional arrangements in milk collection, processing and marketing have emerged (Karanja, 2003). This has seen more involvement of the private sector and government divestiture from service provision. Since liberalization the dairy industry has experienced entry of new players as exhibited in table 8.

Table 8: Table Licensees 2002 -2006

	2002	2003	2004	2005	2006
Processors	31	27	23	19	25
Mini Dairies	109	84	76	62	65
Cottage industries	42	56	47	62	50
Cooling plants[1]	0	0	3	16	19
Milk bars	177	841	650	818	987
Producers[2]	111	350	325	485	609
Total	**470**	**1358**	**1124**	**1462**	**1755**
1- Licence introduced in 2004 2- Licensed to sell milk directly to consumers					

Source: Karanja, 2003

The different institutional organizations and their roles which have emerged following liberalization are shown in table 9. Kenya Dairy Board has been strengthened to undertake regulatory and market promotion roles in the sector. Several collective associations such as ESADA have come into place to enhance regional coordination of the sector.

Table 9 Table: Players in the dairy industry and their roles

Organization	**Type of organization**	**Role**
KDB (Kenya Dairy Board)	Government	Regulation of quality standards, Dairy market promotion
ESADA (East and Southern Africa Dairy Association)	Collective association	Forum for discussing regional issues
KAM (Kenya Association of Manufacturers)	Collective association	Resolving disputes in processing
AKEFEMA (Association of Kenya Feeds Manufacturers)	Collective association	Regulatory
KARI (Kenya Agricultural Research Institute)	Research	Relevant Research
Ministry of Livestock and Fisheries Development	Government	Policy making
Ministry of Cooperatives	Government	Promote cooperative movement
CAIS (Central Artificial Insemination Services)	Government	Provide AI services, Maintain Germplasm
DVS (Department of Veterinary system)	Government	Regulate AI services
ILRI (International Livestock Research Institute)	Research	Relevant research
Private Banks	Private	Provide working/financial capital
KEBS (Kenya Bureau of Standards)	Government	Regulating quality standards
Private companies (e.g. World Sires, ABS-TCM)	Private	Provide services e.g. AI, Veterinary services
Farmer cooperatives (e.g. Undugu Dairies)	Farmers	Production, Bulking of milk, and to some processing
Milk Processors	Private	Milk processing and value addition

Source: Authors Compilation, 2007

In line with the recommendations outlined in the Sessional Paper No. 1 of 1986 on *Economic Management for Renewed Growth* services such as Artificial Insemination (AI), veterinary clinical services and tick control (dipping) were liberalized in 1991. The removal of the government supported services led to the decline in the performance of the dairy industry as the majority of the farmers could not afford to pay for the more expensive AI, dipping and clinical services. Indeed many of the farmers reverted to the use of bulls for breeding purposes leading to a decline in milk productivity. The challenges that arose due to liberalization saw the formulation of the Dairy Development policy in 1993. The issues addressed by this policy included a smooth exit of government from the provision of some of the government supported services, intensification of dairy production systems, increasing production in non-traditional areas and opening up milk processing to new investors. The divestiture of the government, though untimely, allowed the private enterprise to competitively participate in service delivery. Since then there has been entry of new players in the sector at all levels of the value chain. The policy changes that have taken place have addressed strengthening of the KDB to perform its regulatory functions effectively. There have been efforts to revive KCC, now the New KCC following its collapse in early 1990s.

The current Dairy Policy draft addresses the current challenges of the dairy industry and the crosscutting issues (Environmental, Land, Water, Youth and Gender and HIV/AIDS) which were inadequately addressed in the Dairy Development Policy of 1993. In particular it addresses the provision of support services, supply of inputs including breeding, veterinary, clinical and credit services. Besides, the new policy recognizes the role of goats and camels and other milk producing animals, especially in the Arid and Semi-arid lands (ASALs) and further examines how the product chain can best meet consumer needs at affordable prices while ensuring acceptable returns to the industry players. In line with the development framework envisaged in the Economic Recovery Strategy for Wealth and Employment Creation (ERS-WEC), Strategy for Revitalizing Agriculture (SRA) and the Draft Vision 2030, the new dairy policy reflects on the dynamism in the dairy industry and bears out the interventions the government, together with stakeholders, will make in the entire dairy value chain. These interventions will cover dairy research, milk production, extension, marketing of milk and milk products, milk processing, milk consumption, human resource development and training, financial services, institutional, legal and regulatory issues.

3. Innovations

Innovation here refers to the application of techniques, processes or organizational forms in the search for improved profits and incomes and results in enhanced productivity of the firm or system. This section discusses the innovation at the various levels of the value chains for each sub-sector, maize, tomato and dairy.

3.1 Maize

Improved inputs

The high costs of improved inputs and low yields characterise maize production in Kenya. The average cost of production of maize is over Kshs 11,774/ha whereas the yield rates remain at 1,334 kg/ha. The price of agricultural inputs especially fertiliser, agro-chemicals and seed have more than doubled since 2007 --thus becoming a major constraint to smallholder farmers. Yet, access and appropriate use of improved inputs will make a significant yield difference to farmers.

Based on interviews with key input suppliers (viz. Kenya Seed Company, Pannar, Bayer, and Farmchem), improving input supply is more than new seeds and fertilizer. It is also about innovative ways to incorporate input supply into the value chain and make the chain itself more competitive. For instance, a value chain approach to improving access to inputs could identify input suppliers who have access to small-scale farmers and create a certification system that turns an input supply (viz seed, fertilisers, agro-chemicals) depot into an agricultural information hub.

Seeds

Seeds are a critical input into agriculture and recognised as placing the upper limit to productivity gains. Given the significance of seed production and the need to maintain a reliable supply of good quality seed and ensure its wide-wide distribution, many governments have historically tended to retain it within the public sector. In Kenya, seed production has until very recently been the province of the parastatal, Kenya Seed Company (KSC). It had also exclusive rights to the multiplication and production of varieties bred by the Kenya Agricultural Research Institute (KARI). KSC initiated its own breeding programmes principally in hybrid maize. As a part of wider economic reform in the early 1990s, the seed sector underwent a significant policy changes and was opened up for increased private sector entry. This also led to the establishment of the Kenya Plant Health Inspectorate Service (KEPHIS) in 1996 as an autonomous regulatory body to regulate the seed markets and enforce the Seed and Plant Varieties Act.

Over years a number of foreign companies (e.g. Pannar from South Africa and Seed Co from Zimbabwe) have entered Kenya. The key companies operating include Western Seed Company, Lagrotech, Pioneer, Pannar, Faida Seeds, Freshco, Monsanto, and Seed Co among others. The main crop of the seed market is (hybrid) maize. The new maize varieties developed and released are high yielding, disease resistant and weather resilient. These varieties can be grown in different agro-ecological zones through East Africa. Kenya was one of the first countries in sub-Saharan Africa to adopt hybrid maize

It is estimated that 45% and 54% of the annual total seed market of 30 million Kg is commercial maize seed with only a limited amount of open-pollinated maize varieties. Hence, a sizeable share of the market is catered through “informal” sources. Even upon opening of the seed market, KSC continues to retain its dominating position and accounts for 86% of maize seed market. This has led the private seed companies through their business association Seed Traders Association of Kenya (STAK) to lobby for a more facilitative Seed Policy.

Fertiliser

Although many smallholder farmers are increasingly fertilizer, there is need to increase the level of use of fertilizers and ensure that smallholder farmers understand how to use fertilizer in efficient and environmentally sound ways. This calls for integrated approach to soil fertility management that takes into account local soil and water resources and considers how organic matter, fertilizers, farmer cropping systems, and farmer knowledge can work in concert to restore soil fertility. Access to fertilizer is, however, equally difficult for Africa’s small-scale farmers. Its cost of has skyrocketed. For instance, the fertilizer DAP has soared from about $216 per ton on the global market in 2007 to about $680 per ton today. It is this context that MEA informed of having recently introduced the latest and largest blending facility and an ultra modern soil and fertilizer testing lab in the East African region.

Agro-chemicals

The introduction of biopesticides by all the agro-chemical companies that we interviewed was in response to food safety and environmental concerns. It is also a part of their market strategy. For instance, Bayer East Africa’s Green World flagship focuses on the local stockists as the link between the company and farmers. There are 4,500 stockists in Kenya that are linked to about 60 agro-dealers. While the relationship between Bayer and agro-dealers is clear, the situation is different for stockists. Based on Bayer’s assessment, stockists seem to only sell different products without understanding the needs of farmers. Thus, there is need to build their capacity for better service delivery to smallholder farmers. The Bayer's initiative is to build capacity of stockists by matching needs and best practices, recommend regime for spraying that support sustainable agriculture and providing green bins to stockists to collect waste. This initiative was motivated by the following concerns:

- Adulterated products;
- Inadequate environmental safety; and
- Absence of linking associations between product packaging and needs of smallholder farmers (packaging rationale).

Based on the interview with ACDI-VOCA (see Box 1), linking small farmers to input suppliers is mutually beneficial in the sense that the small-scale producer gains access to improved inputs, and the input supplier enjoys greater business through a new role. For instanced, input suppliers could further increase sales by holding farmer field days in which they demonstrate the appropriate use and storage of improved seeds and farm inputs. Buyers can also actively facilitate the availability of desirable inputs. In many cases, intermediaries in the value chain, such as processors or wholesale brokers, provide inputs on credit, with repayment due upon sale of the agricultural products. Value chain performance will seriously deteriorate if good seeds are used but fertilizer is under-utilized, or if a fungus ruins the crop before it is harvested. Thus a full set of inputs with the associated services are necessary to ensure optimal results.

Box 1: Coordinating role of ACDI-VOCA

Input Supply in Kenya: Ensuring Farmers Access the Right Inputs in the Right Amounts

Maize prices in Kenya are among the highest in sub-Saharan Africa –the poorest quarter of the population spends 28 percent of its income on the crop. Inefficient production and marketing in the maize sub-sector contribute to economic stagnation and poverty. ACDI/VOCA's Kenya Maize Development Program (KMDP) is committed to ensuring that maize farmers use the seeds and the fertilizers that will increase production and offset these difficulties.

One method the project has employed is producing improved fertilizer varieties that balance the soil acidity and fit with the existing production practices. Through use demonstration plots, farmers can see the results firsthand. KMDP has also implemented a program to ensure not just that the right input varieties are available but that they available in the right amounts.

In Kenya, fertilizer is usually sold in 50-kg bags. Even one is far too expensive for a smallholder farmer, not to mention, far more than a small farm would require.

KMDP began breaking the larger bags into smaller ones that were cheaper and appropriately sized for smallholder farmers. This effort, the first to target smallholders as a consumer market, has been expanded dramatically.

With a proof that smallholder farmers can pay for inputs in these smaller sizes, local shops have begun to adopt the practice, greatly increasing the number of farmers who can now access improved inputs at reasonable prices.

Source: ACDI/VOCA Website

Processing: Many respondent firms used the available machinery to solve particular post-harvest processing problems and flour milling. Introduction and promotion of moisture metre by Cimbria East Africa was part of its Corporate Social Responsibility (CSR) aimed to solve the high moisture content and reduce post-harvest losses in grains. The company distributes post-harvest grain storage and processing equipment. Other observed innovations are:

- Although 20 large maize millers in Kenya are required by the Kenya Bureau of Standards (KEBS) to process and sell maize meal (*ugali*) as it is, some firms are trying to diversify into breakfast cereal and porridge which includes both maize and wheat. For instance, Pembe Flour Mills Ltd is trying to diversify into high value products for targeted clients but is constrained b poor quality of maize grain due to mycotoxins.
- Corn Products Ltd is also using hydrolysis of starch to produce many value added products –including new laundry and cosmetic products.
- New forms of organizing activities through contract transport and use of road tankers to facilitate bulk transport and reduce costs.
- Due to the requirement to process maize meal (ugali) as it is, many large milling firms have focused on the efficiency in milling and product delivery. At the same time, small millers are enriching the nutritive value of the maize flour. However, their main obstacle is limited access to appropriate technology and markets to achieve scale.

Marketing:
Many firms that we interviewed have adopted new ways of doing business. This has been done in response to existing market opportunities and threats in the operating environment of the agribusiness firms. For instance, Kenya Seed Company resorted to clustering farmers in seed production to overcome the problem of land-sub-division which reduces the isolation distances between fields. The required isolation for production of maize seed is 200 m. Also, many of the firms we interviewed had established extensive distribution networks by closely working with agro-dealers and stockists. This improved education and business knowledge and skills of agro-dealers and stockists. It also improved our professional and marketing edge. It means that their customers are assured of good quality product and timely service.

The agrochemical firms that had introduced biopesticides in business activities changed from conventional ways of using agro-chemicals to integration of Integrated Pest Management (IPM). "This has forced our company to change how we operate in terms of product positioning and market orientation" said one respondent. Other observed changes include:

- Use of ICTs --on-line links to markets for efficiency: ICT is an important component of all the agribusiness firms interviewed. A number of staff members in these companies have computers and the internet to facilitate internal communication and e-commerce. For instance, some companies have purchased and set up Enterprise Resource Planning (ERP) software system to enhance connectivity to their branch offices and outlets. In one of the milling companies, ICT is used in the formulation of food/feed rations and quality control. Banks such as Family Bank have ATM Service. According to its Marketing and sales Manager, "Family Bank Family was the first banking institution to use the smart card. It is a paperless banking that is friendly to illiterate people."
- Developing and implements strategic plan(s) that focuses on business growth: Many agribusiness firms have adopted new ways of doing business in terms of re-organisation of market function. This is exemplified, by a parastatal, the National Cereal and Produce Board (NCPB) which previously waited for customers but now it packages and brands its products and looks for customers (viz. millers, retailers). It also provides handling and storage services for the third party to utilise the available grain storage facilities. This includes the recently launched warehouse receipts system.

Services: Financial institutions are proactive in developing and participating in new micro-credit facilities. Based on the interview with the Family Bank:

- The micro-credit facility for the youth and women from the government of Kenya – which is provided at a subsidised interest of 80% and at a reducing rate. This is unlike the commercial leading flat rate of 24%.
- The Nafaka loan was aimed at supporting smallholder farmers to offset their cash problem as a result of delayed payment upon delivery of maize to NCPB. The loan is calculated at 80% of the total value maize delivered to NCPB. Payment from NCPB is paid through the Bank which makes deductions. This facility is currently suspended by Family Bank because of delays in receiving payments from NCPB. NCBP was not able not commit itself to the facility through a contractual arrangement.
- The collaboration with farmers, growers' associations and agro-dealers to set up a credit scheme in order to facilitate transactions. This is exemplified by warehouse receipt systems (see Box 2).

Box 2: Launching of Warehouse receipt System

Misery for selling at a loss

For a long time smallholder maize farmers have always been miserable at harvest time. Despite the time, money and energy spent tending their crops; they still find themselves trapped in a cycle of debt because proceeds from the sale of their crops are never enough to cover the cost of farm input. Most local farmers sell their crops at throw away prices at farm gates for their daily upkeep. Because they rely on the same weather patterns, they also happen to offer for sale all our produce at about the same time when everybody else is harvesting and selling.

To the agricultural commodity market, however, this similar behaviour by farmers' only results in the fluctuation of prices — to the detriment of small- scale growers. For instance, farmers who dispose of their crops cheaply at harvest time can barely buy the same commodities back three months later when prices shoot up due to low supply in the market.

For some time, the Ministry of Agriculture has been mounting campaigns in different parts of the country to persuade growers to stop selling green maize at the farms. But farmers who heed their advice are usually disappointed when the National Cereals and Produce Board (NCPB) either takes too long to respond or fail to absorb all their produce during harvest time.

Working of Warehouse receipt system

But now, there seems to be some light at the end of the tunnel with the installation of a warehouse receipt system. The Eastern Africa Grain Council (EAGC), in conjunction with Equity Bank, has set up a pilot Warehouse Receipt System in Kenya: In a warehouse receipt system programme, farmers or traders can deposit maize at a certified warehouse between December and March when the market experiences a glut and get a warehouse receipt. Depositors wishing to get money in the meantime can present their receipts at Equity Bank and obtain the cash as they wait to sell the maize in the stores when prices increase from between May and August. When the sale is finally done, the farmers are required repay the loan and storage costs but retain some margin instead of selling during harvest period when prices are depressed.

Announcing the project, Ms Anne Mbaabu, the EAGC Executive Director, said they had negotiated for affordable storage and minimum financing costs with the participating partners. "Millers and other organisations wishing to procure grain such as food aid agencies can buy the warehouse receipts which guarantee the quality, quantity and location of the commodity," she said.

A partnership:

Apart from Equity Bank, the initiative has the backing of the Financial Sector Deepening Trust, the USAID Kenya maize Development Programme (KMDP) and Regional Agricultural Trade Expansion Support (RATES), Lesiolo Grain Handlers Ltd.

Source: Adapted from: Grain farmers to reap from new receipt system (Business Daily, April 18, 2008*)*

3.2 Tomatoes

All the actors in the tomato industry value chain who were interviewed confirmed to having tried new ideas and or experimented with new forms of organization in the recent past. The innovations observed along the tomato value chain include:

Production: Input supply and Tomato Producers

The quality inputs including seed, fertilizer and chemicals constitute the largest cost element in tomato production. Consequently, the access to good quality and affordable seed and chemical has been a challenge for smallholder farmers. Responding to this challenge and coupled with the changing market demand for specific attributes, firms involved in the supply of various inputs have developed innovative products and mechanisms to ensure that these are widely available. The main innovations that have emerged include:

Seed

- The development of new high yielding and disease tolerant tomato varieties adaptable to a wide range of environmental conditions, for example, 'Kentom". Based on the Interview with Simlaw Seed Company, there are two main approaches that the firms are using to develop and avail the identified high quality tomato seed.
    - Enhanced collaboration with international companies to import high yielding, disease tolerant varieties has been one method. Thereafter, the firms have developed innovative packaging into affordable quantities for a wide market reach. An example of a product that has been marketed thus far is the Fortune maker tomato variety.
    - Secondly, seed companies are increasingly engaging in seed research in collaboration with international and local researcher organisations. Through collaboration with CYMMIT which enabled access to its germplasm, Simlaw used these germplasm to set up lines for new tomato varieties. The research work of Simlaw Company involves developing seed with the desirable attributes, testing it various parts of the country and bulking to gain the required quantity. These are then marketed through field days, demonstrations and mass media, new phenomena reaching a wide population.

As the case with maize, the enactment of legislation on the plant breeders' rights has also spurred research in the seed sub-sector.

Agro-chemicals

- Bio-pesticides are the other new products that have been introduced into the market. The technology is mainly imported, tested and registered for the local market. Innovations in branding and marketing have led to wide usage. Increase desirability of biological production has been the single most important trigger to this innovation.
- To ensure that the new products reach a wide population, innovations in marketing and distribution have emerged. Most firms such as Osho Chemical Company are increasingly collaborating with other stakeholders by providing extension services to promote their products. Promotion competitions in the mass media have also been used to increase reach.

Innovations in branding and use of mass media are a hallmark in product promotion. Firms sponsor farming programs on vernacular radios, place commercial spots in the electronic media, produce brouchers and technical handbooks and are actively involved in the training of stockists and farmers.

Box 3: Kenya starts plastic "greenhouse" tomato farming

Green house tomato farming is expected to address the issue of seasonality and uniformity of tomato for improved marketing and increased small holder incomes. The system is developed by the Kenya Horticulture Development Programme (KHDP) and agricultural inputs suppliers Seminis Seeds and Osho Chemical Industries. A grower requires about 240 square metres of land and a greenhouse kit to get started. The cheapest kit, comprising a 500 litre water tank, irrigation drip lines, plastic sheet, seeds and chemicals has been put at Ksh150,000 ($2,239) for those participating in the project. The plot of land can grow 1,000 plants. The fourth demonstration site, for the Coast province, was launched last week at the Agricultural Training Centre in Mtwapa, Mombasa. Others are in Nairobi at the Horticultural Crops Development Authority compound near the Jomo Kenyatta International Airport, at the Agricultural Training Centre, Kabianga in Kericho, and at the Lake Basin Development Authority compound in Kisumu.

The system enhances resource use and produces high quality tomatoes which have a longer shelf life of 21 days compared to 14 days for tomato grown in the open. In the system, one plant has a potential of up to 15 kg at first harvest, going up to 60 kg by the time it has completed its full cycle — recommended at one year. The plant vines are supported inside the greenhouse with sticks and strings, growing up to 50 metres in height. If well looked after, the minimum plot of land under greenhouse production can yield up to 25,000 tonnes of tomatoes. Tomatoes are generally highly susceptible to diseases requiring heavy application of pesticides but under the greenhouse growing techniques, which come with basic training on hygiene, most of common infections are easily kept at bay. Also kept at bay are insects and other pests known to invade plants as well as weeds.

Apart from huge savings on crop protection chemicals, which constitute a huge part of production costs, less labour is employed in a greenhouse, while exposure to chemical toxins associated with application is minimized or eliminated altogether. It is also good for the environment. The partners are organized such that Seminis East Africa provides the seed; Osho Chemicals is providing free chemicals to farmers in the initial stages of planting as well as technical advice on application. The introduction of greenhouse tomatoes in Kenya heralds what could be a major shift from open pollinated farming to hybrid high yielding methods, which if adopted in other sectors could lead to massive improvements in crop production, output, incomes and ultimately self-sufficiency in food production. There has been a marked uptake of improved planting materials in the country, a sign that farmers are keen to adopt new products and technology.

Source: Source: www.nationmedia.com - Publication date: 10/5/2007

Processing and Marketing of tomato and tomato products

Tomato industry is characterized by seasonality in production. During periods of glut, farmers experience high losses due to the perishable nature of the product. Government policy of promoting the formation of common interest groups triggered the move towards processing of various agricultural commodities at the farm level, tomato included.

Cottage industry / farm level

- Based on interviews with Kyevaluki Sef Help Group (a farmer group of 30 smallholder farmer groups in Machakos District) and Kamumo products Company (an entrepreneur), the innovative response by farmer groups and small enterprises was the formulation and processing of tomato to produce new products including tomato jam, tomato paste and tomato sauce. In addition to mitigating against the losses, agro-processing aims at capturing higher value compared to sale of raw tomato. The processing is generally small scale but the practice is carried out nationally. These products are mainly sold in the local market. Some groups and small enterprises are in the process of seeking certification so as to sell in the bigger supermarket chains.
- Other innovations include product branding and labelling to capture the uniqueness of the group product.

Processing industry level
For the large tomato processing industries as Trufoods, the constraints in the acquisition of quality and adequate raw materials and increased competition from cheap imports have been the main motivation for innovation. Innovative responses of the large processors include;

- The development of new tomato based products. Most firms have diversified tomato products by combining with other agricultural products to develop new ones. The new products includes tomato crisps, tomato chilli sauce, tomato garlic sauce, whole tomato paste among others. Innovations have also aimed at enhancing product quality and safety.
- Development of niche products for high end niche markets. There is a trend towards organic products and processing firms are collaborating with NGOs involved in organic agriculture to develop an organic certified tomato paste for export market.

Marketing
Based on the interview with Uchumi supermarket, supermarkets are increasingly becoming an important outlet for fresh agricultural produce including tomato. Due to the intense competition in the retail business, firms have had to respond in innovative ways. These include:

- Decentralized receiving of agricultural produce to enhance decision making process. For instance, in Uchumi supermarket chain, each outlet receives its products and ensures that these meet high quality standards.
- Novel ways of displaying target products. Previously, most supermarket outlets sold tomatoes in prepackaged weights (kilograms) however they have realized that this is limiting to consumers. Consequently, consumers now have a choice of the amount of products to purchase. Also, the supermarkets never used to place all the produce on display but have since realized that that the more products is displayed, the more the consumer perceives freshness and increase purchase.

In both the processing and marketing, the issue of raw material supply constraints has resulted in innovative ways in the supply chain management. Instead of relying on the market alone as the source of raw material supply, firms are increasingly engaging the farmers as follows:

  - Reorganization of the operation structure to include agronomy specialist whose main role is to provide advisory role to farmers and act as the link between the firm and the producer. These specialists often work closely with extension service providers to advice and monitor farmers' activities.
  - Contract formation between the producers and the firms has also emerged. Identified farmers normally enter into contractual arrangement with processors and retail outlets (supermarkets) for the supply of tomatoes.
  - Processors and market retail outlets are also involved in enabling farmers' access credit by providing them with guarantees. Firms assure lending institutions of their relationships with the farmers there by enabling them access to credit.

Box 4:Uchumi supermarket and Farm Concern partner to ease ayment to farmers

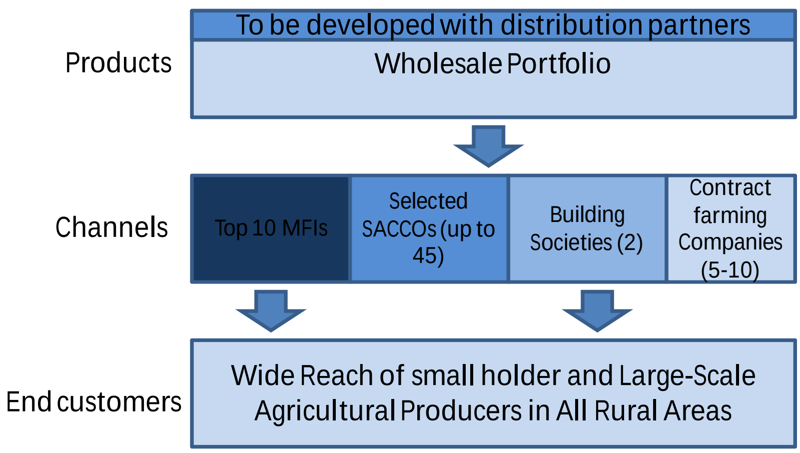
Uchumi is one of the major retail outlets in Kenya with branch network all over the country. The fresh produce section which encompasses tomatoes has an annual gross turnover of Ksh 30 million. Farmers supply the branches through the receiving area where quality of produce is checked and the necessary transaction captures. According to the company policy, payment is made after a fortnight. Due to farmers' immediate cash needs, Uchumi has entered into an agreement with Farm Concern International, a Charitable Development Trust, involved in developing pro-poor marketing models and strategic alliances to enhance economic growth among poor communities across Sub-Saharan Africa. This arrangement enables farmers who have supplied their fresh produce to Uchumi supermarket to use the transaction record receipt to be paid immediately by FCI instead of waiting for two weeks. Upon the maturity of the transaction, the supermarket then transfers all due payments to FCI.

Financial Services

Agriculture Finance Corporation, government owned non-bank development financial institution provides credit to the agricultural sector. Unlike other financial institutions, it is dedicated to agricultural development and receives its funding from the government, resulting in sustainability problems. Due to the challenges of outreach and sustainability, and to be able to continue existing, the firm had developed a new model for providing financial services. The firm has also developed new ideas and products with the innovative ones including:

- Broadening of loan portfolio to include seasonal crop credit. It never used to provide this service before. The facility finances the development of nurseries, seedbed preparation, planting materials, green houses and equipment, water supply systems, electricity supply networks, harvesting, grading and packaging equipment, cold rooms and equipment, labor and other operational costs and marketing for horticultural crops including tomato.
- To be able to effectively deliver and manage its products, the firm has undertaken business process automation and innovatively used it as a platform its executive decision making application to support effective and timely decision making at its remote branches.
- The firm has also developed a financial delivery system geared towards wholesaling of financial services, away from the retail model. This is aimed at increasing its outreach and enhances sustainability of its operations. This model is depicted below:

Figure 4 Financial Delivery Structure for AFC



The innovations of the firm are borne out of the need to survive in an increasingly competitive and vibrant financial market. However, government policy which has established the institution are still not in tandem with the changes as it does not provide for the mobilization of resources from the economy in the form of savings.

3.3 Dairy

Improved milk production and collection

Milk production, collection, bulking and distribution have been an entry point into the dairy industry. The main incentives to innovations in this point are the economies of scale. While most of the farmers are unable to deliver milk to distance processor collection centers, they find it appropriate to form cooperatives which collect, deliver and sell milk on their behalf. The main objective of the formation of cooperatives and Saccos is to provide to the local farmers. The dairy cooperatives have put innovative ways to enjoy the economies of scale. Several innovative ways adopted by cooperatives and processors are illustrated below in Box 5.

Box 5: Undugu Dairies, P.o Box 22 Egerton, Tel 020 2139613 Manager-Simon Ndirangu-0723 854348, Deputy Manager John Mungau-0721 252126

Milk collection, bulking and distribution have been an entry point into the dairy industry. Most of the dairy co-operatives operate operations hinge on the economies of scale within this point. While most of the farmers are unable to deliver milk to distance processor collection centers, they find it appropriate to form cooperatives which collect, deliver and sell milk on their behalf. Undugu dairies operate as a subsidiary of the Undugu Sacco Society. The main objective of the formation of the Sacco was to provide services to the local farmers. Currently the dairy serves an estimated 380 dairy farmers, collecting 700 litres of milk daily. There are 10 employees and one 6 tonne collection and distribution truck. The dairy has put innovative ways to enjoy the economies of scale. Such include,

- Engagement in value addition in milk. The dairy cooperatives have engaged in activities higher above the value chain. These include e.g. in processing and production of yoghurt.
- To operate effectively and minimize costs of operation, the cooperative have established 12 milk collection centers which are accessible and farmers collect their milk from their homes.
- They have established service delivery systems where they facilitate access to inputs (feeds, animal drugs and fertilizers) and other services (AI and financial) to their member farmers. To effectively provide service to their farmers, they have engaged the services of veterinary officers, animal feeds companies (Century Feeds Ltd) and AI service providers and banks (Agricultural Finance Corporation --AFC) to provide credit

Innovative responses to avail inputs to dairy farmers in Kenya

Animal Feeds

In the dairy sector, the feed industry plays and important role as improved productivity cannot be achieved without proper feeds. To compete effectively in the competitive markets, feeds firms have engaged in innovative practices that ensure increased market share. Some of these innovations include;

- Palletising feeds-this is making pellet form feeds for the dairy animals
- Ingredient change-this has involved changing of the active ingredients of the feeds according to preferences of the farmers
- Change in packaging-there have been changes in packaging from big packages to smaller packages which are affordable by the farmers
- Contractual agreements- there have been contractual agreements with dairy processors to avail feeds to farmers on credit. The cost recovery is done by the processors as farmers deliver milk.

Animal Drugs

The dairy industry is one of the health sensitive sectors. The supply and access to affordable animal drugs is crucial to increase productivity. The firms which deal with drugs have, in a bid to ensure steady supply to the ever growing markets, become innovative in their own way. For instance, the firms have;

- Enhanced their distribution systems- initially the firms used to sell drugs to the government as the government controlled veterinary services and supply of drugs. Currently the firms have improved their distribution systems by networking with agro-veterinary shops which have become their outlets country wide. In addition, some of the firms have their own regional sales agents/representatives who market their drugs and coordinate supply and maintain stocks at regional levels.
- Changes in active ingredients-the firms have engaged in changing of the drugs active ingredients according to the changing disease and pest resistance.
- Enhanced packaging of the drugs- the firms have engaged in smaller packaging to match the changing affordability.

Although dairy production has been impeded by several factors including poor infrastructure, poor access to inputs and services including finance and animal drugs, the current National Livestock Policy and the Dairy Industry Development policy recognizes the importance of addressing these constraints in order to improve milk output. Consequently the interventions by the policy target improving breeding services, dairy feeds, veterinary services and animal health, extension and advisory services and dairy research and development.

New products and organized marketing of dairy products

Dairy products processing experienced a tremendous growth following liberalization. The entry of many players in the processing and cottage industries has stiffened competition. This has called for innovative ways by the processors and cottage firms to maintain their market shares. Key innovations in the processing segment of the chain have centered on minimization of processing costs, improvement of quality of the products, lengthening of shelve life, improvement of distribution and supply of milk and sustain ably maintaining consumer and producer loyalty. Key innovations are as illustrated in Box 6.

The main thrust to diversification in the dairy industry has been as a result of policy change especially liberalization which ended monopoly of KCC. The policy change has facilitated entry of private processors in dairy business. The resulting competitive environment has opened markets for different innovations. There has been an increase in different brands of dairy products and even new products which fit the consumer preferences. The dairy policy evolution from the era of market control to the era of deregulation has embraced more positive and private accommodation in the sector. The increasing population urbanization and income are the driving the demand higher. The increasing demand is a major pull, factor to innovations in the sector owing to the increasing returns.

However despite the policy positive policy change, public processors such as New KCC are still under the government procurement policy. This slows down the purchase of equipment to respond to any changes in the competitive market environment. This has been sometimes rendering technologies absolute relevant to the market dynamics. Other prohibitive policies include the tax policy, import policies and clearing and forwarding procedures which besides increasing the cost of importing equipment also delay the delivery. In addition, exchange rate fluctuations have a profound effect on the importation and exportation of equipment and finished products. Although there have been complains on that only New KCC is the licensed to powder milk, it is evident that the private processors lack of equipment used in milk powdering process and are being encouraged to purchase the equipment to engage in the business.

Box 6: Cases of Innovation in the processing Level of the Dairy Industry in Kenya (New KCC and Spin-Knit Dairies)

Dairy products processing experienced a tremendous growth following liberalization. The entry of many players in the processing and cottage industries has stiffened competition. This has called for innovative ways by the processors and cottage firms to maintain their market shares. Key innovations in the processing segment of the chain have centered on minimization of processing costs, improvement of quality of the products, lengthening of shelve life, improvement of distribution and supply of milk and sustainably maintaining consumer and producer loyalty.

Key innovations include;

- New product development- the market has witnessed the development and marketing of new dairy products- e.g. *Shakalaka* a whey drink innovated by New KCC. Initially whey used to be washed away into the drain, but now it has being reprocessed and processed into a drink. *Tamu Milk (Maziwa Tamu)*- this is a new dairy product introduced to fit markets within regions and areas where *Khat* is highly consumed. The firm (New KCC) pioneering this product follows the discovery that *Khat* consumers require a sugary drink while chewing *Khat.* This could be a substitute to coke cola soda which has gained wide acceptance to the consumers of *Khat.*
- New packaging- there has been new packaging ranging from reduced sizes affordable in the markets to new packaging materials and processes. The new packaging processes witnessed include the Ultra Heat Treated (UHT) packaging which is lengthening the shelve life of milk. There has also been brand and appearance change in UHT milk. This include-*tetraphenol* for the semi-long life milk and *tetraclassic* for the medium range (2 months) long life which have enabled dairy processors to reach long distance markets without the products getting perished.
- To enhance milk collection and supply of processed milk, the dairy processing firms have improved on their transportation by use of refrigerated trucks and establishment of milk cooling plants in high dairy potential areas. The processors have established distribution agents in every market region to maximize on increasing dairy products demand.
- There have been contractual agreements between processors and financial institutions to provide financial services to the farmers. The processors take the risk of cost recovery for the financial institutions upon milk delivery by the farmers. Similar contractual arrangements have also been witnessed in the AI, drugs and feeds provision services by NGOs and other private service providers.

In the dairy cottage industry, key innovations include;

- Packaging and packaging material-inclusion of seals which give the products uniqueness. In the cheese packaging, there has been a shift from vacuum papers to pro-biotic papers to maintain the right posture of cheese. Yoghurt is also being packaged in plastic cans unlike initially when it was packaged in papers.
- Shapes and sizes-there has also been changes in sizes to fit certain occasions and preferences of the consumers-these shapes include-slices, cubes and portions which suit the market preferences and occasions of the consumers.
- Batch numbering- this has been achieved through the use of jet machining. The batch numbers have helped in tracing in the event of bad products.

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Cost saving and wide reaching service delivery systems

Artificial Insemination

Perhaps AI service provision presents one of the most innovative ways of service delivery considering the market dynamics, quality requirements and the unlevelled market field. The players in this segment have capitalized on the market dysfunction and succeeded in modelling a service delivery mechanism. Key innovations in this segment have targeted AI service demand creation and effective and timely delivery of the services. Notable two innovations in the segment include;

- The Artificial Insemination “service hub model”- this has been an innovation service delivery mechanism to the dairy farmers. The service hub(s) is (is) created around the milk collection centres (cooling plant) where farmers deliver milk. Within the service hub(s) there are various service providers –service bulking-(AI, veterinary and extension services) and farmers can get the various services without travelling far. This brings services nearer and ensures timely delivery to the farmers.

- Changes in product site- that is, initially semen was stored by CAIS, however, currently AI service providers (private and NGOs) can store semen on their own. Demand for the service is created by regional distributors and regional representatives who coordinate with the head supplies office and semen is sent by Express Mail Service (EMS) after the bank transaction statement is faxed to the office.

Financial services

The dairy sector cannot succeed without access to financial services. The capacity to innovate and engage in economically viable scale of operation wholly lies with the access to working capital. Owing to the opening up of markets, financial service access is deemed important to compete effectively. Many innovative ways of providing financial services have been witnessed. Majority of the innovation focus on availing easily accessible service at the least cost, minimizing the collateral requirement and shortening the financial operation procedures. Some of the innovations also target new and special products and means of transacting. Key innovations which have been witnessed so far include;

- Account opening procedures and requirements: the banks have improved on their service delivery. The terms and conditions of products and services have been made available affordable to the clients- Simplified account opening and maintenance procedures-which have minimum requirements in deposits, passport size photographing free and instant within the bank
- New banking products, services and systems: these include cash banking services-e.g. E-banking, mobile banking system-this has been done through mobilizing vans equipped with computers which are connected to the mainstream computer (server) and consequently people in rural and far areas away from the vicinity of the banks branch network can open accounts. IT changes- these have come up through undertaking of more of better communication and computer based technologies-they include ATMs and M-transact. They have eased the payment systems. Money transfer System- invention of the “soko tele” by K-rep Bank which is a money transferring system that enables sending and reception of money. The idea has led to business and employment creation. *The bank wants to technologically advance the “Soko Tele” idea to enhance livestock marketing through easing the process of payment to livestock farmers after delivery of their livestock and livestock products to the market e.g. KMC and even in dairy companies.*
- The requirement of collateral for loans has been replaced with “social collateral” where the local groups are entitled to the responsibility of ensuring that any loan obtained by a member is guaranteed and repaid accordingly. Other forms of collateral include “Chattel collateral” where the client does not have necessarily to posses physical capital, but valuable and viable business ideas. The banks requests for proposals which are pre-qualified through economic viability criteria and then the clients are loaned.
- The “village banks”- e.g. K-rep Bank has moved from the traditional in-house banking operations to embrace outside local group working principles. The local rural groups work like banks and within themselves conduct transactions like banks. K-rep has several of these groups which also enhance service access to the local community. Each of the groups has an advisor from the bank.
- Contractual agreements with dairy processors. This has facilitated financial access in terms of credit to the farmers. The processors recover the money on behalf of the service providers after milk delivery.

The overall agricultural policy in the SRA spells service provision in agriculture as important in increasing productivity. In the dairy sector, through the National Livestock Policy and Dairy Industry Development Policy, AI services and financial services have been mentioned as points which require intervention to stimulate growth of the sector. The policy thus points at various interventions that will be undertaken to encourage innovation to the provision of these services

4: Organization of linkages

The section discusses the interactions and linkages within the sub-sectors, maize, tomato and dairy. The discussion develops and uses the following typology of linkages: company to company, public to private partnerships, company to intermediaries, company to farmer/farmer organization or association and company to knowledge organizations. This typology is based on cited linkages that go beyond the typical public to private partnerships (PPPs). The section also highlights the key ccollective or business associations which are seen to coordinate linkages between policymakers and agribusiness firms.

4.1 Interactions and linkages

Company to company

Maize: Agro-chemical companies such as Monsanto, Syngenta, Dupont facilitated maize innovation by providing access to seed technology. The plantation companies were bulk purchases of fertilizers and provided a ready market for agrochemical companies. Traders, supermarkets, millers and retailers also provided market for maize and its products. Transport companies facilitated transportation of maize and its products to their respective market outlets. Micro-finance institutions facilitated access to loans and micro-credit and management. Input supply companies also provided technology and service to agribusiness firms.

Tomatoes: The linkages facilitating tomato innovation within this interaction prism include those that involved companies that jointly collaborated in technology dissemination, for example, agrochemical companies and agro-dealers. The agrochemical companies supported agro-dealers and stockists by providing training and credit among other logistical support.

Public to private partnerships

Maize: The contribution of public-private partnership to maize innovation was cited at two levels namely, technology transfer and dissemination. Public research bodies such as CIMMYT and KARI facilitated technology transfer to agribusinesses through donating their germplasm for improving maize seed to companies including Kenya Seed Company, Pannar, etc. The Ministry of Agriculture extension service played an important role of organizing and coordinating agricultural shows, field days and exhibitions.

Tomatoes: The interactions between agribusiness firms and public organizations focused on product testing and dissemination. For instance, Osho Chemical Company partnered with KARI in product testing while Simlaw Seed Company engaged entomologists and pathologists at the University of Nairobi in seed validation trials. Ministry of Agriculture collaborated with Trufoods and Osho chemicals to organize farmer extension outreach. Also, the private and public sector organizations were actively involved in stakeholder forums for knowledge learning and sharing.

Dairy: Public-Private Partnerships (PPP) have been witnessed less in the dairy industry because of lack of incentives that enhance private participation in the sector. However, the Kenya Dairy Board has been partnering with private laboratories (Ana-labs) to ensure milk quality standards in the dairy industry are maintained. The dairy board has also been partnering with dairy training institute and Egerton university to ensure there are training standards. There have also been some linkages between private animal feeds companies with public research institutes in manufacturing of animal feeds. For example, the outlawed Mathenge plant was once processed into an animal feed by ILRI and Sigma Feeds Company but the feed was rejected by the government.

Company to Intermediaries

Maize: The Intermediating agencies that facilitated the agribusiness firms were banks, agro dealers, AFC, transport companies and NGOs. AFC and Equity bank provided credit support and financial management to smallholder farmers in maize production. Agro-dealers and stockists facilitated the distribution of seed and helped in accessing smallholder farmers. NGOs facilitated agribusiness firms by securing financial services for their farmers and facilitate government procurement.

Tomatoes: The main interaction between agribusinesses and intermediaries involved the provision of financial services and credit to producers. AFC in implementing its wholesaling model used private companies including contract farming companies to channel the funds to the end customers. This enabled the end-user to finance their innovations provided they are within the lending requirements.

Dairy: In the dairy industry company-intermediary linkage is prominent in the drug companies where the companies liaise with several agro-veterinarians and animal drug stockists in various regions to act as the retail outlets. The animal drug companies network with the agro-chemical retailers and regional representatives and distributors to maintain and enhance the supply of animal drugs to the farmers.

Company to Farmer Organizations/Associations

Maize: Farmer cooperatives organized group of farmers and facilitated bulk transportation of inputs and products. Seed growers and agents played a key role of growing and distributing seed on contract basis. Millers Association of Kenya provided maize milling companies to the government and levelled the playing field for them

Tomatoes: These interactions appeared to be the most facilitative in terms of tomato innovation as they provided an important source of knowledge used during the process. For instance, Simlaw Seed Company used its membership in International Seed Federation (ISF), African Seed Association and ACP Seed Association to source information invaluable to their innovation processes. Also, Kamumo foods' interactions with CGD enabled it network with important stakeholders enabling the entity to improve on its produce. Farmers who have been organized into groups are also better placed to receive training and other technological support greatly facilitating the innovation process. Trufoods, for instance, has contracted both individual farmers and farmers groups enabling it to provide technical support that enhance innovation. Farmer groups that are members of the KOAN in addition to being coordinated, also have a platform for sharing new knowledge necessary for innovation.

Dairy: In order to avail inputs and enhance financial access to dairy farmers, processors and financial institutions have come up with models of providing working capital to the farmers. The mode of interaction in these models is through formal contracts which are witnessed by the Kenya Dairy Board. The financial institutions- particularly the banks, provide credit and financial services to the farmers who supply their milk to a processor. The processor in turn recovers the money on behalf of the financial institution once the milk is delivered for processing. For example Equity Bank partners with New KCC to offer dairy farmers financial services. New KCC thus recovers the money o behalf of Equity bank when the farmers supply milk. Similar arrangements are also found in the other input providers where farmers partner with feeds companies to access animal feeds on credit. For example, Sigma feeds have an arrangement with brookside dairies to supply farmers with feeds. Several companies providing the AI service have come up with what they call the "service hubs" formed around the milk cooling and collection plants in rural dairy producing regions. Such model of service delivery is used by American Breeding Society Total Cattle Management (ABS-TCM) to provide AI services to farmers. Within these "service hubs" dairy farmers can access all the services especially AI and veterinary services which they require. The cost of meeting these services is recovered once the farmer delivers his milk to the cooling plant.

Company to knowledge organisations

Within the maize, tomato and dairy value chains, linkages with knowledge organisations are weak and where they exist are not properly coordinated. For instance, the knowledge institutions do not consult any industry actor when setting their strategic research objectives. Also, they do not have any representative of these institutions in their governing bodies in an official capacity. The instances where linkages have been cited include student placements with agribusiness firms by universities and institutes of high learning. However, such linkages were event-related and on *ad hoc* basis. Many respondent agribusiness firms indicated that while they were satisfied with the level of education of most graduate, they were dissatisfied with their inadequate hands-on experience. They also stated that the government was not providing financial support and other incentives for student placements and skill development.

4.2 Coordinating linkages through value chain

This sub-section pays attention to value chain coordination –especially a range of organizations established to coordinate various activities, including marketing, access to technical and financial capacity or services, assistance in meeting or setting quality standards, and political lobbying, etc.

Maize: Under the auspices of Kenya Maize Development Programme (KMDP), An NGO, ACDI-VOCA coordinates linkages between small farmers and input suppliers for mutually benefits. The agrichemical companies are member of Agro-chemicals Association of Kenya (AAK), which ensures level playing field for its members. The Association is useful in providing information and guidance to its members especially with respect to government regulations. It also makes dealing with public officials much easier. For instance, while there are standards for weights, quality and environmental safety, the problem is their weak enforcement. Also, there is need for structured waste disposal system. This calls for coordination between agro-chemical companies and public extension service.

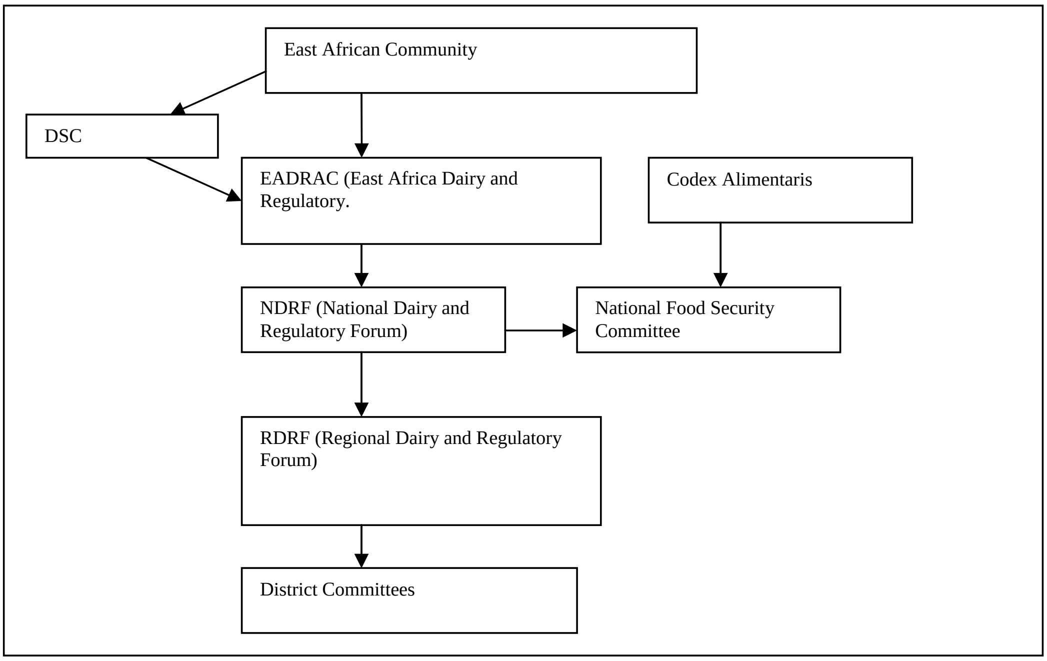
The seed companies such as Kenya Seed Company and Pannar are members of Seed Trade Association of Kenya (STAK) which is an association of private seed companies. These companies are also members of Kenya Association of manufacturers (KAM). These associations are useful in lobbying for policy change and gain from their coordination and access to information. The maize processing firms are active members of Kenya Millers Association. KMA has a membership of 20 millers. The association is useful in ensuring level playing field in the procurement of maize and packaging materials.

The financial service institutions such as banks are participating in the Kenya Banking Association (KBA) as means for channelling collective problems as well as lobbying for policy change. On its part, NCPB as a marketing agency is a member of the Eastern Africa Grain Council (EAGC). The Council lobbies for maze trade policies in the East African region.

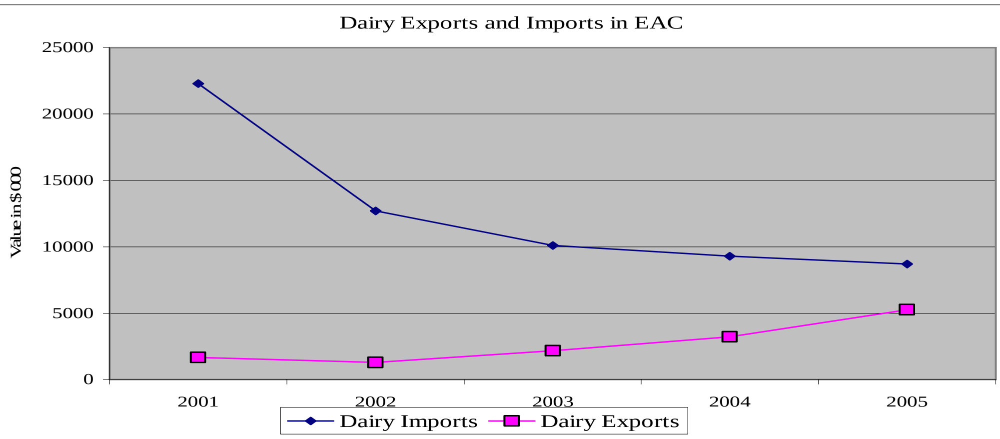
Tomatoes: Apparently, the tomato value chain does not appear to have a single institution coordinating linkages. Subsequently, coordination appears to be spontaneous and localised. In the processing and retailing stages of the chain, the involved firms are more interested in ensuring a stable supply of raw materials and products respectively. Consequently, they have reorganised their operations to include departments which vet, recruit and provide advisory services to tomato producers. Their main aim is to create a working and sustainable relationship with the farmers to reduce problems in the supply chain. Similarly, the input suppliers are more interested in coordinating activities that enhance their sales to the producers. Each of these works disparately and is not linked in any way. Agricultural Financial Corporation's plans of forming an Apex body to facilitate access to credit for input supply and product marketing comes closest to performing an overall coordinating role. Its model involves credit provision to enable input supply to farmers, link the farmers with the market and recover its loans from the beneficiaries through the marketing institution. However, this is aimed at the dairy industry and not tomato, and is subject to a change in its in-cooperating policy (Act of Parliament). A more localised coordinating role is performed by an NGO which has been able to link farmers with tomato market, entered into an agreement with the buyer so as to pay the farmers in advance while waiting to recover its money from the buyer after two weeks.

Dairy: Strengthening of the KDB during the liberalization era was one of the key institutional changes that have so far had great impact in the dairy industry. The KDB was strengthened to undertake its role in regulatory, market promotion and increasing milk production and value addition. To effectively execute its regulation of standards and market promotion role, the KDB has established a regulatory network of institutions at national level and regional levels. This institutional network functions in promotion of dairy products in the regional and domestic markets and maintaining of quality standards. The network is also linked to *Codex Alimentarius,* an international food safety body which gives guidelines to food quality and standards. At national, and district levels, the institutions partner with accredited laboratories and farmers to maintain milk quality. This new institutional framework is part of KDB reforms undertaken under the new dairy industry development policy. This is in addition to aggressive training programs tailored to fit specific requirements of different actors. The impact of organizational innovation that aims to promote marketing is illustrated in Box 7.

Box 7: Framework for ensuring quality standards and market promotion of dairy products in Kenya: Case of Public Institutional Innovation- The Kenya Dairy Board (KDB).



The Board through this framework has realized some harmonization of regional quality standards. For instance East Africa Dairy Standards have been gazetted. On the market promotion role, the Board is closing in on reducing the imports of dairy products as while promoting more of exports. This is shown by the chart below.



5. Public Policy Influence on Agribusiness Innovations

This section presents the link between policies specific and relevant to a sector with innovations and innovation systems. The policy, legal and institutional frameworks of the policy is assessed as to how they influence the operational environment of the sector. Since

Kenya is still undergoing economic reforms, consideration is given to the fact that there are still policy drafts which have not undergone full policy process and hence have not yet been finalised. However, sectors with such cases may be observed to be operating at best practices in line with draft policies.

In this section, general overview of the agricultural policy is given as spelt in overall development frameworks. This is followed by consideration of the three sectors; maize, tomatoes and dairy in which the influence of policies in stimulating and enhancing innovation is assessed. The dairy sector takes a relatively different format due to its unique characteristics. These include a well developed institutional organization and specific policy unlike in the other two sectors (maize and Tomato).

The overall agricultural sector in Kenya is governed by 131 pieces of legislation of which many are obsolete, unenforceable or inconsistent with the current policy (MoA, 2005) and dynamism of the operational environment. The current overall agricultural development framework is spelt in the SRA and adopted within the national economic development framework—Vision 2030. The current development framework requires development of sector specific policies to address unique development issues that affect each sector. In addition there are also specific policies enforced in inputs perceived as important. Such include inputs like fertilizer and seeds which are regarded as important in agricultural production. For instance, the National Livestock Policy (NLP) governs the overall livestock sector. In addition to the NLP, there is the Dairy Industry Development Policy which articulates issues specific to the Dairy industry only. The Seed policy and Fertilizer policy as they affect the maize and tomatoes address specific issues related to these inputs. These sector specific policies are important in stimulating, encouraging and enhancing innovation at the micro level. Although not all sectors may have sector specific policies, analysis of the influence of policy on innovations will be pegged on the sector specific policies and other relevant and related policies and the overall macro policy were necessary. Policies are characterised by incoherencies which may arise from legal and institutional framework inconsistencies. Owing to the legal and institutional incoherencies that characterise agricultural policies at macro or micro level, it is important to note that it is difficult to declare a policy as holistically facilitating or impeding innovations. It is thus intuitively appealing to note that it is elements within a policy that can be said to be facilitating or impeding innovations.

Policy influence on Maize and Tomatoes innovations

In the maize and tomato sub-sectors, lack of sector specific policies confines the assessment to overall agricultural policy and other related policy elements in policies such as the tax policies, seed and fertilizer policies.

The key policies that have elements that were identified as having an effect on maize and tomato agribusiness innovations included the following;

- Trade policy
- Finance / Fiscal policies
- Agriculture policy
- Communication policy
- Legal Guarantees

In each of these, either an element of the policy or a regulatory body was cited as facilitating or impeding agribusiness innovation. By applying an augmented Dennis (2005) typology approach, an analogy of the key elements of the cited policies as follows:

Trade policy

Facilitating: Trade Policy: Import and Export policies. These policies have made import and export of materials easy. This has enhanced and reduced the cost of production while expanded the market share for the finished product for agribusinesses and benefit in the prices prevailing in the world market.

- Quality assurance policy has facilitated agribusinesses involved in the importation of agrochemicals and equipment by evaluating the quality of their products through Kenya Bureau of Standards (KEBS) to ensure good quality and food safety standards at reasonable cost.
- Policies on value addition enabled milling and processing firms such as Pembe and Corn Products Ltd to add value to the raw materials through processing into various products.
- Private Public Partnership policies especially through business and collective associations facilitated in reducing bureaucracy because some of the services were commercialized and the long waiting process in the public sector could be eliminated by the private partners.

Impeding: Trade policies through bureaucratic delays, high custom duties, and the requirement of relatively high international quality standards impede importation of seeds, equipment and materials and consequently innovation. For instance, import policies-although agricultural inputs are zero rated and there are tax exemptions on imported cooling equipment but delays in the port lead to delays in adoption of technology.

- KEBS was commended for effectively enforcing standards such as the requirement to put company logos on manufactured products in order to reduce incidents of fake products. However, many respondent said that KEBS lacks sophisticated equipment for assessing and assuring food safety standards. For the many respondent agribusiness business firms:
- The main impediment for business is the high transaction costs because of the poor road infrastructure and logistics. For instance, poor infrastructure inhibit efficient milk collection, access to inputs, market information and other important services such as extension and AI.
- Local authority cess collection policy and modalities to enhance cess payment and administration to curtail corruption were an impediment.

Finance/Fiscal policies

Facilitating: The liberalization of financial services in the country and the subsequent enactment of the Central Bank Act 1996 has encouraged private players in the industry.

- The Central Bank Act led to the recognition of the Microfinance institutions (MFIs) and the growth of several microfinance institutions. For instance, Banks such as Family Bank which have come up with agricultural related products are attributed to public sector reforms policy, which have allowed financial institutions to provide loans to agribusiness firms thereby creating a conducive business environment (see also the microfinance section under dairy sub-sector).
- Policy on Social Services registration enabled agribusiness firms to facilitate registration of Self Help Groups and give them a mandate to engage in income generating activities that enhanced their performance (see for example, the “Village Bank” model of K-REP).

Impeding: While the zero-rating of agricultural inputs was facilitating the importation of agrochemicals and equipment, the taxation of experimental materials was impeding their importation. This made experiments expensive and many agribusiness firms were discouraged from carrying out various experiments that would improve their products and processes.

- Agribusiness firms were unable to access funding from most financial institutions because interest rates were unfriendly and the collateral for loans was so high and cumbersome for the small processing agribusiness firms.
- Taxation impeded technology upgrading as the cost of acquiring the technology.

Agriculture policy

Facilitating: ***N***ational Agricultural Policy: This policy promotes technology and dissemination. Through this policy agribusinesses and farmers were able to access information on new product development and this improved their production systems and quality of production. For instance:

- Agricultural Extension policy through National Agricultural and Livestock Extension Programme (NALEP) Focal Area approach facilitated performance by making it easier, cheaper and faster for farmers and agribusinesses to access extension services. This improved their production ability. As one respondent pointed out: "The attitude of extension workers is very positive in the sense they facilitate our outreach to farmers via farm visits and field days".

Impeding: The agricultural sector in Kenya is governed by 131 pieces of legislation of which many are obsolete, incoherent or inconsistent with the current agricultural development framework as espoused by the Strategy for Revitalising Agriculture (SRA) and the national economic development framework—Vision 2030.

- The tension between policy and implementation is illustrated by maize marketing (i.e., liberalised markets versus implementation hurdles because of government intervention). Also, legal impediments are created by Act of Parliament Cap 338 of 1995 --governing operations of the National Cereal and Produce Board (NCPB). This act has not been revised. NCPB is currently operating using circulars and policy statements which are not legally binding. There is need to revise Cap 338 in lieu of liberalisation because NCPB is expected to raise its own revenue and serve as third party broker in order to stabilise the price of maize.
- Land policy (or lack of it) is another major impediment to technological investments and agricultural innovation. For instance, seed production by Kenya Seed Company is currently constrained by land-sub-division especially among its contract farmers. This reduces the isolation distances between fields which is supposed to be 200m. As a result, the company has been forced to cluster farmers in order to produce adequate certified maize seed.

Communication policy

Facilitating: Information and Communication Technology Policy has facilitated agribusinesses to access information on new product development through research and internet facilities. For instance:

- ICT policies facilitated the agribusinesses by being able to get information on finance and service provision through internet and telecommunication at affordable rates for agribusinesses. A majority of the agribusiness firms that we interviewed were using ICT for internal and external communication and assure sound financial transactions. This is most demonstrable by ICT which is facilitating access to finance and markets in the dairy sub-sector.

Legal Guarantees

Facilitating: The Seed Policy Act (Cap 326) is well defined and governs the seed system. Also the Act is being revised to bring it to speed with the developments in the seed industry. For instance, its support for the Intellectual property rights for the protection of new varieties of plants has encouraged entry of private seed companies and subsequent development and deployment of new plant varieties. The process of seed testing by KEPHIS has become faster and more efficient.

- Policy to distribute seed to stockists appointed in conjunction with Kenya Inspectorate Services (KEPHIS) has made it easy for farmers to access quality and certified seeds and for seed companies to distribute their products.
- Quality assurance and food safety policies have strengthened institutions and charged them with quality assurance responsibility. That is, KEPHIS and KEBS have respectively encouraged the production of quality products that are safe for human consumption and ascertained that market outlets like Uchumi supermarkets received good quality products.

Impeding: Policy on seed: The major impediment of maize seed is the monopoly of parastals such as KSC, Kenya Agricultural Research Institute (KARI), and KEPHIS. Also, the seed input is strictly regulated and seed cannot be produced at the village level under Duality Declared Seed and this has led in higher prices to farmers for horticultural seeds. Other cited policy impediments are:

- Policy on inspection of production process by local authority deterred the performance of agribusinesses. This was because most of them had not met all the stringent and often outdated requirements by the local authority and had to hurriedly close business whenever the local authority visited them to avoid penalties.
- Environmental policy: The environmental standards especially those espoused by National Environmental Management Agency (NEMA) were high. The cost of meeting the standards required by NEMA for the some processing agribusinesses like Trufoods was high thus increasing the production costs for their products.
- Energy policy: The high costs of electricity deterred the performance of processing agribusinesses as this culminated in high costs of production.
- Disaster preparedness policies were limiting because they did not adequately address the issue of supply during drought seasons, flood seasons and off season therefore unstable supply of products to markets.

Policy influence on dairy innovations

The move to liberalize the dairy industry has brought positive changes in the dairy industry market. There has been an increase of private processors but however informal milk hawking has also increased. This has allowed the selling of low quality dairy products in the markets. The resulting competitive environment has opened markets for different innovations. There has been an increase in different brands of dairy products and even new products which fit the consumer preferences. The dairy policy evolution from the era of market control to the era of deregulation has embraced more positive and private accommodation in the sector. The dairy sector has been recognized by the ERS-WEC, and SRA. The new National Livestock Policy (NLP) provides an overarching policy framework for the entire livestock sector, including the dairy industry. These policy frameworks have been adopted in the Draft Vision 2030 and dairy sector through the overall agricultural sector is recognized as an important sector in poverty alleviation. The focus will be on encouraging more private participation and creation of incentives for Public-private relationships. The current Draft Dairy policy purports to make intervention over the entire dairy value chain. The Draft Dairy policy statement reads

"Interventions will cover dairy research, milk production, extension, marketing of milk and milk products, milk processing, milk consumption, human resource development and training, financial services, institutional, legal and regulatory issues".

The main target of policy reform in dairy industry and in agriculture as general has been creation of a conducive environment within which actors in the sectors can operate. For instance, liberalization targeted opening up the markets and divestiture of the market environment which would otherwise encourage private participation. The competition resulting from the entry of more private actors was expected to enhance producer prices in agriculture while also enhancing consumer prices. Institutional reforms envisaged within the reforms package focused facilitation to market access rather than marketing of the produce.

Key innovation facilitating policies in the dairy industry include the Draft Dairy Industry Development Policy and the Draft National Livestock Policy (NLP). As aforementioned, while the NLP provides the overall livestock development framework, the Draft Dairy Development Policy prescribes the specific important development policy to the dairy industry. Other policy documents that have recognized the dairy industry as key to development and poverty alleviation include the SRA, ERS-WEC and the Vision 2030 through agriculture. The Dairy Industry Development policy encourages:

- Entry of many players in the dairy industry market in line with liberalization policy. As aforementioned several players have been licensed since liberalization of the sub-sector.
- Innovative ways of accessing animal feeds; while there are no government incentives to invest in the animal feeds industry, the current dairy policy encourages and supports farmer innovation towards achieving access to animal feeds. The policy reads

  "Future efforts will be directed at ensuring availability of pasture and fodder seeds by encouraging large scale range intensification and regeneration of existing pasture. Also, development of feed ration ingredients for every district is crucial to assist farmers make their own feeds, as this would greatly reduce supplementation cost. The Government will also encourage co-operatives and farmer groups to put up small feed mills or purchase feed mixers for making homemade ration using locally available materials. Making bulk purchases for members would facilitate availability, price uniformity and distribution".

- Harmonization of the various Acts that govern the animal health and strengthening of the Department of Veterinary Services. The Draft National Livestock Policy and Draft Dairy Policy recognize animal Health and Veterinary services as key to the improvement of the overall livestock and dairy industry. The legal harmonization proposed in the Draft Dairy policy is a welcome to innovation. While previously the policy through the legal Cattle Cleansing Act recognize cattle dipping as the only way of tick control, the policy is being amended to accommodate other diverse methods of tick control. Further the amendments of the Veterinary Surgeons Act to allow Para-veterinary workers with diploma and certificate training to treat animals, and the Pharmacy and Poisons Act to allow veterinarians to dispense veterinary medicines increases the access to veterinary services in the rural areas. This is enhanced further by the strengthening of the DVS to deal with epizootic diseases. Previously breeding services were monopolized by the government through the Central Artificial Insemination Services (CAIS). The target for the current dairy industry development policy is to revamp CAIS and commercialize its activities while maintaining the national strategic livestock genetic pool. The commercialization of CAIS enhances the AI service markets although CAIS is faced with criticisms that it has engaged in low quality semen which goes at low cost in the market. Its revamping is expected to enhance the market for AI services and consequently stimulate innovation in the sector.

- Public-private investment in the extension and advisory service provision; The government through the policy while seeking to provide demand driven extension services and involvement of the private sector, will encourage financing of private extension services by enforcement of a clear legal framework that will govern contractual agreements

- Establish National Livestock Research Institute within which Dairy Research Center will be incorporated. The policy encourages research in dairy product diversification as well as in packaging. In addition to technology development, the dairy industry development policy seeks to enhance technology development and transfer mechanisms for increased adoption. Research will be enhanced by royalties and contracts including government grants and commercialization of research products.

- Addressing dairy business environment. The policy promotes ethical business practices that hinge on development of contractual agreements and the complementary legislation in the dairy industry. Markets are deemed important in innovations as they are the key pull factors. Innovation in dairy and as in other sectors responds to market returns positively. In terms of imports and exports, the policy targets ensuring that cooperatives and processors develop sufficient capacities to produce and efficiently distribute dairy products in order to satisfy the domestic demand and also surplus for export markets. This can be achieved through export market promotion, consistent and continous production and inclusion of dairy issues in regional and international negotiations.

- Revival of milk marketing cooperatives- The importance of cooperatives in milk collection, bulking and marketing cannot be overemphasized. Cooperatives reduce marketing costs and consequently increase returns to the farmers. The growth of cooperatives such as Githunguri, Lari, Udungu and daima dairies is attributed to the policy reforms. The policy encourages revival of cooperatives and emphasize on contractual engagements to facilitate marketing, inputs and services access under economies of scale.

- Encouraging private participation in maintaining feeder roads regularly in milk producing areas, while encouraging private sector facilitation, speed up rural electrification programme to encourage and enhance milk cooling, and supporting and promoting more local milk processing, the dairy cooperatives and private sector operators in order to benefit from tax allowances on new investments. The initial infrastructure of milk collection was facilitated by KCC. Owing to the collapse of KCC, milk collection mechanism has been poor. The policy targets to improve milk collection through the revival of farmer cooperatives and farmer groups that will facilitate rural milk collection. Similar approaches have been witnessed in several cooperatives and processors who have set collection centers in rural areas. NGOs such as Heifer International, Technoserve Limited and companies such as African Breeders Association for Total Cattle Management (ABS-TCM), and World Sires have come into the dairy industry to facilitate milk chilling and service delivery. The rural milk collection centers have been advanced by installing chilling plants in order to preserve milk especially where the distances to the processors are long. It is expected that revival of cooperatives and farmer groups will result to increased incentives to promote ethical business practices and contractual agreements. To enhance increased milk cooling and preservation, the government will target to speed up electrification in rural areas with high dairy potential while also promoting exploration of alternative sources of energy such as solar, wind, mini hydro plants and organic fuels for use in milk cooling. Since production costs are inflated by electricity costs, further, measures to reduce electricity tariffs for reduced cost of milk cooling will also be explored and adopted.

- Zero rating of taxes on inputs used in liquid milk processing with regard to value added tax. Tax exemption on equipment especially those involved in powder milk processing is important in the dairy industry in supporting processing. The policy recognizes that private sector operators will continue to benefit from tax allowances on new Investments. Further inputs used in liquid milk processing will are zero rated with regard to value added tax.

Other positive measures that stimulate innovation within the dairy industry development policy include;

- Promotion of the development and adoption of cost effective milk packaging that is of acceptable standards and that addresses health issues as well as discourages use of packaging materials that are environmentally unfriendly.
- Measures to ensure that dairy processors and manufacturers put in place quality testing and assurance systems that conform to national and international standards.
- Implementation and enforcement of the new management tenets embodied in the amended Co-operative Societies Act of 2004, encouragement of partnerships between cooperatives and other private sector players, especially processors, promotion of bulk purchases of farm inputs by co-operatives to minimize costs and improve competitiveness; and formulating ways of protecting producers and producer organizations from the effects of collapsed firms.
- Ensure adherence to quality standards for domestic and imported dairy products will be strengthened, while the level of participation in the development and setting of world dairy standards will be enhanced
- Premium prices during dry seasons to processors.
- Promoting the processing of affordable long-life milk products and ensuring inclusion of dairy products in the stocks of national food strategic reserves, including the Strategic.
- Implementation of the ICT and the e-government policy to the full.
- Strong linkages will be promoted between universities and other research institutions. In addition, the government will set up a national dairy information centre at KDB that will be equipped with a databank facility to collect, analyze and disseminate information on the dairy industry.
- The policy also proposes innovative ways of ensuring sustainable environment, entrenchment of diary industry in line with land policy and implementation of the water policy besides institutional changes that will see reforming of KDB.

- *Financial service provision; c*urrent information and communication system restructuring and the liberalization of the financial sector has steered financial services access to the rural majority. The communications and information sharing environment has been enhanced and this has also prompted to numerous and fast methods of making transactions. The Central Bank Act 1996 in which was geared towards encouraging private players in the industry. The Act led to the recognition of the MFI and the Association of Micro Finance Institutions was formed. The growth of several microfinance institutions such as Faulu Kenya, Kenya Women Finance Trust, Jamii Bora trust and even Equity and Family finance banks which have come up with agricultural related products is attributed to the liberalization of financial services in the country. The current Draft National Livestock policy (NLP) and the Draft Dairy Policy all positively recognize financial service delivery as a key input in increasing livestock productivity and to the growth of a vibrant economic livestock sector. Although there has been significant improvement in the communications and information sector, there is still more to be done since a vast rural area is still yet to gain financial access. The issue of collateral to access loans and credit services by the rural poor is still a barrier. This is pegged to the land policy which does not confer secure land ownerships which promote economic investment and sound environmental conservation and management. Trade policies (tax, monetary, fiscal, exchange and interest rates) have been in focus as being disincentives to the provision of financial services since they increase the cost of doing business and thus the cost of loans and credits.

All these elements in the Draft Dairy Policy serve to influence the operational environment of the actors over the value chain. It is evident that access and use of agricultural innovations can be improved if there is a favourable market environment .The influence positive influence enhances the actors' returns and enables them to invest more in innovations.

However, there are also several policies that impede innovations in the dairy sector. Despite these innovations being available, there have been constraints in accessing and using of these innovations. A major constraint sprouts from the constrained market returns. It is evident that most of the firms reinvest their little returns in enhancing and testing their innovations. In this case policies that govern the trade and markets are the main points of contentions. These include county and municipal council's policies which impose a charge on animal feeds sold in every county, the tax policies and the infrastructure (communication and roads) policies-all these policies work to increase cost of production which is transmitted to the markets as increased feed prices

- Lands policy which by failing to define sustainable land ownership, constrains capital and technological investments and consequently innovations that would otherwise improve productivity.
- Trade policies; Import policies-although agricultural inputs are zero rated and there are tax exemptions on imported cooling equipment, delays in the port lead to delays in adoption of technology relative to the dynamic market environment. Sometimes imported technology is overtaken by the requirements in the dynamic markets hence despite the companies incurring costs, the technology becomes obsolete.
- Infrastructure and communication policy-milk is produced in regions with high potential. However, these regions are characterized by impassable roads especially during the rainy season. Poor infrastructure in these regions inhibit efficient milk collection, access to inputs, market information and other important services such as extension and AI.

- Exchange rates policy-unstable exchange rates greatly influence the prices of imported equipment especially whenever there is a delay. For instance, New KCC which is a public company is still subjected to govern procurement and tendering procedures. These are the main causes of delays to adjustment to the dynamic market scenarios. Delays in importation of capital goods are sometimes grossly affected by exchange rates fluctuations.

6. Conclusion

This study entailed the assessment of whether national public policies impede or facilitate innovations. It is evident that policy in the institutional and legal contexts influence innovations in Kenya. The three sub-sectors -maize, tomato and dairy are contextually different in terms of policy and geographical regions. The value chains, actors and linkages are different in the three sub-sectors. The influence of policy on the innovation is thus varied over the value chains. While dairy sub-sector has a sector specific policy that influences the environment of the sector, maize and tomatoes do not have and thus their operational environment are influenced by other relevant policies within the agricultural sector.

While there is that varied effect of policies over the value chains in stimulating innovations, it is evident that, the current policy drafts include the innovation concept but it is not well articulated in a systemic way. The need to stimulate innovations through adequate infrastructure that lowers cost of doing business in markets is imperative. This is particularly due to the fact that markets remain as the most important drivers of innovations as they create incentives to innovativeness. Within a government policy there are elements; policy documents, legal and institutional frameworks which support while others impede agribusiness innovation. These policy elements indirectly influence innovation through the operational environment of value chain actors and their attributes. Policy reforms and institutional arrangements are hence important in triggering innovations as with the case of liberalization that enhanced entry of private players and opened the markets to external competition in the agricultural sector. The competition that resulted from these actors has positively triggered innovations through business and collective in order to lobby for policy change. The collective or business associations play an important role of coordinating linkages between policymakers and agribusiness firms. For this reason, there is need to pay attention to the direct influence of agencies which coordinate linkages of actors in the value chain of the three case studies and the entire agriculture sector. These include coordinating agencies in the government, private sector and the civil society organizations.

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