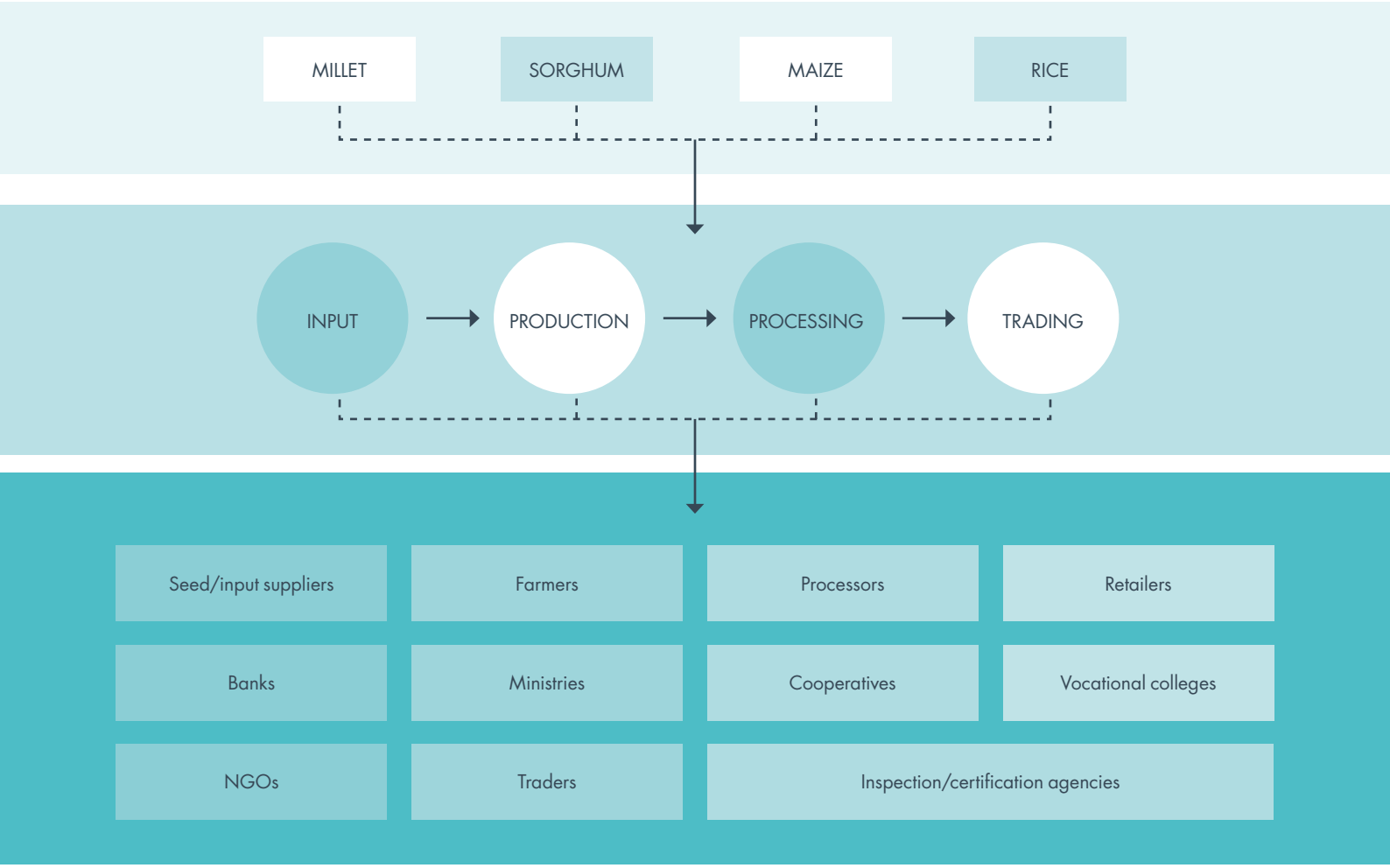
CTA Discussion Paper

Mapping Study of Food-Grain Value Chains in Eastern Africa



CTA

Kilimo Trust

ABOUT CTA

The Technical Centre for Agricultural and Rural Cooperation (CTA) is a joint international institution of the African, Caribbean and Pacific (ACP) Group of States and the European Union (EU).

CTA operates under the framework of the Cotonou Agreement and is funded by the EU.

For more information on CTA, visit www.cta.int

ABOUT KILIMO TRUST

This mapping study was conducted for CTA by the Kilimo Trust.

Kilimo Trust is an independent organisation working on agriculture for development across the East Africa Community (EAC) Region – in Burundi, Kenya, Rwanda, Tanzania, and Uganda – and more recently in the new Republic of South Sudan.

It promotes regional solutions to local problems to make agricultural markets work better for the reduction of poverty and elimination of hunger. Kilimo Trust implements and manages programmes and projects in partnership with and/or on behalf of governments, international and regional organisations, and the private sector. The Trust spearheads market-driven solutions designed to "deliver the promise of the East African Common market" with respect to reducing poverty and eliminating hunger in the region.

DISCLAIMER

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Acronyms and abbreviations

ACP	African Caribbean and Pacific
AGRA	Alliance for a Green Revolution in Africa
ASARECA	Association for Strengthening Agricultural Research in Eastern and Central Africa
B2B	Business-to-business
CAADP	Comprehensive Africa Agriculture Development Programme
CARI	Competitive African Rice Initiative
CBO	Community-based organisation
CIMMYT	International Maize and Wheat Improvement Centre
CMA	Cereal Millers Association
CRDB	Cooperative Rural Development Bank
CTA	Technical Centre for Agricultural and Rural Cooperation
DIMAT	Development of Inclusive Markets in Agriculture and Trade
DSIP	Development Strategy and Investment Plan
EAAP	East African Agricultural Projects
EABC	East African Business Council
EABL	East African Breweries Ltd
EAC	East Africa Community
EAFF	East Africa Farmers Federation
EAGC	Eastern Africa Grain Council
ECARSAM	Eastern and Central Africa Regional Sorghum and Millet Network
EPRC	Economic Policy Research Centre
FAO	Food and Agriculture Organization of the United Nations
GAP	Good agricultural practices
GIZ	German Federal Enterprise for International Cooperation
GOT	Government of Tanzania
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
ICT	Information and communications technology
IFDC	International Fertilizer Development Centre
IITA	International Institute of Tropical Agriculture
IRRI	International Rice Research Institute
ISABU	Institut des sciences agronomiques du Burundi
JICA	Japan International Cooperation Agency
KALRO	Kenya Agricultural Livestock and Research Organisation
KARI	Kenya Agricultural Research Organisation
KPIA	Key priority intervention areas
MAAIF	Ministry of Agriculture Animal Industry and Fisheries – Uganda
MAFC	Ministry of Agriculture Food Security and Cooperatives – Tanzania
MARI	Mikocheni Agriculture Research Institute
MGF	Matching grant fund
MINAGRI	Ministry of Agriculture – Rwanda
MOA	Ministry of Agriculture – Kenya
NARO	National Agricultural Research Organisation
NERICA	New Rice for Africa
NGO	Non-governmental organisation
NMB	National Microfinance Bank
NRI	Natural Resources Institute
PHH	Post-harvest handling
PPP	Public-private partnership
PSTA	Strategic Plan for Agricultural Transformation in Rwanda
RAB	Rwanda Agricultural Board
RATIN	Regional Agricultural Trade Intelligence Network
RBPs	Regional Business Plans
RUFORUM	Regional Universities Forum for Capacity Building in Agriculture
SEATINI	Southern and Eastern African Trade, Information and Negotiations Institute
SME	Small and medium-sized enterprise
SMS	Short Message Service
SNV	Netherlands Development Organisation
TAFSIP	Tanzania Agriculture and Food Security Investment Plan
UNAFFE	Uganda National Farmers Federation
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
USTA	Uganda Seed Traders Association

VAT	Value added tax
VCI	Value-chain institution
VCSIs	Value-chain support institutions
VCSSPs	Value-chain support-service providers
VEDCO	Volunteer Efforts for Development Concerns
WFP	World Food Programme

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Executive summary

Agriculture is one of the East African Community's most important economic sectors. The major staple foods in the region are maize, rice, potatoes, bananas, cassava, wheat, sorghum, millet and pulses. However, agricultural production in the region is prone to the vagaries of climate change, fluctuating food prices, a rapidly growing population in the urban areas and natural resource degradation. Even though governments have intensified efforts to develop agriculture in the region, intra-regional trade in staple food grains is still very low.

The Technical Centre for Agricultural and Rural Cooperation (CTA) is repositioning itself in key strategic areas in order to support the development of agriculture in the East African Community (EAC). The two strategic, key priority intervention areas include: i) to support policy practice and strengthen institutional capacity for policy analysis and advocacy; and ii) to support inclusive and sustainable value chains in selected strategic food commodities especially the food grains – maize, millet, rice and sorghum. In order to inform the operationalisation of its strategic plan, CTA commissioned Kilimo Trust to conduct a rapid assessment of the maize, sorghum, millet and rice value chains in the EAC. The main objective of the study is to provide CTA with: (i) an understanding of the salient features of the four food-grain value chains in the EAC region, and (ii) information and possible entry points about the types of commodities to be supported and the nodes of the food-grain value chains that interventions should focus on. The methodological approach used to conduct the assessment was mainly secondary data analysis and a few key informant interviews.

The findings reveal that maize and rice have similar value chains that are well developed and vertically integrated. In the 1960s and 1970s, governments in the region promoted maize as a food security crop and supported rice production to reduce imports. Millet has the least developed value chain and is the least supported food grain in terms of research and investments. The sorghum value chain is fairly well developed because it is a key ingredient in the brewing industry.

Further scrutiny of various nodes of the value chains shows a clear structure of actors. At the input node level, most of the actors are small agro-dealers in the maize and rice value chains and they supply seeds, agrochemicals, equipment and tools. Sorghum and millet both have no formal input supply system and use mainly informal, home-saved seed. Some of the challenges identified at this node include: limited adoption of certified seed leading to persistent use of low-quality land races by smallholders; weak enforcement of regulation and quality standards by national standards bureaux, which exacerbates proliferation of counterfeit and adulterated inputs; absence of proper storage facilities for inputs leading to deterioration and contamination; a poor perception and low opinion of millet and sorghum as being inferior and only for poor people in remote, semi-arid regions.

The majority of maize and rice producers are smallholders with fewer than 5 ha of land. Some 20% of farmers are organised in farmer groups, while large commercial farmers account for 10% of producers. Sorghum is produced mainly by smallholders (85%) and farmer groups (15%) under contract farming arrangements. Millet is essentially produced by smallholders. Producers are the main actors in the value chains profiled. Challenges faced by producers include: low economies of scale caused by fragmented production and low levels of productivity; land tenure insecurity and lack of ownership of productive resources; weak extension systems; and limited and unreliable market information to guide production and trade.

On the processing node, the majority of the actors are small-scale processors using diesel-powered mills. About 2% of processors in the food-grain value chain are large-scale operators. Most of the processing done in the four food-grain value chains is primary. Challenges faced by processors include: inconsistent supply of raw materials (produce); expensive and intermittent electricity supplies, which disrupts operations; and lack of affordable spare parts and skilled personnel. Most machines are imported from Asia and Europe without local spare parts and people trained to operate them.

Trading of maize, sorghum, millet and rice is largely informal by small- and medium-sized enterprises situated in the areas of production. Large traders of maize and rice operate nationally, regionally and internationally and they constitute approximately 5% of all traders. Challenges faced by food-grain traders include: inadequate and untimely market information; insufficient and inadequate market-level storage and bulking facilities among private sector trading agents and assemblers of grain; poor rural infrastructure that increases the cost of transport; inappropriate financial products for traders; lack of harmony in quality standards in the region; and an unfriendly business environment arising from inconsistent and incoherent trade policies.

Gender roles in the four food-grain value chains are clear and distinct. Women are predominately involved in activities at the production node. Activities such as sorting and grading at the processing node are dominated by women, while transporting, loading and offloading are predominately male roles. However, this gender role distribution does not translate to commensurate financial benefits because women do not own land and have limited access to agricultural financial products.

There are a number of value-chain institutions (VCIs), value-chain support institutions (VCSIs) and value-chain support-service providers (VCSSPs) participating in the selected chains. VCIs are member-based and voluntary organisations of agricultural value-chain actors that aim to improve access to markets, enhance organisational management and improve cooperation, collective bargaining and advocacy. They include farmer cooperatives, business associations and civil society organisations like the Union of Rice Cooperatives (Butare, Rwanda) and the Association of Kilombero High Quality Rice Growers (Tanzania). VCSIs, also called 'enabling institutions,' take the form of overarching policy and regulatory frameworks. They operate at national level often as public institutions and services. They aim to influence the functioning of agricultural product markets by enhancing the effectiveness of policies, strategies, laws and regulations.

The main actors are national standards agencies and seed certification institutions. VCSSPs offer services such as training, finance, research and extension to actors along agricultural value chains. They include government agencies such as private sector foundations, national research systems/organisations and financial institutions.

Several development initiatives were identified at both national and regional levels. Most of the regional initiatives were implemented by development partners and implemented by sub-granting or subcontracting arrangements mainly in Kenya, Uganda and Tanzania. In the case of national initiatives, most of those in Tanzania focused on the rice value chain, while in Kenya it was on the sorghum value chain, in Uganda it was maize and rice value chains, and in Rwanda it was maize, rice and sorghum value chains.

A number of coordination structures and platforms were identified in the five countries. Most of these exist to strengthen and facilitate the development of the value chains. The structures or platforms identified include trade associations, regional commodity networks, online platforms, non-governmental organisations (NGOs) and civic organisations, cooperatives and farmer associations along with agriculture sectoral committees of national and the East African parliament.

In order to have an impact on the majority of the actors in the four food-grain value chains, a number of intervention areas are proposed. These include:

- In the sorghum, rice and maize value chain:
  - Strengthening the capacity of agro-input dealer associations to comply with quality standards at the input nodes through collaboration with national input dealer associations.
  - Promoting and supporting the existing extension services system in the EAC at the production nodes, in partnership with support agencies like BRAC and the Regional Universities Forum for Capacity Building in Agriculture (RUFORUM).
  - Strengthening market information systems at the production and trading nodes in

collaboration with organisations such the East African Grain Council (EAGC), Agri-ProFocus and the Grameen Foundation.
  - Supporting capacity building of trade associations in order to drive policy change and the creation of business-friendly policies at the processing and trading nodes. This can be achieved by strengthening the capacity of advocacy agencies such as trade associations including EAGC, the East African Business Council (EABC); farmer groups such as the Uganda National Farmers Federation (UNAFFE); and NGOs such as Kilimo Trust and the Southern and Eastern African Trade, Information and Negotiations Institute (SEATINI).
  - Support the review and harmonisation of policies and regulations designed to attract private sector investments in agricultural mechanisation with organisations like the Kilimo Trust, the East African Farmers' Federation (EAFF) and SEATINI.

- In the millet value chain:
  - Developing programmes to promote awareness among consumers of the health benefits of millet so as to increase demand and drive production and research at the input and production nodes, in partnerships with organisations such as the East and Central Africa Regional Sorghum and Millet Network.

Introduction

Background

As part of refining the operationalisation of its strategic plan, Technical Centre for Agricultural and Rural Cooperation (CTA) has developed a series of six Regional Business Plans (RBPs) that specify the key priority intervention areas (KPIAs) and the priority value chains for the Centre for the next three years (2015–2017). For **Eastern Africa, the objectives of CTA's three-year priorities** are to:

- enable CTA to achieve targeted outcomes that are consistent with its strategic directions and regionally-defined agricultural and rural development goals
- help better identify target clients and outline market segments and opportunities
- enable CTA resources to be utilised optimally by avoiding overlaps and creating synergistic effects, and
- provide a medium for interaction with partners, including potential funding agencies.

The Eastern Africa RBP has two specific KPIAs and related objectives:

1. **KPIA 1**: Support policy implementation and strengthen institutional capacity for policy analysis and advocacy in CTA's key thematic focus areas.

2. **KPIA 2**: Support inclusive and sustainable value chains in selected strategic food commodities.

In its work in the Eastern Africa region, CTA will focus on food grains (maize, millet, rice and sorghum), fish and livestock.

To support the operationalisation of the Centre's strategic plan in Eastern Africa, Kilimo Trust has been commissioned to undertake a meta-analysis and rapid assessment of the maize, millet, sorghum and rice value chains in the East African Community (EAC).

Objectives

The study has two main objectives: to provide CTA with (i) an understanding of the salient features of the four food-grain value chains in the EAC region, and (ii) information and possible entry points about the types of commodities to be supported and the nodes of the food-grain value chains in which interventions should focus.

Methodology

This study employed primary and secondary data analysis as a methodological approach. Primary data sources included interviews with key stakeholders in the selected food-grain value chains in Eastern Africa. Interviews were conducted with grain traders, researchers, processors, input suppliers, farmers and heads of institutions in Kampala, Nairobi, Dar es Salaam, Kigali and Bujumbura (See Annex 1). Secondary data analysis included review of annual reports of the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) and the National Agricultural Research Organisation (NARO) in Uganda; the Ministry of Agriculture, Rwanda (MINAGRI) and the Rwanda Agricultural Board (RAB; and the Ministry of Agriculture, Food Security and Cooperatives (MAFC) and Mikocheni Agriculture Research Institute (MARI) in Tanzania. Other documents that were reviewed include national policy documents such as the agricultural strategic plans of Uganda, Rwanda, Kenya, Tanzania and Burundi; regional policy documents such as the EAC agriculture and investment policy, and reports from the Comprehensive Africa Agriculture Development Programme (CAADP). Some of the other documents included programme documents, published and unpublished, and documents from development institutions such as the United States Agency for International Development (USAID), the German Federal Enterprise for International Cooperation (GIZ), the United Nations Development Programme (UNDP), the Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA) and Kilimo Trust.

Organisation of the report

The remainder of this report is organised as follows: chapter two provides a synopsis of the agricultural sector and food-grain subsectors in the EAC. This is followed by a chapter that offers an overview of the four food-grain value chains highlighting their current status, opportunities and challenges. Chapter four provides information on the institutions and actors in the four value chains while chapter five describes the current value-chain development initiatives. Chapter six offers insights into the coordination structures and platforms that exist in these value chains. Thereafter, chapter seven provides a summary of the challenges and recommended areas for CTA support in the selected food-grain value chains.

An overview of the agricultural sector and the food-grain subsector in Eastern Africa

Agriculture in the EAC

The EAC, which consists of Burundi, Kenya, Rwanda, Tanzania and Uganda, is estimated to be the home of 143.5 million people and an economy with an estimated market size of US$98 billion in 2012 (EAC, 2014). Agriculture is one of the Eastern African region's most important sectors, with about 80% of the population of partner states living in rural areas and depending on smallholder mixed-farming for their livelihoods. The main staple foods in the region are maize, rice, potatoes, bananas, cassava, wheat, sorghum, millet and pulses.

Agriculture in the region is dominated by small-scale producers, most of whom produce at subsistence level with little surplus for sale. This is despite the realisation that with help, they have considerable scope to turn their farming activities into businesses. Extensive investments by national governments, non-governmental organisations (NGOs) and development partners have provided agronomy-based support to farmers, but without sufficiently addressing market constraints. These efforts only result in production surges that lead to price collapses in thinly traded national markets. This points to a failure to integrate established value-chain approaches in food-grain sector development strategies.

In addition, production of staple cereal grains is constrained by low levels of mechanisation. There is no economic activity where sub-Saharan Africa has been more comprehensively by-passed by technological development than in agricultural operations especially crop production (Hatibu, 2013). More than 80% of farmers do not own, have access to, or use even oxen or mules (let alone tractors) for agricultural field operations. Over 90% of the transportation of agricultural produce from field to home and/or local markets is done on the heads of women and children. Studies show that the EAC has one of the lowest power usages (manual, animal and mechanical) and the lowest level of farm mechanisation. The average number of tractors is about 28 tractors per 1,000 ha compared with the world average of 241 tractors per 1,000 ha (Houmy *et al*., 2013). Consequently, between 50% and 80% of the area under cultivation of staple food crops such as maize, rice, sorghum and millet continues to be through back-breaking manual labour (Clarke, 2008). This leads to very low yields per unit of labour, to the extent that often the food produced is just enough to recover the calories expended in its production (Kibalama, 1993).

Moreover, the agricultural sector in this region is still prone to the vagaries of climate change, unpredictable food prices, an ever-increasing population exerting pressure on limited arable land and in turn on food security, and natural resource degradation. Furthermore, changing consumer preferences in this market, influenced by growing rural-urban migration, and increasing incomes among the urban middle-class have seen an increase in demand for processed foods and a move away from traditional staple foods.

Although most governments in the EAC have conducive policies for staple food production and the governments in the region are committed to developing agriculture, as attested to by the adoption of the Common Agriculture and Rural Development Policy and the EAC Food Security Action Plan and the lowering of intra-regional trade barriers to enhance trade, intra-regional trade in food staples like maize, rice, sorghum and millet is still only a small percentage of the total regional trade.

Most of the cross-border food trade in the region is informal. Formal trade in food staples accounts for only 13% of the total trade volume in the EAC (Kippra, 2012). Informal trade poses serious challenges to governments and other business stakeholders in the EAC resulting in the absence of information on the magnitude and direction of trade flow in agricultural food products, loss of government revenue, and the underestimation of the value of national accounts and balance of payment statistics (Fonjong, 2004; UBOS, 2006; Nkedah, 2010).

This further complicates the formulation of appropriate economic policies and strategies that would improve markets and trade in food crops, which is especially important considering that the majority of those employed in the sector are poor. Moreover, in order to achieve food and nutrition security and improve the incomes and livelihoods of the majority of the population in the region, intra-regional trade of food staples is key.

The food-grain subsector: a commodity perspective

Food grains that have food and income security implications for both commercial and smallholder farmers include maize, rice, sorghum and millet. Although these staple food grains are generally considered as food security crops (since they are produced for own household consumption), currently they are recognised as dual crops providing both food and income needs of farmers.

The East African Grain Council (EAGC) reported in 2013 that food grains are the most traded agricultural products accounting for 32% of the region's total agricultural cross-border trade – both formal and informal (USAID, 2010a). These food grains are among the most traded commodities because they can be transported long distances unlike roots and tubers, which are bulky and highly perishable (Chemonics, 2010).

The greater importance of these grains is reflected by the large share of arable land allocated to these crops. For example, in EAC a total of 6.84, 1.28, 1.62 and 0.63 million ha of land are allocated to maize, rice, sorghum and millet production, respectively. This means that more than 80% of arable land is dedicated to growing these crops in EAC (MAFC, 2009; UBOS, 2009; MOA, 2011; FAOSTAT, 2012). Furthermore, in a study conducted by Kilimo Trust to compare the number of smallholder households involved in the production of 40 food commodities in the EAC, maize was ranked first by over 9 million households (Kilimo Trust, 2011). Sorghum, rice and millet were ranked 13th (2 million households), 17th (1.5 million households) and 18th (0.7 million households), respectively.

The four food grains are estimated to employ about 65% of smallholders, 15% of agricultural commodity traders and 25% of food processors in Eastern Africa (Govereh *et al.*, 2008; EAGC, 2014). Scoping and value-chain studies in EAC by various institutions indicate that the four cereal grains are valuable food and income-

Table 1: Maize production, consumption and level of sufficiency in Eastern Africa in 2011

ITEM	TANZANIA	KENYA	UGANDA	RWANDA	BURUNDI	EAC
Area planted (ha)	3,287,850	2,131,887	1,063,000	223,414	128,000	6,834,151
Total production (t)	4,340,823	3,376,862	2,551,000	525,679	128,483	10,922,847
Consumption (t)	2,647,202	3,239,220	1,429,197	157,376	137,000	7,611,860
Surplus/(deficit) (t)	1,693,621	137,642	1,121,803	368,303	(8,517)	3,312,852
Surplus/(deficit) (%)	64	4	78	234	(7)	44
Source: FAOSTAT, 2015						

generation crops with considerable potential industrial use (ASARECA, 2012; Kilimo Trust, 2011; USAID, 2010a).

Recent projections show that demand for the four food grains is expected to grow dramatically in the coming decades because of the high rate of urbanisation, rapid population growth in rural areas and climate-induced food deficits in fragile ecologies (Govereh *et al*., 2008; Kilimo Trust, 2011). This scenario presents opportunities for improvements in production, processing and use and considerable scope for the development of intra-regional trade in food staples. However, regions with food staple surpluses in the EAC often lie within political borders of individual countries. Therefore, trade and movement of the staple foods from surplus regions to deficit regions face tariffs and non-tariff impediments to cross border points (EAGC, 2014). These raise the cost of doing business, lower incentives for producers and raise consumer food prices in cross-border deficit markets.

Maize

Maize is ranked number one as a food security crop by the ministries of agriculture in the region (NARO, 2006; MAFC, 2009; USAID, 2010a; MOA, 2011). It provides nutrients for humans and animals, and serves as a basic raw material for the production of starch, oil and protein, alcoholic beverages, food sweeteners and, more recently, bio-fuel. Compared with other crops in the region, per unit area, maize is high-yielding, easy to process, readily digested and costs less than other cereals. It is also a versatile crop, growing across a wide range of agro-ecological zones in the region. In addition, every part of the maize plant has economic value: the grain, leaves, stalk, tassel and cob can all be used to produce food and non-food products (UBOS, 2009; AGRA, 2011).

Tanzania is the largest maize producer in the region (3.3 million t), followed by Kenya (2.1 million t); Burundi produces the least maize (Table 1). With the exception of Burundi, all the countries in the region experienced a maize surplus in 2011. The EAC region as a whole produced over 40% more maize than it consumed in 2011.

Rice

Rice is the second most important food grain in the EAC in terms of production and consumption. Rice is ranked second after maize in Tanzania and Uganda (RLDC, 2009; MAAIF, 2009) and third after maize and wheat in Kenya. Milled rice is mainly consumed and

Table 2: Rice production, consumption and level of sufficiency in Eastern Africa in 2011

ITEM	TANZANIA	KENYA	UGANDA	RWANDA	BURUNDI	EAC
Area planted (ha)	1,119,324	28,031	90,000	14,592	28,200	1,280,147
Total production (t)	2,248,320	111,229	233,000	80,541	91,415	2,764,505
Consumption (t) – paddy equivalent	1,374,230	648,166	293,026	131,094	92,512	2,539,028
Surplus/(deficit) (t)	874,090	(536,937)	(60,026)	(50,553)	(1,097)	225,477
Surplus/(deficit) (%)	64	(83)	(20)	(39)	(1)	9
Source: FAOSTAT, 2015						

the by-products converted into animal feed. In the EAC, over 1.4 million farming households depend directly on rice for food and income security. On average, smallholders earn about US$550/household/year from rice production (Kilimo Trust, 2013).

Total annual regional production of milled rice is around 2.76 million t. Tanzania is the region's largest rice producer (2.25 million t in 2011), followed by Uganda (Table 2). With the exception of Tanzania, all countries in the region recorded a rice deficit, although overall the EAC region recorded a rice surplus of 225,477 t (9%) in 2011.

Sorghum

Sorghum is an important food grain in Eastern Africa especially in the arid and semi-arid parts of the region (ASARECA, 2012). The crop is ranked third after maize and millet in Uganda (NARO 2006; MAAIF 2010), third in Tanzania after maize and rice (MAFC, 2009) and fourth in Kenya after maize, wheat and rice (MOA, 2011). In East Africa, sorghum has two basic markets – the human food and animal feed markets. The animal feed industry is an important market for sorghum, as it is used in the production of poultry, pet, pigeon and ostrich feeds. There is also a growing brewing industry that is increasingly substituting barley with sorghum, because sorghum has lower production costs in the region (USAID, 2009).

In East Africa sorghum is grown on over 1.6 million ha (Table 3). Although, the region is self-sufficient in sorghum production, with a surplus of 864,208 t, pockets of deficit remain in Burundi. Two countries – Tanzania and Uganda – drive the regional surplus.

Formal (government-regulated) markets handle a small proportion of the total sorghum produced in the region. In Tanzania 10% of the output is handled in the formal domestic markets (ASARECA, 2012). Most of the sorghum produced in the region is consumed by producing households or sold in informal markets, for brewing traditional or local liquors (Rohrbach, 2004).

Despite the importance of sorghum as one of the priority food grains in the EAC, the crop's economic contribution to individual member states' national development is well below its potential. The reasons for this low performance include:

Table 3: Sorghum production, consumption and level of sufficiency in Eastern Africa in 2011

ITEM	TANZANIA	KENYA	UGANDA	RWANDA	BURUNDI	EAC
Area planted (ha)	811,164	254,125	364,000	119,355	67,800	1,616,444
Total production (t)	806,575	159,877	437,000	151,754	86,854	1,642,060
Consumption (t)	347,723	82,523	135,460	125,146	87,000	777,852
Surplus/(deficit) (t)	458,852	77,354	301,540	26,608	(146)	864,208
Surplus/(deficit) (%)	132	94	223	21	(0.2)	111
Source: FAOSTAT, 2015						

- A limited ready market in the rural areas.
- The crop is vulnerable to attack by quelea birds; daily scaring of birds is required, which increases the cost of production.
- Limited investment and research in the crop; for instance, in Kenya there have been only 18 hybrids of sorghum released compared with 164 improved maize varieties up to the year 2011 (Mwadalu and Mwangi, 2013).

Millet

Finger millet is an important food grain for farmers in the semi-arid areas in Eastern Africa (ASARECA, 2012). Finger millet production in Eastern Africa has been on the rise, driven by domestic demand and higher market prices than other cereals (Obilana, 2002). The popularity of the crop is the result of some useful characteristics of the crop, such as the fact that its small seeds can be stored safely for many years without insect damage, making it a traditional component of farmers' risk avoidance strategies in drought-prone parts of the region. Finger millet is also an excellent dietary source of calcium, iron, manganese and methionine, an amino acid lacking in the diets of millions of the poor who live on starchy foods such as cassava, plantain, polished rice and maize meal. Finger millet can also grow in a wide range of agro-ecological zones (Takan *et al.*, 2004; Obilana *et al.*, 2002).

Finger millet is cultivated on 627,960 ha of arable land in Eastern Africa. Production is highest in Tanzania and Uganda (Table 4). The region recorded a millet surplus of 297,964 t (74%) in 2011.

Despite the importance of crop for the livelihoods of millions of smallholders in Eastern Africa, its potential is not fully realised. This is partly because:

- millet yields are inherently very low compared with other food grains; for instance, millet yields an average of 600 kg of grain per ha, compared with 2,500 kg of upland rice
- production is labour intensive
- the market is limited even in rural areas since it is largely produced for home consumption
- there is little research investment by national and international research organisations
- the crop is vulnerable to attack by birds.

Table 4: Millet production, consumption and level of sufficiency in Eastern Africa in 2011

ITEM	TANZANIA	KENYA	UGANDA	RWANDA	BURUNDI	EAC
Area planted (ha)	328,112	111,271	172,000	5,377	11,200	627,960
Total production (t)	312,035	73,396	292,000	8,624	12,000	698,055
Consumption (t)	134,926	43,953	200,869	8,343	12,000	400,091
Surplus (t)	177,109	29,443	91,131	281	0	297,964
Surplus (%)	131	67	45	3	0	74

Source: FAOSTAT, 2015

Structure of the East African food-grain value chain: current status, opportunities and challenges

In the extensive value-chain studies conducted by Kilimo Trust, food staple value chains have been mapped into four distinct nodes – input supply, production, processing and trading (Annex 2). The subsequent sections present the analysis conducted using the structure approach of the four nodes of the four food-grain value chains. It is important to note that the four food-grain value chains exhibit similarities and convergences in many aspects. However, points of divergence exist in the different nodes and they will be highlighted.

Input supply node

The major inputs used in cereal grain production in the EAC include seeds, fertilisers, pesticides and herbicides. There is variable level of usage of these inputs in the EAC region. In terms of input use, the most used inputs by smallholders who dominate cereal grain production are seeds, herbicides, pesticides and fertilisers in descending order (USAID KAVES, 2014). Shelf space share studies among agro-input stockists in EAC indicated that seeds occupy 58% of space compared with 23% for herbicides, 13% for pesticides and 6% for fertilisers (AGRA, 2011). In cereal grains the most commonly used input is seed.

The seed supply system in Eastern Africa is focused on only a few crops. More than 80% of seed companies in Uganda deal in maize, beans and rice while only 5% stock sorghum (MAAIF, 2009). Farmers obtain millet seed from local, informal markets or save their own seed.

The Seed Traders Association of Kenya estimates the total demand for maize seed at 47,000 t, of which the formal sector provides 62% and the informal sector provides 38%. The situation is worse in Uganda and Tanzania where only 13% and 8% of farmers, respectively, use certified seed.

The Eastern Africa input supply sector is structured into three major categories of input suppliers – large, medium and small. The analysis conducted at the input supply node is for maize, rice and sorghum. There are no formal large, medium or small input suppliers of millet in the region. Fertiliser application and agro-pesticides for millet production are rarely stocked.

Large input suppliers: These constitute about 10% of the total input suppliers but control over 80% of the market share in the region. These companies dominate the seed, fertiliser and pesticide sector. For example, in Kenya, Kenya Seed Company dominates the seed market, controlling 70% of the market share while its subsidiaries like Simlaw Seeds control over 30% in neighbouring Uganda and Rwanda. Bayer Chemicals (East Africa) dominates the pesticide and herbicide industry and competes closely with global giants such as Monsanto. These companies operate regionally, are mainly located in major cities but with distribution networks countrywide, and have a large capital base with processing plants, machinery and cutting-edge technologies to manufacture and process the inputs.
These suppliers are legally registered seed or agrochemical enterprises and they serve large-scale farmers and institutional buyers who purchase in bulk. Usually their products are certified by the International Organization for Standardization (ISO), Kenya Bureau of Standards and the Uganda National Bureau of Standards.

Medium-sized input suppliers: These constitute about 30% of input suppliers in the region and control about 10% of the input market. They are legally registered enterprises that dominate mainly local and national markets, and serve medium- to large-scale farmers.
Most seed companies in Uganda belong to this category. Companies such as Pearl Seed Ltd and Equator Seed Ltd have a strong seed-market presence of 25% and 20% in Uganda, respectively, but are not present in other countries in the region. Community seed multipliers, such as the Child Rights Empowerment and Development Organisation in Uganda, also

belong to this category. Chemical and fertiliser companies of similar sizes are either subsidiaries or licensed agents of the large companies. For example, a company like Balton supplies agrochemicals and is a subsidiary of a multinational company in Israel. The distinct feature of this category of suppliers is that they contract farmers to grow foundation seeds or bigger companies to produce chemicals on their behalf. They also operate in major towns and urban centres. Most of these suppliers comply with quality standards and are certified by local and international certification agencies.

Small-sized input suppliers: These constitute up to 60% of the input suppliers in the region. They are mainly sole-proprietor enterprises that control very little of the national market share because majority of them are stockists and agents of the large or medium-sized companies/suppliers. These companies break down the bulk of the handled inputs for end-users of seeds, fertilisers and pesticides. Many of the informal input suppliers also fall in this category.

One of their biggest challenges is conforming to certified quality standards in the region because they repackage bulk inputs into smaller packages to meet the needs of their customers – mainly small and subsistence farmers. It is during this process that most of the adulteration and contamination take place.

Opportunities and challenges at the input node

The input supply node has a number of opportunities and challenges, and the main ones are identified in Table 5.

Production node

The food grains production node is greatly disaggregated by the size of the farm, the scale of operations, asset ownership, level of mechanisation and the purpose of production. Similarly, actors at the production node can be classified into three categories – large, medium or small producers.

Table 5: The main challenges and opportunities at the input node

CHALLENGES	OPPORTUNITIES
• Limited adoption of certified seed leading to persistent use of low-quality land races by smallholders. • Weak enforcement of regulation and quality standards by national standards bureaux and this exacerbates proliferation of counterfeits and adulterated inputs. • Absence of proper storage facilities for inputs, leading to deterioration and contamination. • A poor perception and low opinion of millet and sorghum as being inferior and only for remote and poor people in semi-arid regions, therefore their seeds are rarely stocked by agro-input dealers.	• The growing demand for inputs especially quality seed, fertilisers and pesticides. • An emerging industrial base that demands high quality and large volumes of raw materials – especially sorghum and maize – that are being promoted as substitutes for imported barley in the brewing industry. In Kenya, Uganda and Tanzania the leading beer brands are sorghum-based beers. • Availability of high-performing seed varieties in the region – hybrid maize seeds, Tegemeo, Epuri-pur sorghum varieties and New Rice for Africa (NERICA) rice varieties.

Large food-grain producers: These constitute a small proportion of farmers in East Africa. Farmers in this category own more than 30 ha of land, specialise in monocropping and use improved seeds, pesticides and fertilisers. This category of farmers has mechanised most farm operations. Land preparation, planting, fertiliser application and weeding are performed by tractors while harvesting is done by combine harvesters (Houmy *et al.*, 2013; Hatibu, 2013). These farmers also have irrigation facilities in case of poor rainfall (Hatibu, 2013). Production is highly commercialised as all the produce harvested is for sale. These enterprises are usually registered as limited companies and have well-established management structures with a separate management team and board. They employ in excess of 300 farm workers and usually operate within structured markets to serve institutional buyers and large-scale traders. Kenya appears to have the largest concentration of large-scale food-grain farmers. It is estimated that about 5% of maize and rice farmers in Kenya are large producers. There are 1,000 large-scale maize producers in Kenya and they contribute about 20% of all the maize produced in the country (USAID KAVES, 2014). On the other hand, in Uganda and Tanzania only about 2% of farmers qualify to be considered large-scale farmers. There was no evidence to show that millet and sorghum production is done on a large scale.

Medium-sized food-grain producers: These constitute 15–20% of the food-grain farmers in the EAC region. About 2,500 medium-sized maize producers in Kenya contribute 10% of all the maize produced in the country (USAID KAVES, 2014). The average farm size is between 5 ha and 30 ha. They too specialise in monocropping and use improved seeds, fertilisers and pesticides. They are highly commercialised and operate in large groups usually registered as producer groups, cooperatives or limited enterprises. These farmers, when in groups, have well-structured leadership systems and own assets such as land, warehouses and mechanised farming equipment. These farmers have some farm operations mechanised while others are manual. Land preparations, planting and weeding are performed by tractors (Houmy *et al.* 2013) or animal draught power (FAO, 2013). This category of farmers rarely own combine harvesters or irrigation facilities (Hatibu, 2013). Kilimo Trust (2014a) estimates that medium-sized producers own assets valued at US$150,000 in Uganda and US$400,000 in Tanzania. Research indicates that majority of farmers growing sorghum for breweries in Uganda and Kenya fall under this profile. Similarly, rice farmers (group producers) in Tanzania, Rwanda and Burundi belong in this category. Millet farmers do not belong to this group.

Small-scale food-grain producers: The majority of food-grain producers fall in this production segment. In the case of maize and sorghum they constitute about 75% of producers in Kenya, 82% in Tanzania, 85% in Uganda, and 95% in Burundi. There are approximately 2.973 million smallholder maize farmers in Kenya alone (USAID KAVES, 2014). There is one extension worker for every 30,000 farmers in the region. The average farm size is less than 5 ha of land and they normally grow land races (local varieties) as intercrops to minimise the risk of losses. This category of farmers has the least farm operations mechanised in terms of animal and power usage. Land preparation, planting, weeding, harvesting and transportation of produce are performed by human labour, while in limited cases produce is transported by animal-pulled carts (FAO, 2013). In cases where farmers use tractors, they are often hired from other tractor owners (USAID KAVES, 2014). Most smallholders in the region lack land titles/proper land tenure security because the land is owned by the community, cultural leaders or the government. As a result, there is fear of arbitrary confiscation, which leads to low levels of investment in long-term improvements to land. Often they operate informally, while a few are registered as sole proprietors or limited liability companies. The assets owned usually include bicycles, motor cycles and locally-made storage facilities. They own assets valued at US$2,000–10,000 in Uganda and US$2,000–70,000 in Tanzania (Kilimo Trust, 2014a).

The food-grain value production node exhibits a number of challenges and opportunities, shown in Table 6.

Table 6: The main challenges and opportunities at the production node

CHALLENGES	OPPORTUNITIES
• Low economies of scale caused by fragmented production and low levels of productivity as a result of: – little knowledge and access to technologies (fertilisers, seeds, post-harvest technologies, good agricultural practices [GAP], etc.) – insufficient bulking infrastructure in areas of production and underutilisation of existing ones – individualistic mode of operation where farmers prefer to work on their own and not in groups. • Weak extension systems: low staffing levels of extension workers in rural areas. • Limited and unreliable market information to guide production and trade. • Land tenure insecurity and lack of ownership of productive resources. • High ownership costs and running costs for most agricultural mechanisation machinery. Most machinery is imported and subject to import and sales taxes. Furthermore, maintenance and repair services are high due to the absence of local agents/local franchise-holders.	• All EAC governments have a public extension system in place to support farmers who produce agricultural crops including maize, rice, sorghum and millet. • The existence of a number of NGOs and community-based organisations (CBOs) funded by development partners that support farmers. • Growing awareness by the private sector of the contract farming approach as a way to achieve economies of scale and maintain quality of their products. • The shifting perceptions of sorghum as an inferior crop because of its industrial use. • An increase in crop finance (although interest rates are still high) for farmers in commercial banks, normally with guarantees from national governments or development partners.

Processing node

Most of the processing that takes place in the maize, rice, sorghum and millet value chains is primary processing, which includes sorting, drying and milling into flour. Tertiary processing in these value chains occurs mainly in the case of sorghum in the beer brewing industry. Similarly, the structure of actors at the processing node can be classified into three categories – large, medium or small producers.

Large food-grain processors: These make up a small proportion of processors in Eastern Africa. It is estimated that about 3% of maize, rice and sorghum processors in Kenya and Tanzania are large-scale processors. In Uganda and Rwanda only about 2% of farmers qualify to be considered large-scale processors. Processors in this category are multinational or regional companies with subsidiaries in different countries. These enterprises are legally registered as limited companies with well-defined management structures and employ in excess of 1,000 workers. Their asset base can be valued at more than US$1 million and includes land, warehouses, large automated processing mills (more than 100 t capacity per day) and trucks. Their customers usually include institutional buyers and large-scale traders. Companies belonging to this category include East African Breweries, Unga Ltd and Pembe Ltd in Kenya; Uganda Grain Millers, Mukwano Industries Ltd and Tilda Ltd in Uganda; Azam in Tanzania; and MINIMEX in Rwanda.

Medium-sized food-grain processors: These constitute 10–15% of the food-grain processors in the EAC region. They operate in large groups as registered producer groups, cooperatives or limited enterprise. Those in cooperatives or groups have well-structured leadership systems. They are situated in towns in East Africa and are involved in primary processing. They own assets such as electric dryers, warehouses, processing machinery (10–100 t capacity per day), factory premises, post-harvest handling (PHH) equipment, packaging and sealing machines, large weighing scales and trucks. Kilimo Trust (2014a) estimated that they own assets valued at US$200,000 in Uganda and US$250,000 in Tanzania. Medium-sized processors in Uganda include Maganjo Grain Millers Ltd and Africa Basic Foods; in Kenya, Osho Grains Ltd and Eldoret Grain Millers; in Tanzania, companies such as Ruaha Milling enterprises and Mohamed Enterprises; and some cooperatives in Rwanda like the Coopérative des Agriculteurs des Maïs dans la Zone des Volcans (COAMV) and Sopar.

Small-scale food-grain processors: The majority of food-grain processors fall in this segment. It is estimated that there are over 10,000 small-scale millers in Kenya that handle maize, sorghum and millet compared with only 109 medium- and large-scale millers (USAID, 2010a). They are mainly informal enterprises and are situated in small towns and rural trading centres. The assets owned include small stores, diesel-operated mills (less than 10 t per day), small trucks, and assets valued at US$5,000–20,000 in Uganda and US$5,000–50,000 in Tanzania (Kilimo Trust, 2014a).

The processing node of the food grains value chain in EAC is almost fully mechanised (Hatibu, 2013). Large-, medium- or small-scale processors all own hammer mills and their popularity is attributed to low investment costs and the immediate benefits they provide to owners (Smale and Jayne, 2003). For example, a small hammer mill with a 3 kW diesel engine will produce about 150 kg of coarse flour per hour, which is revolutionary compared with manual grinding.

Table 7: The main challenges and opportunities at the processing node

CHALLENGES	OPPORTUNITIES
• Inconsistent supply of raw material produce. Most farmers are involved in rainfed agriculture and changes in climatic patterns have resulted in unreliable rainfall. Furthermore, productivity of most farmers is low. • High cost of electricity that is intermittent and disrupts operations. • Lack of affordable spare parts and skilled personnel. Most machines are imported from Asia and Europe without local spare parts and people to operate them.	• The potential to generate more income from the underutilised processing mills in the region is high. • There is increasing demand for all staples in the region including maize, rice, sorghum and millet – which would provide raw materials for the industries.

In addition, many large-scale processors have invested in grain-drying technologies such as electric dryers. For example, in Kenya, large processors such as Lesiolo Maize Mill Company operate mobile dryers (USAID KAVES, 2014).

Governments in the region have enacted policies that support local processing by setting up industrial parks where food processing enterprises can be situated. For example, in Rwanda and Uganda industrial parks have been developed in Kigali and Namanve, respectively. The current capacity utilisation of grain mills is approximately 55% in Kenya and 40% in Rwanda.

There are a number of challenges and opportunities that exist at the processing node and they are highlighted in Table 7.

Trading node

Trading of maize, rice, sorghum and millet in the region is largely informal. Traders are usually involved in one activity i.e. trading often in multiple products. In addition, food-grain traders often have strong linkages with millers, retailers and supermarkets through formal or informal contracts. Actors at the trading node can be classified into three categories – large, medium or small traders (Kilimo Trust, 2014a).

Large-scale food-grain traders: There are few large food-grain traders in the region – about 5% of the total traders. Most of these traders are processors as well and are multinational or regional companies with subsidiaries in different countries. They usually employ more than 500 workers. Examples include: Export Trading Company Ltd in Kenya; Uganda Grain Trading and Aponye Company Ltd in Uganda; Export Trading – Babati in Tanzania; and MINIMEX in Rwanda. The kind of assets they own include: warehouses (average storage capacity of approximately 20,000 t), land and trucks valued in excess of US$1 million.

Medium-scale food-grain traders: These are usually general traders selling not only rice, maize, sorghum or millet but also other products. Most of these traders are individuals, families and groups living in towns in the region. Those that are formal enterprises are registered as associations, cooperatives, sole proprietors and limited liability companies. They own assets such as milling machines, factory premises, PHH equipment, trucks and storage facilities. Kilimo Trust (2014a) estimates that a medium-sized food-grain trader would own assets valued at US$50,000–150, 000 in Uganda and US$50,000–400,000 in Tanzania. In Kenya, medium-sized maize traders handle up to 40% of the grain traded in the value chain. In Uganda some of these traders include: Mutima Commodities situated in Kampala, Myanzi in central Uganda and cooperatives in Muhoro area of western Uganda.

Small-scale food-grain traders: The majority of food-grain traders are small and informal enterprises. They are situated in the production areas, towns and rural trading centres where they are usually registered with market authorities and local municipal councils. They own assets like small retail shops, bicycles, motor cycles, weighing equipment and are valued at approximately US$2000–10,000 in Uganda and US$30,000 in Tanzania (Kilimo Trust, 2014a).

There is increased utilisation of ICT resources in dissemination of agricultural information and services in EAC. ICT refers to any device, tool or application that permits the exchange or collection of data through interaction or transmission. ICT is an umbrella term that includes anything ranging from radio to satellite imagery to mobile phones or electronic money transfers.

Applications such as money transfer, item tracking of commodities moving through global supply chains, and knowledge and information exchange have proliferated in EAC (World Bank, 2008). For example, in Kenya, maize and sorghum farmers are offered extension services using a mobile-phone-based platform called M-Farm. The platform uses mobile phones to exchange information through short messaging services (SMS). Similarly in Uganda, The Community Knowledge Worker platform spearheaded by the Grameen Foundation, MTN mobile network and NARO are enabling farmers to access information on production, marketing, weather and food supply situations on 35 crops including maize, rice, sorghum and millet using the Google SMS search platform, with the user paying for each query at the point of purchase.

Table 8: The main challenges and opportunities at the trading node

CHALLENGES	OPPORTUNITIES
• Inadequate and untimely market information. For example, market information provided by major players such as EAGC, Infotrade and Farmgain is confined to daily average market prices, which are not adequate for proper decision-making. • Lack of sufficient and appropriate market-level storage and bulking facilities among private sector trading agents and assemblers of grain. • Poor rural infrastructure that increases the cost of transport. • Lack of financial products for traders (working capital) that could allow volume purchases and medium-term storage. • Lack of harmonised quality standards in the region. For example, the requirement for maize moisture content in Kenya is 13.5%, while in Tanzania and Uganda the standards are 13% and 14%, respectively. • An unfriendly business environment arising from inconsistent and incoherent trade policies that hamper trade in EAC member countries; these include tariffs in the form of tax regimes[1] and non-tariff barriers[2] such as roadblocks and bribes.	• Increasing demand for maize, rice, sorghum and millet within the region and neighbouring countries (especially DR Congo, Sudan and Somalia) that offer prospects for trade. • Improved regional road connectivity. The regional governments have improved the state of the northern corridor road network that connects Mombasa through Nairobi and Kampala to Kigali and Juba. Also the southern corridor that links Dar es Salaam to Kigali and Bujumbura has been improved. • Increased harmonisation of tax regimes across EAC. • Greater collaboration and presence among telecommunication (mobile phone) companies and banks reduces the cost of cross-border trade.

[1] All East African countries have VAT regimes ranging between 16 to 18% on value-added products and services. However, the bureaucracy one has to go through when filing tax returns and the paperwork required to recover VAT at the end of the financial year discourages small grain millers from benefiting from these tax incentives. Some countries such as Uganda and Tanzania have not explicitly outlined exemption regimes for special food items such as staple food grains. This is a disincentive to value addition of food grains because grain processing is treated as a value adding activity and attracts VAT charges like any other value adding activity or process.

[2] Non-tariff barriers like closing times for border points, police bribes and unofficial roadblocks to collect tax increase the cost of doing business in the region. Grain traders experience delays as a result of the roadblocks and some border crossing points close at night, which further exacerbates the slow movement of goods.

Other services that are benefiting farmers and traders of grains with an EAC-wide reach include G-Soko and Esoko, which provide price information on major food grains. However, while these ICT platforms exist in all the EAC countries, the information provided normally focuses on prices. Other information including regulatory trade requirements and average transport costs between key supply and consumption areas are not provided.

Some of the challenges and opportunities identified at the trading node are shown in Table 8.

Gender relations in the food-grain value chains

Women and men are involved in food-grain value chains as wage workers, farm managers, unpaid family workers and entrepreneurs. Their opportunities are shaped by their physical, financial and human assets of which access to land and other productive services (e.g. access to information) are key enabling factors. The various value-chain nodes are influenced differently depending on the predominant roles and functions performed by men or women. Although empirical data disaggregating the contribution of different genders at the input supply, production, processing and trading nodes of cereals in Eastern Africa is hard to come by, literature review and key informants interviews indicate the following:

The input supply node: The majority of actors, especially large and medium-sized suppliers, are owned by men. For instance, a census of agro-input dealers conducted in Uganda indicated that 79% of agribusiness enterprises were owned by men compared with 21% owned by women (UNADA, 2009). Some programmes have targeted women directly in their interventions. One example is the Feed the Future programme (2014–17) which collaborated with the International Fertilizer Development Center (IFDC) in Rwanda to involve women agro-input dealers in supply and distribution of fertilisers since they understand women farmers' unique needs. IFDC in Tanzania is also working with 18 farmer groups under the USAID NAFAKA project in which 42% of the trainers are women. By involving women as trainers and agro-dealers, these projects registered exceptionally high levels of input adoption (73%) and this in turn boosted grain yields. For example, in Dakawa (Tanzania) typical harvests average only 10 bags of rice per ha; however, by involving women as trainers and agro-dealers, yields reached 35 bags per ha (IFDC, 2013).

Production node: The majority of farmers are women and make significant contributions to staple food-grain production, processing and marketing. For example, in Tanzania, women constitute 80% of the rice production labour force in rural areas. In Eastern Uganda, women are involved in all aspects of rice, millet and sorghum production – particularly planting, weeding, bird scaring and harvesting. In the EAC, men and women are engaged in rice harvesting and threshing while rice trading is traditionally dominated by men. This gender role distribution however does not translate to commensurate financial benefits. There is a dearth of research on women's economic participation in the food-grain sector. In another context, women were observed to provide 72% of labour in horticultural crop production but obtained only 38% of the income (Dolan, 2001). The fate of women in the food-grain sector is unlikely to be much different from this, especially given that gender stereotypes are broadly similar across a wide range of agricultural production systems in the region.

Another example of the unfair allocation of benefits in relation to roles is in Uganda, in the production of sorghum for the beer brewing industry. Kapchorwa Farmers Association has yearly contracts to supply sorghum to Nile Breweries. Contracts are signed between the farmer organisation (women farmers are the majority members) and Nile Breweries. However, the farmer agreements are made for and signed by the landowners and Nile Breweries. In most cases majority of the landowners are men or the husbands of the women in the farmer association and are not even association members. Furthermore, payment for sorghum is made into the landowners' (men's) bank account, who, more often than not, invest in items that women may not prioritise. As a result incomes of women have stagnated yet the majority are involved in the grain production. In Uganda women own only 7% of the registered land. Lack of land ownership rights limits effective participation of women in the food-grain value chains.

Processing node: Formal and informal millers – whether small-, medium- or large-scale – of maize, rice and sorghum employ both men and women, but the type of activities carried out in the process of milling are gender disaggregated. A crop like sorghum typically exhibits strong gender segmentation by occupation, type of activity and level of participation in the value chain. Women's work is often arbitrarily assumed to be of lower value and men typically are involved in less burdensome ones. For example, studies conducted in Eastern Uganda at rice, maize and sorghum mills show that about 90% of back-breaking activities, such as sorting and grading of the grains, is done by women while transporting of paddy is predominately done by men (USAID, 2010b).

Trading node: Medium- and large-scale trading, including wholesale and warehousing services of the selected food grains, is predominantly done by men. On the other hand, most of the small-scale retail shops/stands – both formal and informal – in rural and urban areas are dominated by women. For instance, 70% of informal cross-border traders in the EAC are women (Shaw, 2010). Shaw further observed that 50% ownership of business of all small- and medium-sized enterprises (SMEs) in EAC are owned by women but their businesses tend to be smaller, less likely to grow, have less capital investment than male-owned firms, and are twice as likely as male-owned firms to be operating from home. Furthermore, a study on traders conducted in Tanzania indicates that 30% of rural women spend their income on transport. Women spend nearly triple the amount of time in transport activities compared with men.

Institutions and actors in the food-grain value chain in the EAC

This section provides further insight into the four food-grain value chains in EAC by providing an overview of the value-chain institutions (VCIs), value-chain support institutions (VCSIs) and value-chain support-service providers (VCSSPs) participating in these value chains. The VCIs identified are usually specific to a particular food grain or node in the value chain, however, VCSSPs often provide services to all food grains and to all the value chain actors.

Value-chain institutions

VCIs are member-based and voluntary organisations of agricultural value-chain actors that aim to improve access to markets, enhance organisational management and improve cooperation, collective bargaining and advocacy among the value-chain actors (Kilimo Trust, 2014a). They include farmer cooperatives, business associations and civil society organisations.

There is a plethora of VCIs in the EAC operating in the maize, rice, sorghum and millet value chains. In Uganda organisations such as Uganda Seed Traders Association (USTA) advocate for policies that promote use of quality seed and regulate the conduct of their 25 members (USAID, 2009). USTA was instrumental in articulating the views of traders in the formation of the Uganda Seed Act of 2006. Other organisations such as SG 2000, Oxfam, National Organic Agricultural Movement of Uganda (NOGAMU), Volunteer Efforts for Development Concerns (VEDCO) and Africa 2000 Network (A2N) have organised public dialogue meetings where representatives of smallholders present their views and concerns on seed systems development.

These forums address issues on seeds in general. Similar institutions exist in other EAC countries, for example, Seed Traders Association of Rwanda and Cereal Millers Association (CMA) in Kenya. In Uganda, farmers' associations such as Kapchorwa and Pallisa District farmers' associations actively promote sorghum and millet growing. Although farmers' organisations and cooperatives play a role in accessing markets and advocacy, they are usually constrained by financial accountability problems and poor management.

Value-chain support institutions

VCSIs are also called 'enabling institutions' and they take the form of overarching policy and regulatory frameworks. They also take the form of public institutions and services (Hellin and Meijer, 2006; M4P, 2008). VCSIs aim to influence the functioning of agricultural product markets by enhancing the effectiveness of policies, strategies, laws and regulations, and they operate at national level. The best example of a VCSI in the EAC is Kenya Plant Health Inspectorate Services, mandated to ensure that seeds produced are healthy and conform to quality standards. These institutions work on a number of food crops/commodities and development aspects. The main actors are national standards agencies and seed certification institutions. These institutions are however severely constrained in manpower and public funding and as a result their outreach and support is very weak.

Value-chain support-service providers

These organisations provide services such as training, finance, research and extension to actors along agricultural value chains. Ministries of agriculture in the EAC provide strategic sector development plans with elements that address marketing, processing, extension, credit and input supply but they are usually unable to implement proposed plans adequately because of financial and human resource constraints.

The other key VCSSPs are financial institutions like Centenary Bank in Uganda, Equity Bank in Kenya, National Microfinance Bank (NMB) in Tanzania, and Stanbic Bank in Kenya, Uganda and Tanzania that offer agricultural financial products targeting, among others, actors in the maize, rice, sorghum and millet value chains. Most of these banks offer financial support to actors at the trading node. The other nodes such as input supply and production are considered very risky and receive little bank support in the

Table 9: Value-chain institutions (VCIs), value-chain support institutions (VCSIs) and value-chain support-service providers (VCSSPs) involved in maize, rice, millet and sorghum value chains

FOOD GRAIN	VCIs	VCSIs	VCSSPs
Maize	Kenya: United Grain Millers; United Grain Growers Association Uganda: Masindi Maize Farmers Association; Uganda Seed Trade Association	**Standards bodies:** Uganda Bureau of Statistics, Kenya Bureau of Standards, Tanzania Official Seed Certification Institute **Associations:** Eastern Africa Grain Council; Uganda Grain Council; Uganda Cooperative Alliance; Kenya National Farmers Federation; Cereals Association of Kenya; National Cereals Boards; Rice Council of Tanzania; Collective Association of Rice Producers, Burundi; Confederation of Associations of Agricultural Producers for Development, Burundi; Union of Cooperation and Development, Burundi; Rwanda Farmers' Federation	**Ministries of agriculture:** MAAIF, MAFC, MINAGRI, MOA; **Ministries of trade and industry:** Tanzania Chamber of Commerce, Industry and Agriculture; Private Sector Foundation, Uganda **Financial institutions:** Cooperative Rural Development Bank, Equity Bank, Stanbic Bank, NMB **Research organisations:** NARO, KALRO, MARI, ISABU, RAB
Rice	Kenya: MWEA Farmers Multipurpose Cooperative Society Rwanda: Union of Rice Cooperatives of Butare Tanzania: Association of Kilombero High Quality Rice Growers Uganda: Uganda National Farmers Federation (UNAFFE); Namulagwe Area Cooperative Enterprise		
Sorghum	Uganda: Pallisa Farmers' District Association; Kapchorwa Farmers' Association		
Millet	Uganda: Kapchorwa Farmers' Association		

form of loans unless the actors are large (or in groups) or are willing to take on crop insurance (in the case of maize and rice). The Alliance for a Green Revolution in Africa (AGRA) supported the use of inputs in the EAC, particularly seed and fertilisers, via a grant disbursed through Centenary and Stanbic banks in Uganda. The beneficiaries were mainly seed companies such as Finca and Victoria Seed Company, which were working with maize and seed farmers that had contracts to supply big buyers such as Nile Breweries Ltd and World Food Programme.

National research systems/organisations such as NARO in Uganda, Kenya Agricultural Livestock and Research Organisation (KALRO) in Kenya, MARI in Tanzania, Institut des Sciences Agronomiques du Burundi (ISABU) in Burundi, and RAB in Rwanda are mandated by the respective governments to provide strategic direction for publicly-funded agricultural research and set national agriculture priorities. They are also required to harmonise national agricultural research activities and promote the delivery of quality and efficient agricultural research services. They usually work closely with universities and colleges of agriculture. However, as public institutions they too are often underfunded and unable to deliver their mandates. In addition, the research conducted is often disconnected from the specific needs of farmers, processors and traders in the selected value chains. Table 9 shows a summary of the VCIs, VCSIs and VCSSPs involved in the maize, rice, millet and sorghum value chains in the EAC.

Current value-chain development initiatives

This chapter examines the individual country investment plans in relation to CAADP and how their alignment fosters value-chain development of four selected staple food crops in the region. It also highlights a number of development initiatives and the kind of interventions that have been implemented.

CAADP and the individual country food investment plans

CAADP was established as part of the New Partnership for Africa's Development (NEPAD) in July 2003 and focuses on improving and promoting agriculture across Africa[3] (CAADP, 2015). CAADP aims to eliminate hunger and reduce poverty through agriculture. It was also stated that by 2008, 10% of the national budgets of member states would be dedicated to agriculture (ActionAid, 2013) and that countries must pursue a 6% average annual growth rate for the agricultural sector. Of the five Eastern Africa member countries, none has consistently achieved the 10% spending target. Only two countries – Burundi and Rwanda – have done so in a single year during 2014/15 (ActionAid, 2013). Kenya (which allocated an average of only 4.6% of its national budget to agriculture during 2009), Uganda (3–5% in recent years), and Tanzania (an average of just 3.5% during 2014/15) have not achieved the 10% target.

It is worth noting that even though Rwanda and Burundi achieved the 10% CAADP agriculture spending threshold during 2014/15 financial year, most of the allocation went to cash crops to ensure increased agricultural commercialisation. In the case of Kenya and Uganda, the budgetary allocations have focused on agribusiness in general and agriculture infrastructure development that would promote value-chain upgrading.

The Government of Kenya in 2014/15 allocated US$94.1 million to finance irrigation projects, US$23.5 million to an Agri-Business Fund intended to construct 50 food storage facilities and eight agricultural training centres, build 50 markets and link 90 producer groups. In Uganda, the government allocated over 15% of the 2014/15 budget to developing road networks and electric power generation that would boost agricultural production, distribution and processing respectively (UBOS, 2014).

A closer look at the individual country investment plans in relation to CAADP and the four selected food grains reveals that the EAC Partner States are prioritising support to the crops they consider vital for food security. For instance, in Rwanda, the Strategic Plan for the Transformation of Agriculture in Rwanda (PSTA) – Phase II focused on increasing the output of all types of agricultural products with emphasis on export products, which have high potential and create large amounts of rural employment under sustainable modes of production. To achieve this plan, Rwanda identified four programmes: Intensification and development of sustainable production systems; Support to the professionalisation of the producers; Promotion of commodity chains and agribusiness development; and Institutional development. The priority food grains in this strategic plan and the subsequent PSTA III through the Crop Intensification Program were maize, rice and sorghum. So far Rwanda has been able to meet its target of doubling maize production. Analysis of Rwanda's CAADP plan does not indicate the approach of implementation as the value-chain strategy. This implies that the allocation of budgets will be fragmented and possibly more focus will be on traditional cash crops such as coffee and tea at the expense of food staple crops.

[3] http://www.caadp.net/

In the case of Uganda, the Agricultural Sector Development Strategy and Investment Plan (DSIP): 2010/11–2014/15 (MAAIF, 2010) clearly outlines Uganda's commitment to CAADP. Maize and rice are among the food crops prioritised in the investment plan.

- Maize is selected because it is a major food security crop; it has an important multiplier effect in other sectors of the economy such as livestock production, and it has a high potential for seed production and export in the region. Rice, on the other hand, is considered to be a crop with a very high potential future impact, has a high return on investment and therefore essential for poverty reduction, and also has a high multiplier effect in other sectors of the economy such as livestock.
- In terms of performance, DSIP set to increase maize production from 1.53 million t to 1.97 million t between 2010 and 2015. Maize production was 2.3 million t in 2011. For rice, the target was to increase rice production from about 167,000 t in 2010 to 217,000 t in 2015. Rice production was 233, 000 t in 2011. In both instances the production targets were achieved by 2011. Uganda seems to have achieved the targets in terms of production objectives but these statistics hide the bigger picture. Uganda's maize and rice farmers face volatile seasonal price fluctuations arising from uncoordinated supply and demand of the grains.

In the case of Kenya, The Agriculture Sector Development Strategy 2010–2020 is closely aligned to the CAADP priority of agriculture-led growth. The priority food crops in this strategic investment plan are maize, wheat, rice, sorghum, millet and legumes. The target was missed and Kenya still imports maize. As is the case in Uganda and Rwanda, Kenya's agriculture strategy is fragmented and does not consider the value-chain approach explicitly in the implementation of its food crops programmes.

The Government of Tanzania (GOT) signed the CAADP Compact in July 2010 and subsequently formulated the Tanzania Agriculture and Food Security Investment Plan (TAFSIP), which was completed in October 2011. TAFSIP is a sector-wide investment framework that is CAADP-compliant. Although the targets to be achieved by Tanzania through TAFSIP are not explicitly stated, TAFSIP highlighted the food crops it will prioritise. These food crops include maize, rice, cassava, wheat, beans, sorghum, sugar and oil-seed crops. The choice of these crops is based on their significant contribution to food security, income generation and poverty reduction at both household and national levels. There is no evidence that shows that implementation of the agriculture strategy will adopt a value-chain approach.

Although it is clear from the review conducted that the food grains maize, rice and sorghum are considered to be important in delivering the individual country agriculture investments plans, their importance is not reflected in budgetary allocations to these crops. In all EAC countries there is a chronic problem of underfunding staple food-grain value chains leaving it to NGOs and donors to fund. The value-chain approach is not considered in implementation of the programmes. Furthermore important food security crops such as millet are only considered a priority crop in Uganda and Kenya.

Food-crop development initiatives in the EAC

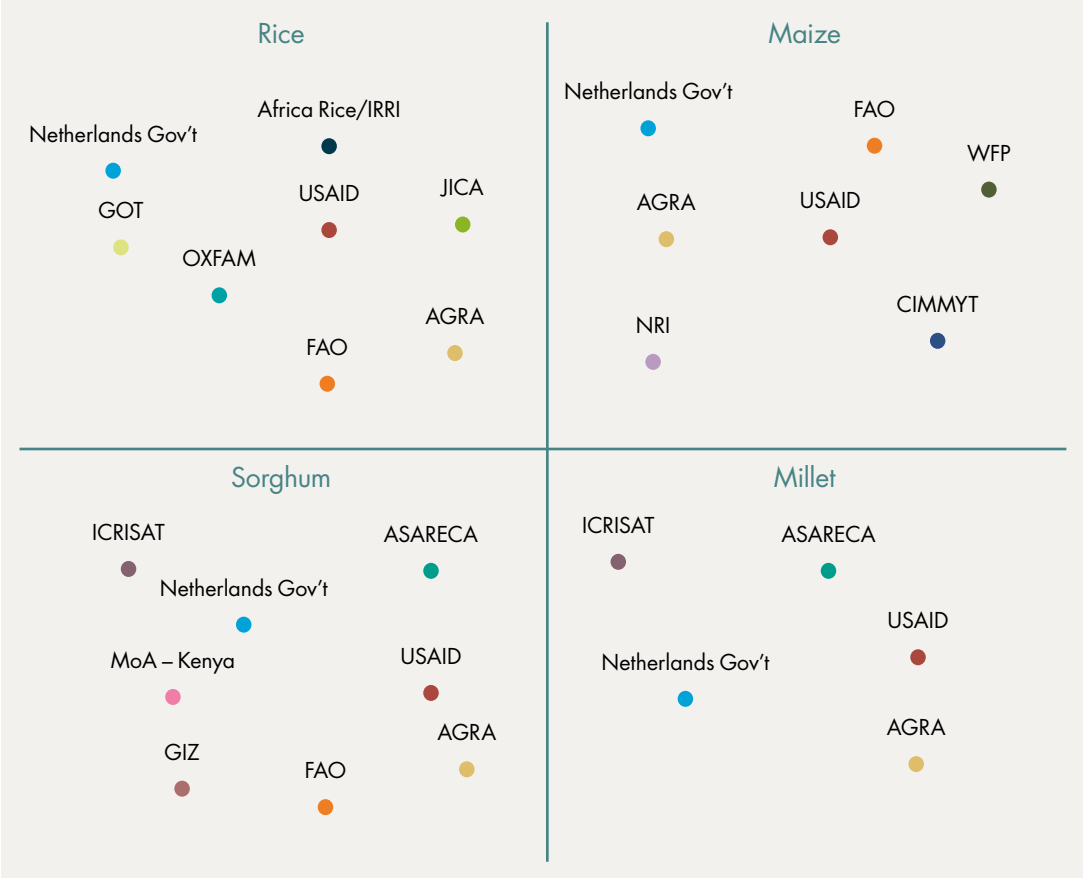
There have been several initiatives in the member countries to foster the development of the four food-grain value chains. The study identified a number of regional and national development initiatives (See Annex 4 for a comprehensive list). Most of the regional initiatives identified were implemented by sub-granting/subcontracting and are located mainly in Kenya, Uganda and Tanzania. The largest projects were funded by multilateral agencies.

Strategies for project implementation

Three key implementation strategies were identified in the analysis of the initiatives and they include: partnership, sub-granting and own implementation.

- **Partnerships:** This refers to an arrangement where organisations agree to cooperate to advance their mutual interests.

Figure 1: Funders of food-crop development initiatives in the EAC



There are several examples of partnership arrangement as regards project implementation. These include public–private partnerships (PPP), business-to-business (B2B) and donor–government partnerships.

PPP is the most popular partnership arrangement in project implementation. For instance, in Uganda, the Natural Resources Institute (NRI), a UK-based institute, collaborated with the International Institute of Tropical Agriculture (IITA) to study industrial market research for starch-based products. Some examples of B2B partnerships can be seen in the arrangement between Food Chain Millers Ltd in Kenya that supplies sorghum to Kenya Breweries Ltd. Similarly, in Uganda, AfroKai (U) Ltd supplies sorghum to Nile Breweries.

A donor–government partnership involves donors working with government to implement a project. For example, the Galana/Kalalu Food Security Project is being co-funded by the Government of Israel (donor) and implemented by the Government of Kenya (government) to establish an irrigation scheme covering 93,540 ha of maize in north-eastern Kenya (GOK, 2015).[4]

- **Sub-granting/subcontracting:** This refers to an arrangement where an organisation signs a contract or a memorandum of understanding with another organisation to perform part or all the obligations in the contract. Majority of donor projects in EAC employ this strategy to implement projects. For example, the USAID-funded Competitiveness and Trade Expansion Program (COMPETE) study was undertaken under a subcontracting arrangement where a private consultant, Financial Transactions Reports Analysis Centre of Canada (FINTRAC), was contracted to undertake the value-chain study.
- **Own implementation:** This refers to a situation where an organisation takes full responsibility for initiating and implementing project activities using its internal resources. Ministries of agriculture in the EAC pursue this approach especially through the public extension system. For example, in 2011 the GOT allocated US$7.2 million from its national budget to MAFC to promote rice-growing by improving productivity and better marketing of the crop.

Regional development initiatives in the EAC

Regional (i.e. cross country) maize value-chain initiatives indicate that seven organisations/multilateral institutions/development partners are involved and they include: the World Food Programme (WFP), AGRA, USAID, the International Maize and Wheat Improvement Center (CIMMYT), NRI, the Food and Agriculture Organization of the United Nations (FAO) and the Government of the Netherlands. The rice value chain is supported by the International Rice Research Institute (IRRI), USAID, the Japan International Cooperation Agency (JICA), FAO, AGRA and the Government of the Netherlands. The sorghum value chain is supported by the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), ASARECA, USAID, AGRA, FAO, GIZ and the Government of the Netherlands. Organisations such as ICRISAT, ASARECA, USAID, AGRA, FAO, GIZ and the Government of the Netherlands support millet value-chain development. On the whole the Government of the Netherlands, USAID, FAO and AGRA are the key funders of development initiatives in the four selected food-grain value chains in the region. Figure 1 shows the main regional value-chain funders and the food grains they support.

[4] http//www.mygov.go.ke/

Coalition for African Rice Development (CARD): regional project

CARD is a consultative group of bilateral and multilateral donors and African/international institutions that aims at the promotion of dialogue among existing and potential stakeholders in rice development in Africa (see Annex 4) through the provision of coordination opportunities (e.g. the National Research Development Services task force and PPPs). The project was implemented in all the EAC Partner States except Burundi. It also provides development partners with a platform for coordination.

Major achievements to date of this initiative include: entrenchment of policy and institutional dialogue in the seed subsector, irrigation and water management, and mechanisation in Rwanda, Kenya and Uganda. Additionally, seed infrastructure has improved in Rwanda and Tanzania. This has resulted in improved seed multiplication, on-farm and off-farm techniques for grain quality control, and efficient water use.

Country-specific initiatives in the EAC

The next section elaborates a few country initiatives that were identified to provide further clarity on their nature and challenges in implementation.

Uganda: Development of Inclusive Markets in Agriculture and Trade (DIMAT) Project

DIMAT is a 4-year project (2012–15) that is being implemented in Uganda and aims to contribute to Uganda's Agriculture DSIP in relation to enhancing market access and value addition. The project focuses on building strong inclusive business linkages between small- and medium-scale producers and enterprises of strategic commodities such as rice, beans and cassava, on the one hand, and profitable markets at national, regional and global levels, on the other.

The project is a collaborative venture between the Government of Uganda and UNDP and is implemented by Enterprise Uganda – a public–private institution designed to support the government in realising its objective of promoting SMEs to become levers of economic growth in the country. Kilimo Trust and the other private-sector development companies are the implementing partners.

In the rice value chain, DIMAT has impacted on 13,635 producers of both grain and seed organised in 23 groups spread across 14 districts by training them in GAP and good PHH practices, and linking them with input and output markets. Specifically, rice yield among the target beneficiaries have increased from 1.3 t/ha in 2012 to 2 t/ha in 2014. Also, through the market linkages facilitated by the project, producers have sold 1,387 t of rice grain and seed to off-takers who range from millers to seed companies in the region.

Tanzania: Eastern Africa Agricultural Productivity Project (EAAPP)

EAAPP supports designated regional centres of excellence to take a leading role in technology generation, dissemination and training on a regional basis for specific agricultural commodities that include rice, wheat, cassava and dairy. Tanzania has been selected as a regional centre of excellence in rice production. In this respect, EAAPP's overall goal is to enhance sustainable productivity, value addition and competitiveness in the sub-regional rice system. The 6-year programme that started in 2009 is implemented by ASARECA and funded by the World Bank with a budget of US$90 million.

Competitive Africa Rice Initiative (CARI)

The initiative is a collaboration between Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), Kilimo Trust, Technoserve and John A. Kufuor Foundation with funding from the Bill and Melinda Gates Foundation. The project started in January 2014 and will end in December 2017. The goal of CARI is to significantly improve the livelihoods of 120,000 small-scale rice farmers in Tanzania, Nigeria, Ghana and Burkina Faso with the aim of reaching at least 30,000 male and female (at least 30%) smallholders in Tanzania with a daily income of less than US$2 (Kilimo Trust 2014b; CARI, 2015).

CARI's strategy focuses on intervention areas that will result in the following outcomes:

- increased productivity and quality of paddy rice based on the development of sustainable and competitive rice production systems
- improved sourcing capacity through structured producer-off-taker linkages
- improved storage technologies and processing efficiency
- increased access to innovative finance products and services for all value-chain actors
- strengthened enabling environment at national and regional level including policy framework and market linkages between producers, processors and traders.

CARI is a partnership-based development programme. Cooperation with public and private sector partners and the formation of effective and innovative PPPs plays a pivotal role in achieving this objective. The implementation approach uses a financing model that seeks to leverage and share risks between CARI and its partners to ensure high ownership and commitment. A matching grant fund (MGF) serves as the main incentivising tool. The MGF provides the opportunity to mobilise and jointly allocate resources, provide technical assistance, create alliances for the implementation of the projects, and set up mechanisms for monitoring and evaluation. CARI-Tanzania encourages the formation of consortia where different partners are committed to implementing a business model that achieves increased profitability for all actors involved. Kilimo Trust is the implementing partner in Tanzania.

Burundi: US-Africa Partnership for Development

A partnership between South Carolina University and Ngozi University in Burundi has resulted in the establishment of an experimental research station and outreach community programme for rice at Ngozi University and five districts in Ngozi province, Burundi. The stations support rice producers in seed testing for adaptation to local conditions. USAID is funding this project up to US$450,000 for a 5-year period from 2011.

Through the project, 250 farmer organisations have been trained in soil nutrient management, plant disease identification, water management, enterprise selection and good PHH practices. This has contributed to an increase in knowledge of GAP by farmers – a situation that results in increased productivity of rice among participating smallholders.

Coordination structures/platforms

Different structures and platforms have been formed and strengthened to facilitate value-chain activities in the region. They take on different mandates and some are formal while others are informal in nature. Almost all the structures or platforms identified are member based and rely heavily on membership fees for their operations. The analysis conducted identified a number of coordination platforms or structures that are described in the following sections.

Trade associations: In Eastern Africa, there are a number of trade associations that are registered and recognised by respective governments to take care of the interests of members. For example, the Cereal Growers Association, CMA and the United Millers and Farmers Association in Kenya. Similar organisations exist in other EAC member countries as well. In Uganda there is the USTA. There are also trader associations, which are usually composed of all actors in the value chain but traders and processors predominate. These associations are usually not specific to a particular food crop. The governance of the associations is often led by a board, which on behalf of members selects the management team that runs the daily operations of the association. Members benefit from these associations by participating in trade fairs and shows organised by associations, advocacy and lobbying governments and training members on cutting edge industry improvements. For instance, USTA organises Seed Trade Fair Shows annually to showcase new technologies. Although trade associations provide a number of opportunities for their members they are usually hampered by several problems like political interference, poor management and corruption.

Regional commodity networks: Regional agricultural networks such as East and Central Africa Regional Sorghum and Millet Network (ECARSAM) with secretariats in Nairobi coordinates food-grain value-chain activities. Members are usually scientists and researchers and join by subscribing to the network. Membership can be by individuals, organisations and even national governments. Members select management of the secretariat from among their peers.

The secretariat coordinates all activities like organising conferences – where members can showcase their work, publishing proceedings of the conferences, and training of members.

Online platforms: These are agriculture web-based platforms that support and connect value-chain actors mainly with information on prices, production and marketing. For example, Agri-ProFocus has an online platform that connects agribusiness entrepreneurs in Eastern Africa. It was initiated at Arnhem in the Netherlands. It has subsidiary Agri-ProFocus networks in all EAC countries, which manage and run operations nationally but are coordinated from the Netherlands. Agri-ProFocus posts market information on its website and on an online community forum where members request information. The Agri-ProFocus platform is accessed by traders, producers and processors. However, this platform is constrained by low levels of internet usage and penetration in EAC. Less than 10% of the EAC population is internet literate and therefore the majority of smallholders cannot utilise these resources. Another regional example is Regional Agricultural Trade Intelligence Network (RATIN) that provides a quick way for farmers, traders and processors to get regional market information anywhere, any time, easily using mobile phones or computers. RATIN serves members and stakeholders with improved early warning marketing and trade information, leading to more efficient and competitive transactions in food trade between surplus and deficit regions. RATIN has regional coverage in the five EAC countries – Kenya, Uganda, Tanzania, Burundi and Rwanda. RATIN uses a fast-tracking Real Time Volume Tracking System for real-time volumes of inflows and outflows transmitted through a smart Android phone and the RATIN website. A national example includes M-Farm in Kenya, which provides market information and extension services through a mobile-phone-based platform to maize and sorghum farmers.[5]

Civic organisations forum: These organisations are not-for-profits and they promote and develop some commodity value chains. Their membership consists of NGOs, CBOs and faith-based organisations, and governance is

usually in the form of a board, trust or secretariat team. Members join by subscription. Members run secretariats with staff. They organise conferences and workshops, train members and play a significant advocacy role in the sector. For example, VEDCO – an NGO in Uganda – organised an advocacy walk in July 2014 to highlight the plight of charging VAT on agro-inputs in Uganda, and as a result the agriculture committee of parliament decided not to pass the 2015/16 agriculture budget until there are waivers on agro-inputs. Another example, Solidaridad works to create sustainable value chains from producers to consumers. This enables producers in developing countries to obtain better prices, for better products and helps preserve the environment. It is active in Tanzania and Kenya. The Dutch NGO SNV is operating in all EAC countries by providing advisory services, brokering knowledge and supporting policy dialogue at national level.

Cooperatives and farmers' associations: These are farmer-owned and farmer-managed organisations that are formed to take care of the interests of farmers – production and marketing. Farmers pay a subscription to become members. They are registered and recognised by governments as such and consist of primary societies, cooperative unions and farmer federations. Their governance structure usually consists of a board and a management team that runs the association. The benefits include group production, group marketing, in some cases they offer credit to farmers, organise trade fairs and exhibition/shows, advocacy and lobbying governments and training members on improved farming. For instance, UNAFFE and Uganda Cooperative Alliance organise national agricultural trade shows in Jinja (Uganda) every June. Other examples include KENAF (Kenya), Le Forum des Organisations des Producteurs Agricoles du Burundi (FOPABU), and Mtandao wa Vikundi vya Wakulima Tanzania (MVIWATA).

Like all government-supported agencies, they are hampered by political interference especially through patronage and weak management.

Agriculture sector committees of national parliaments and the East Africa Parliament: Parliaments have committees that are either select, standing or sessional committees. Parliaments in the region have agriculture committees. They are mandated by parliaments to oversee the activities of the ministries of agriculture and government parastatals dealing directly with agriculture. They consist of members of parliament from all parties. These are appointed as representatives to this committee. The committees are chaired by a committee chair person who reports to the speaker of the parliament. These committees prioritise the development of agriculture in the national plans and budgets, and scrutinise and develop policies/acts. For example, the agricultural sector committee of Uganda parliament during 2013–14 financial year organised roundtable meetings before and after budget readings for the public to influence budgetary allocations to agriculture sector. Although the role of these committees is to consult extensively with the public, they often meet stakeholders in towns and cities and rarely interface with value-chain actors in rural areas and communities.

Crop platforms: These exist in Eastern Africa especially for cash crops and root crops such as cassava and sweet potatoes. However, cereal grains do not have crop platform networks. Uganda Grain Council has initiated a dialogue between maize growers and traders that may evolve into a maize platform.

[4] www.mfarm.co.ke

Recommended areas for CTA support in the food-grain value chain

The analysis conducted in this study shows that there are a number of food-grain value-chain development efforts in the region. However, the economic and social benefits accruing from adoption of various value-chain approaches are not significant given that the majority of smallholders still have limited access to markets. Constraints exist across the entire technical, socio-economic, institutional and policy environment in which the food grains are produced, processed and marketed. In order to design the appropriate interventions in the selected value chains, it was considered prudent to highlight the key challenges identified in section 3, which are summarised in Table 10.

Matching these challenges (regional needs) with CTA's investment priorities in Eastern Africa – and potential development partners in the EAC – will enable CTA to focus on those areas in the value chains that will have the greatest impact on the value chain actors. The proposed interventions are similar for sorghum, maize and rice value chains while those for millet are unique to the value chain. The proposed interventions include:

Input node for sorghum, rice and maize: Strengthening the capacity of agro-input dealer associations to comply with quality standards. In order to improve the quality of the inputs in the EAC market, CTA could collaborate with national input dealer associations like Uganda National Agro-input Dealers Association (UNADA) to support training of input dealers on quality standards and self-policing skills that will prevent the proliferation of counterfeit and adulterated inputs. In addition, these associations can also be supported to develop awareness programmes to farmers on the benefits of using genuine agro-inputs such as seeds and fertilisers; and identifying counterfeit and adulterated inputs. Further support can be provided to agro-input dealers to develop a verification system for their products.[6]

Production node for sorghum, maize and rice: Promote and support the existing extension services system in the EAC. In order to enhance productivity and extension services to farmers, CTA can support agencies such as BRAC and RUFORUM to expand their outreach in these areas. Given that the region has an extensive extension system, CTA's intervention through these organisations should focus on providing extension workers with modern extension tools, such as mobile apps that, for example, allow farmers to upload problems and extension workers to reply or offer advice. Additional training can be in teaching manuals and other materials.

Production node for sorghum, maize and rice: Support the review and harmonisation of policies and regulations designed to attract private sector investments in agricultural mechanisation. To attract investment in agricultural mechanisation, CTA can collaborate with policy research and advocacy agencies like Kilimo Trust, East African Farmers Federation, SEATINI, etc. that are involved in policy research and advocacy to lobby governments to reduce the cost of mechanisation. The areas they can focus on can include the removal of legal and regulatory constraints against leasing and hire purchasing; support manufacturing of implements locally and regionally; and the removal or reduction of import and sales taxes on low-cost agricultural machinery and equipment. Other policy areas CTA can intervene in are the promotion of cross-border and regional collaboration for the movement of equipment and provision of mechanisation services.

Production and trading node for sorghum, maize and rice: Strengthen market information systems. To address information asymmetry, CTA can support the establishment of information bureaux in communities ('satellite centres') that gather, process and disseminate information using mobile phones, radios, the internet and social media, community notice boards and newspapers. This can be in partnership with

organisations such as EAGC, Agri-ProFocus and the Grameen Foundation that are working in this area. In order to increase the use of these and existing platforms, there is the need to strengthen the capacity of farmers, processors and traders to utilise these platforms by training them and initiating mass information campaigns to increase the awareness and benefits of using the platforms.

Processing and trading nodes for sorghum, maize and rice: Support capacity building of trade associations in order to drive policy change and the creation of business-friendly policies. In order to create business-friendly policies, the ability of the value-chain actors to advocate for changes in policies must be strengthened. This will require strengthening the capacity of advocacy agencies such as trade associations, including EAGC and the East

Table 10: Challenges at various nodes of the four food-grain value chains in the EAC

INPUT SUPPLY	PRODUCTION
• **Inferior inputs in the market:** low-quality land races still predominantly used by smallholders • **Weak enforcement of regulations and quality standards arising largely from** inadequate capacity of enforcement agencies • **Inappropriate storage facilities for inputs resulting** in ineffectiveness of the inputs • Low opinion among farmers regarding **some crops as being inferior** e.g. sorghum and millet	• **Limited and unreliable market i**nformation to guide production and trade • **Weak extension systems due mainly to** inadequate capacity of agriculture ministries/agencies and low staffing levels of extension agents in rural areas • **Low economies of scale** caused by fragmented production and low levels of productivity • **Land tenure insecurity** among the vast majority of smallholders • **High ownership and running costs** for most imported mechanisation equipment
PROCESSING	**TRADING**
• **Inconsistent supply of raw materials** affecting production schedules and contractual supplies • **High cost of electricity** with intermittent supply • **High cost of operation** driven mainly by high labour costs • **Inadequate technical skills** and lack of affordable spare parts	• **Inadequate market information:** information is untimely and unreliable • **Inappropriate market storage facilities** • **Lack of harmony in quality standards** across the EAC that constrains trade across borders • **An unfavourable business environment that increases the cost of doing business** • **Inappropriate financial products**

[6] An approach that has been used in Ghana in the health sector to reduce counterfeit drugs in the market may provide useful insights to counteract the problem of adulterated/counterfeit agro-inputs in the EAC market. The system works as follows: A buyer sends an SMS verification number that is on the packaging to the established Medical Board that verifies the authenticity of the drugs. Once the Board verifies the SMS number it then sends a message confirming the authenticity of the product.

African Business Council; farmer groups such as UNAFFE; NGOs such as Kilimo Trust and SEATINI; and CBOs by providing them with training in management skills, advocacy and lobbying skills – along with supporting the creation of platforms where the public and private sector stakeholders can engage. Given that the long-term sustainability of some these entities like farmer groups is through increasing their membership base, CTA's support can also focus on supporting these entities to increase their membership base to develop comprehensive communication and engagement strategies where well-crafted communication messages on the role and benefits of being a member are disseminated. It is envisaged that once these entities have a strong voice they will be able to penetrate key decision-making bodies/ platforms like parliamentary committees to create policy changes.

Input supply and production nodes of millet: Develop awareness programmes among consumers of the health benefits of the grains so as to increase demand and drive production and research. This can be achieved by collaborating with ECARSAM. The CTA and ECARSAM intervention can focus on branding millet as a nutritious food targeting the emerging class of high-income and health-conscious consumers that are willing and able to pay a premium for a "nutritious and healthy" product. By using regional supermarkets networks such as Uchumi and Nakumatt, CTA could collaborate with implementing agencies to link smallholder millet farmers in the region to the emergent regional high-value healthy foods market.

Figure 2 highlights the key interventions/ investments at each node where CTA could partner or collaborate with the above-mentioned institutions to develop and improve the cereal grain value chains of maize, rice, sorghum and millet.

Figure 2: Recommended areas for CTA intervention/investment and potential implementing partners

	INPUT ▶	PRODUCTION ▶	PROCESSING ▶	TRADING ▶
Sorghum Rice Maize	Strengthen the capacity of agro-input dealer associations to comply with quality standards, in collaboration with UNADA in Uganda	Promote and support the existing extension services systems, in collaboration with BRAC and RUFORUM Support the review and harmonisation of policies and regulations designed to attract private sector investments in agricultural mechanisation – Kilimo Trust, SEATINI, East Africa Farmers Federation (EAFF) Strengthen market information systems by supporting EAGC, Agri-ProFocus and Grameen Foundation	Support capacity building of trade associations in order to drive policy change and the creation of business-friendly policies – EAGC, EABC, Kilimo Trust, SEATINI	Strengthen market information systems by supporting EAGC, Agri-ProFocus, Grameen Foundation Support capacity building of trade associations in order to drive policy change and the creation of business-friendly policies – EAGC, EABC, Kilimo Trust, SEATINI
Millet	Develop awareness programmes, among consumers, of the health benefits of millet so as to increase demand and drive production in collaboration with ECARSAM, Uchumi and Nakumatt supermarkets.			

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Annexes

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Annex 2: The structure of maize, rice, sorghum and millet value chains in the EAC

NODE	STRUCTURE OF THE VALUE CHAIN
	Maize and rice: the main actors are multinationals, regional and national companies and small general agro-dealers. Majority of agro-dealers in the region supply inputs such as seeds, agro-chemicals, equipment and tools. Less than 3% of the total actors in these two value chains provide inputs.
	Sorghum: has no formal input supply system. Any equipment and tools used in production such as ox ploughs are supplied by local agro-input dealers.
	Millet: has no formal input supply system. Seed is mainly informal, recycled, farm-saved seed.
	It is important to note that by law, private seed companies do not produce or own pre-basic and basic seeds. Government institutions (such as national agricultural research systems and universities) provide support – mainly inform of research – to the input supply sector.
Production	**Maize and rice:** the main actors are smallholders (70%), farmers groups (20%) and commercial farmers (10%).
	Sorghum: is produced mainly by smallholders (85%) and farmer groups (15%) under contract farming arrangements. Hardly any large commercial farmers exist in this value chain.
	Millet is produced largely by smallholders (100%).
	On average, smallholders produce on less than 5 ha of land; medium-sized producers on between 6 and 30 ha; and large/commercial farmers produce on more than 30 ha.
	Producers are the main actors in all the value chains profiled.
Processing	**Maize and rice:** most of the actors in this value chain are small processors (80%) with diesel-operated mills. Medium processors (15%) and large processors (2%) produce maize flour, rice flour and milled rice, and are vertically integrated into the animal feeds sector.
	Sorghum: the main actors are small processors (95%) producing sorghum flour. The large processors (5%) are in the beer industry and they use most of the sorghum produced.
	Millet: majority of the actors are small processors (95%). Medium processors are about 5% of the actors. Millet flour is the only product produced.
	Mainly primary processing of the four cereals occurs in the value chains.
Trading	**Maize and rice:** trading is largely informal by SMEs. These trade locally and mainly in the areas of production. Large traders operate nationally, regionally and internationally.
	Sorghum and millet: trading is mainly informal in local and national markets – and happens mainly in supermarkets and small retailers.

Annex 3: Value chain maps of the four food grains in Eastern Africa

	ACTORS IN THE VALUE CHAINS			
	INPUT ▶	PRODUCTION ▶	PROCESSING ▶	TRADING ▶
Maize, rice	Seeds companies, small agro-dealers, agrochemical industries, tool and machinery companies	Smallholders, farmer groups, commercial farmers	Small processors that are mainly informal; medium-sized and large processors producing mainly maize flour, rice flour and animal feeds	Small retailers and local traders that are mainly informal; supermarkets, medium and large traders that operate nationally, regionally and internationally
Sorghum	Informal seed system, tool and machinery companies	Smallholders, farmer groups	Small processors and large multinational beer companies	Retailers, local traders
Millet	Informal seed system	Smallholders	Small and medium-sized processors	Retailers, supermarkets, local traders
Supporters	• Financial institutions like banks, microfinance banks, SACCOs • Universities, technical/ vocational/ colleges • Trade associations	• Local government – extension systems • NGOs/CBOs • Private companies • Cooperative unions • Farmer associations	• Financial institutions like banks, SACCOs • Ministries of finance • Ministries of trade and industry • Processors' associations • Research institutes, universities/ vocational colleges	• Financial institutions • Ministries of finance • Ministries of trade and industry • Trade associations • National standards bodies
Enablers	• Ministries of agriculture • Seed inspection and certification service agencies • Ministries of finance, and of trade and industry	• Ministries of agriculture • Seed inspection and certification services • Ministry of finance, and of trade and industry • Universities/ vocational colleges	• Ministries of trade and industry	• Ministries of trade and industry • Revenue authority agencies

Annex 4: Regional development initiatives in the food-grain value chains

CEREAL	VALUE-CHAIN NODE	PROJECT NAME	FUNDER
Maize	Input supply, production	PASS	AGRA
Millet, sorghum	Processing	Hope: Commercialising millet and sorghum processing	ICRISAT
Millet, sorghum	Processing, trading	Enhanced sustainable productivity, value added and competitiveness of the regional sorghum and millet system	ASARECA
Sorghum and millet	Input supply	Delivering New Sorghum and Finger Millet Innovations for Food Security and Improving Livelihoods in Eastern Africa	ICRISAT
Maize, rice, sorghum, millet	Input supply, trading	Integrated Seed Systems Development	Netherlands Government
Sorghum	Processing, trading	Increasing Sorghum Utilisation and Marketability through Food Product Development	ASARECA
Maize	Trading	Purchase for progress (P4P)	WFP
Sorghum	All	Sorghum Value-Chain Development in Eastern Africa	FAO
Maize, rice	Production	The Food Security Through Commercialization of Agriculture in the Great Lakes Region	FAO

	PROJECT BUDGET	IMPLEMENTATION STRATEGY	PERIOD	COUNTRY
	18,400,094	Collaboration and partnerships	2009–2012	Tanzania, Kenya, Uganda
	-	Partnership	-	Tanzania, Kenya, Uganda
	-	Sub-granting and subcontracting	-	All five countries
	-	Sub-granting	2011	Tanzania, Kenya, Uganda
	-	Partnering	2013	All five countries
	129,4820	Sub-granting	2009–2011	Tanzania, Kenya, Uganda
	54,700,000	Own implementation	2002–2012	All five countries
	4,044,166	Sub-granting		Tanzania, Kenya, Uganda
	9,570,000	Sub-granting	2013	Uganda, Rwanda, Burundi and DRC

Annex 5: Country-specific cereal value-chain initiatives

CEREAL	VALUE-CHAIN NODE	PROJECT NAME
Tanzania		
All four grains (maize, rice, sorghum, millet)	All four nodes (input supply, production, processing and trading)	Competitiveness and Trade Expansion Program (COMPETE)
Rice	Production, trading	Improving Rice Profitability through increased Productivity and better marketing
Rice	Production	New Rice For Africa (NERICA)
Rice	Production, processing, trading	Tanzania Agricultural Scale-Up (TASU) Programme
Rice	All four nodes (input supply, production, processing and trading)	Regional Rice Center of Excellence, Tanzania
Kenya		
All four grains (maize, rice, sorghum, millet)	All four nodes (input supply, production, processing and trading)	Competitiveness and Trade Expansion Program (COMPETE)
All four grains (maize, rice, sorghum, millet)	All four nodes (input supply, production, processing and trading)	Kenya Agriculture Value Chain Enterprises (KAVES)
Sorghum	Processing, trading	Increasing Sorghum Utilisation and Marketability Through Product Diversification
Sorghum	All four nodes (input supply, production, processing and trading)	Adaptation to Climatic Change and environment

	FUNDER	PROJECT BUDGET	IMPLEMENTATION STRATEGY	PERIOD
	USAID	-	Contracting	2008–2010
	Tanzania Government	-	Own implementation	2007–2009
	JICA	-	Sub-granting	2007–2013
	OXFAM GB	-	Collaborating/ partnering	2009–2011
	USAID	30,000	Sub-granting	2005–2010
	USAID	-	Contracting	2010
	USAID	-	Contracting	2014
	ASARECA	-	Sub-granting	2009–2011
	GIZ	-	Sub-granting	2012

CEREAL	VALUE-CHAIN NODE	PROJECT NAME
Uganda		
Maize, rice, sorghum, wheat, millet, barley)	All four nodes (input supply, production, processing and trading)	Value Chain Prioritization for USAID-funded Livelihoods and Enterprises for Agricultural development (LEAD) Uganda Project
Rice and maize	All four nodes (input supply, production, processing and trading)	Stabilisation-Driven Value Chain of Rice, Groundnuts and Maize in Northern Uganda
Maize		Industrial Markets for Starch-based Products
All four grains (maize, rice, sorghum, millet)	All four nodes (input supply, production, processing and trading)	Competitiveness And Trade Expansion Program (COMPETE)
All four grains (maize, rice, sorghum, millet)	Input supply	Agro-Dealer Development Programme
Rwanda		
All four grains (maize, rice, sorghum, millet)	All four nodes (input supply, production, processing and trading)	Competitiveness and Trade Expansion Program (COMPETE)
Maize	Processing, trading	Enhanced Maize Productivity and Marketing
Maize, rice, Sorghum,	All four nodes (input supply, production, processing and trading)	Crop Intensification Program
Sorghum	Processing, trading	Improved Marketing and Utilisation of Sorghum
Rice	Input supply, production	New Rice for Africa (NERICA)
Burundi		
All four grains (maize, rice, sorghum, millet)	All four nodes (input supply, production, processing and trading)	Staple Value Chain Analysis. COMPETE Project
Rice	Input supply, production	NERICA
Maize, rice, sorghum	Producing	Feed the Future Project

	FUNDER	PROJECT BUDGET	IMPLEMENTATION STRATEGY	PERIOD
	USAID	-	Contracting	2006–2009
	USAID	-	Contracting	2007- 2008
	NRI/IITA	-	Partnering	2000
	USAID	-	Contracting	2008–2010
	AGRA	1,296,323	Sub-granting	2010–2013
	USAID	-	Contracting	2007–2009
	CIMMYT/IITA	-	Sub-granting	2010-2013
	AGRA	300,000	Sub-granting	2012
	ASARECA	150,000	Sub-granting	2011
	Africa Rice/IRRI	146,000	Sub-granting	2010
	USAID	-	Contracting	2008–2010
	Africa Rice/IRRI		Sub-granting	2008–2011
	USAID	-	Sub-granting	2014 to date

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