Opportunities for Agro-industry Development for Food Security in the East African Community Region

A Rapid Appraisal

small scale millers dominate agro-processing in the EAC
Opportunities for Agro-industry Development for Food Security in the East African Community Region

A Rapid Appraisal

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for

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About Kilimo Trust:

Kilimo Trust is an independent regional development organization working on agriculture for development across the East Africa Community (EAC) Region, covering the countries of Burundi, Kenya, Rwanda, Tanzania and Uganda. We have also started to undertake implementation of projects in the new Republic of South Sudan. We see the East African Common Market as an opportunity for achieving higher security in food, nutrition and incomes in the region through deepening of markets, as well as expansion of trade in agricultural commodities and value added products. Our mission is to catalyze the growth and competitiveness of strategic agricultural sectors for the benefit of a large number of people in East Africa. We are focused on developing and promoting regional solutions for local problems by providing leadership and hands-on implementation of programmes and projects on behalf of, or in partnership with, governments, international and regional organizations, and the private sector. We have developed a close collaboration with the EAC and with governments of the EAC Partner States.

About this Report:

The rapid appraisal reported here was jointly commissioned by Kilimo Trust and the FAO’s Division of Rural Infrastructure and Agro-industries (FAO-AGS). This is part of the on-going collaboration between the Trust and FAO especially with AGS and the FAO sub-regional office for Eastern Africa (SFE). An initial draft of this report was used to guide discussions at the workshop and policy dialogue meeting held in Dar es Salaam on 15 – 17th March 2011. Report of the Workshop has already been published and widely distributed.

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Disclaimer:

The views and conclusions contained in this report are entirely those of the Author and do not necessarily reflect the policy and views of Kilimo Trust or FAO-AGS.

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EXECUTIVE SUMMARY

1) The extent of development of a country’s agricultural sector is often defined by the proportion (in value and size of employment) that falls in the agro-industry portion of the agricultural value chains. For example, in developed countries and continents such as USA and Europe, the proportion of those employed in agro-industries is 83% and 63% respectively of those employed in the overall agricultural sector.

2) Why are food agro-industries important for meeting the MDG 1 in the East African Community (EAC) Region? There are three major reasons:
a) The majority of the poor and hungry are employed in farming;
b) Apart from maize, the commodities produced by the largest majority are highly perishable such as all the starchy crops, and livestock products (meat and milk) - requiring processing in order to fully contribute to food security; and
c) Agro-industries also contribute to reduction of poverty in the following ways:
   i) Increased access to markets that are distant in space and time – enabling producers to participate in national, regional and global markets, and
   ii) Creation and retention of high proportion of the value by agricultural dependent communities.

3) The EAC, now constituting a common market of more than 125 million people with a combined GDP of about US$ 44 billion and its strategy for trade-based food security provides great opportunities for accelerated development of agro-industries.

4) Therefore, the purpose of the review reported here was to produce evidence to support accelerated development of agro-industry for food staples in the EAC Region. This review is designed to generate the evidence to show how investment in agro-industries can facilitate regional value chains leading to increased production of staple food commodities in areas of high and medium potential for production; followed by efficient supply of such commodities and their products to major centres of consumption.

5) Linking production to agro-processing capabilities is critical to minimize idle equipment and machinery, reducing post harvest losses, and creating decent employment. In the EAC, the milling capacity/year for maize is almost the same as the total annual production. This is both a result of the importance attached to maize as the leading staple commodity in the EAC Region and the advanced adoption of hammer mills by small scale operators. It is also an indication of the importance of the size of the market of a commodity in driving the development and investment in related agro-industries.

6) However, in the EAC there is a serious problem of the “missing” medium scale enterprises – because the installed capacity for processing cereals and perhaps other commodities is skewed towards small scale enterprises. There is also a significant proportion of the installed capacity that is in the form of large scale. The medium scale
enterprises are missing from the picture. Perhaps because of lack of financing mechanisms suited to medium scale operations.

7) Processing of livestock into meat products is very limited in the region and is often limited to slaughter. In general most (85%) processing of beef and small ruminants meat is conducted close to the areas of consumption in rural trading centres, using slaughter slabs, and small abattoirs. There are only very few slaughter houses in towns and cities. There is negligible processing by large scale slaughter and meat packing factories. However, a majority of on-going agricultural development programmes in the region are targeting development of agro-processing for the livestock industry.

8) Still with the very limited capacity, the case studies conducted for this review showed that there is idle meat processing capacity of 860,500 MT/year in the EAC. On average, utilization capacity of dairy plants in the EAC is only at 26% of the installed capacity.

9) Processing to branded secondary and tertiary products is hardly happening in the EAC region. Analysis of 40 major food commodities produced in the EAC block has shown that the region has comparative advantage compared to importation from global lead producers, in nearly 30 of these commodities. These include: most meats, beans (dry, soya and French), fruits (such as citrus, mangoes and pineapples), spices (such as ginger, cloves and vanilla), cashew and coco nuts, sunflower, vegetables (such as cabbage and carrots), cassava, sugarcane, dairy milk, potatoes, and cereals (sorghum, wheat and barley). The EAC as a block is also among the top 20 producers in the world for most of these commodities. This therefore presents a tremendous opportunity with respect to un-met demand for agro-processing.

10) Past and on-going investment by the private sector was assessed for this review by a rapid survey of 150 major agro-processors in the EAC Region with respect to commodities handled. As expected maize leads by frequency of number of investors handling this commodity. It is followed by wheat and oil crops, but both register around only a half of the frequency of investment in maize processing. The general picture is that past and current investment has targeted major staples of cereal and oil crops and there would therefore be a large un-met demand for the processing of perishables. The low frequency for tea and sugar can be explained by the fact that processing facilities for these commodities tend to be large in size.

11) Supportive initiatives by the public sector: About 20 programmes and projects of governments and donors in the EAC were evaluated with respect to investment directed to agro-processing. A clear picture is emerging that public sector support towards agro-processing especially of the highly perishable commodities is expanding. Programmes supported by IFAD and USAID were found to have frequently large components on agro-processing.
12) The main constraints to the development of agro-industries in the EAC, include the following:

a) **Limited technical skill base to run agro-processing facilities**: There is little vocational training deliberately focusing on agro-industries, leading to inadequate technician skills required to operate and maintain agro-processing plants and equipment. This inadequacy coupled with the fact that most of the technology used by the agro-industries is imported leads to poor maintenance and performance of equipment.

b) **Inadequate R&D**: Although R&D is not the only driver of innovation, it plays a crucial role including building local capacity to search for, import and absorb knowledge and technologies from other countries. Therefore, the currently little public and private R&D on agro-industries is a major obstacle to the development of this sector. There is an urgent need to build linkages between NARES, the private sector (from inputs suppliers to retailers of differentiated agricultural products), development supporting organizations, and other public institutions especially those undertaking industrial research. This should be designed to accelerate the use of existing knowledge and technologies while expanding indigenous capacity for the generation of new knowledge and technologies.

c) **Un-conducive business environment**: Despite being a common market, the EAC is still faced with serious non-tariff barriers which make it very difficult to trade even within one country.

d) **Limited supportive infrastructure** was found to be a critical constraint to the development of agro-industries from both the perspective of supply of raw materials and marketing and trade of finished products. Most major agro-industries are located along the major transportation corridors, which in the EAC also coincide with main transmission lines for grid electrical power. Therefore, data from Tanzania show that rice and maize producing areas with power and road infrastructure seem to have attracted the most private investment in storage and primary processing facilities.

13) Therefore, priority areas of investment in order to accelerate the development of agro-industries in the EAC should be:

a) **Supply of agro-processing equipment**: Even in the current small size of the agro-industry, locally produced machinery and equipment account for only a very small proportion of installed capacity. Nearly all advanced machinery and equipment are imported from outside the EAC. Therefore, there is a need and opportunity for rapid expansion of local manufacturing of the necessary machinery and equipment. The starting point should be the support of mutually reinforcing SME equipment manufacturers for SME agro-processors leading to a critical mass of manufacturers of low cost but efficient equipment. R&D should be the key area of support by the public sector.
b) **Improvement of last mile infrastructure** especially warehouse/cold storage, power supply and roads are the most critical to agro-processing because high transaction costs related to lack of such infrastructure is the largest contributor to low capacity utilization and efficiency of even the existing low agro-processing capacities. Therefore, solving these problems should be priority number one for public sector investment aimed at facilitating the development of agro-industries in the region.

c) **Expand pool of skilled entrepreneurs and labor** by expanding vocational training deliberately focusing on agro-industries, to produce technician skilled to operate and maintain agro-processing plants and equipment.

d) **Remove financing obstacles**: Financing of capital investment is very expensive due to the weak development of investment vehicles such as stock exchanges. Therefore, innovative financing mechanisms are required to deal with this problem in order to accelerate investment in agro-industries in the region.

14) **Investment briefs** have been provided for these four priority areas of investment. It is estimated that these will require the following levels of investment for proof-of-concept:

a) **A US$ 50 million fund** to establish an initiative designed to build the capacity and networking of large size fabrication workshops existing in the region, to enable them to adopt innovative approaches and technologies for the **manufacturing of factory-scale machinery and equipment for agro-processing**.

b) **A US$ 35 million project** to initiate the process of integrating agro-processing development with biomass-based electrification in rural areas to remove the most serious **last mile infrastructure** constraint. The proposed project will install at least 10 such power generation plants of at least 1 MW capacity for proof-of-concept pilot stage.

c) **A US$ 6 million initiative** to establish a critical mass of Vocational Training Centres (VTCs) to provide high quality **vocational training in agro-processing** in the EAC region.

d) **A US$ 0.5 million planning project** to explore and design innovative and acceptable financing mechanisms for agro-industries sectors in the EAC Region, to provide the medium size agro-entrepreneurs with **wider and easier access to capital financing**.
**ABBREVIATIONS**

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
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<tr>
<td>EA</td>
<td>East Africa</td>
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<td>EAC</td>
<td>East African Community</td>
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<td>EAGC</td>
<td>East Africa Grain Council</td>
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<td>EC</td>
<td>European Commission</td>
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<td>EU</td>
<td>European Union</td>
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<td>FAO</td>
<td>Food and Agricultural Organisation of the United Nations</td>
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<td>FAOSTAT</td>
<td>FAO Statistics</td>
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<td>FIIRO</td>
<td>Federal Institute of Industrial Research, Oshodi, Nigeria</td>
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<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
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<tr>
<td>HACCP</td>
<td>Hazard Analysis and Quality Control Points</td>
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<td>HND</td>
<td>Higher National Diploma</td>
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<td>ISIC</td>
<td>International Standard Industrial Classification</td>
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<td>ISO</td>
<td>International Standards Organisation</td>
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<td>ITC</td>
<td>International Trade Centre</td>
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<tr>
<td>KCC</td>
<td>Kenya Creameries Company</td>
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<tr>
<td>KIRDI</td>
<td>Kenya Industrial Research Development Institute</td>
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<tr>
<td>LIC</td>
<td>Low Income Countries</td>
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<td>LS</td>
<td>Large Scale Enterprise</td>
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<td>MDG</td>
<td>Millennium Development Goal</td>
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<td>MS</td>
<td>Medium Scale Enterprise</td>
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<td>MSc</td>
<td>Master of Science</td>
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<td>MSE</td>
<td>Micro Scale Enterprise</td>
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<td>MT</td>
<td>Metric Ton</td>
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<td>MVA</td>
<td>Manufacturing Value Added</td>
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<td>NAFCO</td>
<td>National Agricultural and Food Corporation – Tanzania</td>
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<tr>
<td>PhD</td>
<td>Doctor of Philosophy</td>
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<tr>
<td>PPP</td>
<td>Public Private Partnership</td>
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<tr>
<td>R &amp; D</td>
<td>Research and Development</td>
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<tr>
<td>REC</td>
<td>Regional Economic Community</td>
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<td>SME</td>
<td>Small to Medium Enterprises</td>
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<td>SS</td>
<td>Small Scale Enterprise</td>
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<td>SSE</td>
<td>Survivalist Scale Enterprise</td>
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<tr>
<td>TD</td>
<td>Technical Diploma</td>
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<tr>
<td>UACE</td>
<td>Uganda Advanced Certificate of Education</td>
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<tr>
<td>UFPEA</td>
<td>Uganda Fish Processors and Exporters Association</td>
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<td>UHT</td>
<td>Ultra Heat Treated</td>
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<td>UNIDO</td>
<td>United Nations Industrial Development Organization of the United Nations</td>
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<td>VAT</td>
<td>Value Added Tax</td>
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<td>VSE</td>
<td>Very Small Scale Enterprise</td>
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<td>WRI</td>
<td>World Resources Institute</td>
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1 INTRODUCTION

1.1 The Context

1) “Agro-industry” is an expression that could be interpreted in several ways in the sense that agricultural industry is often taken to mean the entire integrated value chain that include (i) supplying inputs to support field production of agricultural commodities (crop, livestock, fishery and forest), (ii) the agricultural field production itself (mainly farming), and (iii) the processing (transformation, value-addition, preservation) and distribution of products required by final consumers. However, it is generally agreed that “Agro-industry” is defined to cover only the industrial processing for transforming agricultural raw materials to semi-finished goods or finished products ready for consumption. This definition therefore excludes the manufacturing of inputs that go to farming, such as machinery, fertilizer and chemicals. The International Standard Industrial Classifications (ISIC) (United Nations, 2010), recognizes the following four clusters of agro-industries:
   a) The manufacturing of products of food, beverages and tobacco;
   b) The productions of textiles, apparel and leather;
   c) The pulp, paper and packaging industries based on wood raw material; and
   d) The production of other wood-based products.

2) The extent of development of a country’s agricultural sector is often defined by the proportion (in value and size of employment) that falls in the agro-industry portion of the agricultural value chains. For example, in developed countries and continents such as USA and Europe, the proportion of those employed in agro-industries is 83% and 63% respectively of those employed in the overall agricultural sector (UNIDO, 2010). For China, the rate is 3% (UNIDO, 2010) and in India, it is estimated that 3.8 jobs are created directly and 6.4 indirectly across the supply chain for every USD 200,000 invested in Agro-industries (Ministry of Food Processing Industries, 2005).

3) In most African countries, agro-processing is the most important manufacturing sub-sector accounting for at least 50% of manufacturing value added. Foods and beverages represent the largest part and in some countries, the beverage industry mainly breweries is three or four times that of the food industry. Despite the dominance of agro-industries in overall manufacturing, only a relatively small part of agricultural commodities is processed. Most of the foodstuffs (cereals, roots and tubers, fruits and vegetables, pulses and oilseeds) are sold to the final consumer in un-processed form or is consumed by the producers themselves. Processing of export commodities such as cocoa, tobacco, coffee, and tea is also limited to primary processing mostly only drying. Therefore, while sub-Saharan Africa is a major exporter of several agricultural commodities, it remains a net importer of processed and differentiated products of the same commodities.

4) In the Low Income Countries (LIC) such as those of the member states of the East African Community (EAC), agro-industries as defined above, although very small in global terms, constitute the largest proportion of the industrial sector (Figure 1). It can be seen that the food, beverages and tobacco products sub-sector contributes the largest share (44%), followed by textiles, apparel and leather products (5%) (UNIDO, 2010). However, although food and beverages processing is the largest, processing of staple food crops in the EAC Region is still very low. This is a misnomer because the perishable nature of most of staple food commodities means that without high level of processing and preservation the food production sub-sector which employs the majority of the poor, fails to contribute to the UN’s MDG 1 - eradication of hunger and poverty. Furthermore, in the EAC Region, agro- industries in all the four categories have been developed. However, many of these especially in Tanzania and Uganda, were established under public parastatals and several have been closed down.
Figure 1: Contribution of Agro-industries to MVA in the EAC Region (2007 – 2009)

5) The agro-industries for food processing found in the EAC Region can be categorized in three different scales:
   a) Village industries owned and run by rural households with very little capital investment and therefore operating labor-intensive processes;
   b) Small and medium scale (SME) industries characterized by medium investment and semi-automation (typical products include edible oil, milled rice, maize flour etc); and
   c) Large scale industry involving large investment and a high level of automation (typical products include sugar, beverages, powdered milk, edible oil, and baked products).

6) Why are food agro-industries important for meeting the MDG 1? There are two major reasons:
   d) The majority of the poor and hungry are employed in farming (AfDB and World Bank (2009); Salami et al. 2010); and
   e) Apart from maize, the commodities produced by the largest majority are highly perishable commodities such as all the starchy crops, livestock, meat and milk (Figure 2).

Figure 2: Smallholder Households involved in production of staple foods in the EAC Region (2008)
7) More specifically, agro-processing contributes to **Food and Nutritional Security** because processes such as drying, milling, dehydration, and pasteurization, coupled with packing in hermetically sealed containers, contribute to the preservation of food products leading to the following:

a) **Increased possibility to move food long-distances from centers of production to the centers of consumption (normally in the urban areas).** This is important because increasing urbanization is pushing most of the consumers further away from rural areas where food is being produced. As shown in **Figure 3**, it is estimated that nearly 50% of the population of Sub-Saharan Africa will be living in urban areas by 2030. Apart from the distance, urban dwellers also adopt preferences for consumption of processed and/or semi-prepared food products.

![Figure 3: Rapid reduction of people living in the rural areas – with projection to 2030](after Meijerik & Roza, 2007)

b) **Improved ability to move food for long-distance from centers of abundant production to centers of deficit production.** For example, while Uganda is a major producer of plantains and bananas in the southern west part of the country, and often up to 40% of the harvest goes to waste, plantains and bananas do not feature in the relief food provided to frequently food deficit areas of West Nile, Eastern and Northern Uganda. More generally, across Africa, perishables such as bananas, vegetables and fruits are sold at markets located more than 80 km from where they are grown (New Agriculturist-Focus, anon)

c) **Increased shelf-life to allow long periods of storage that allows availability of food beyond the production season, is another benefit of processing and preservation.** For example, Uganda produces about 1.5 million litres of fresh milk daily; a prolonged drought hit Uganda’s dairy industry in 2009 leading to the milk production level dropping by 50%. A litre of fresh pasteurized milk which sold at UGX 1,200 shillings in May 2009 had gone up to 2,000 shillings by August 2009. As a result of the sharp milk scarcity during that period, Sameer Agriculture and Livestock Ltd, a well known dairy processing industry in Uganda stopped making milk powder, ultra heat treated milk, cream and butter in July 2009. Pouch milk and yoghurt production was reduced by 75%, and milk exports to lucrative markets like Kenya were suspended (Bekunda et al., 2009). At the same time dairy industry reports show that up to 50% of the milk produced during the rainy season is wasted due to shortage of processing capacities (Kiziba Investments Limited, 2009). What
does this tell us? It tells us that the processing and preservation capacity has not been designed to deal with the fluctuations in production resulting from weather variability.

d) Reduction of losses in quantity, quality and safety of food is another benefit. Estimates show that globally post harvest losses can be as high as 30% in cereals, 50% in roots and tubers, and up to 70% in fruits and vegetables (FAO/UNIDO, 2010).

8) Agro-industries also contribute to reduction of poverty in the following ways:

i) Increased access to markets that are distant in space and time enabling producers to participate in national, regional and global markets.

ii) Creation and retention of high proportion of the value by agricultural dependent economies. This is because as shown in Figure 4, when the final consumer product is highly processed, the portion of final price that revert to the producer of primary commodity is usually very little. Therefore, value addition to agricultural commodities at the local level to produce products containing as many as possible, of the attributes demanded by the final consumer, enables a farmer, a farming community, and/or an agricultural country to capture a higher proportion of the price paid by the final consumer. However, to achieve this, it is important to ensure that:

- The farmer, community, or country is rewarded for performing an activity that traditionally has been performed at another stage along the value chain;
- Such value-added products can be sold directly to consumers (direct marketing) so as to gain the margin that has been earned by traditional processors and/or wholesalers; and
- The reward/benefit from the value-adding operation significantly exceeds the costs of undertaking it.

iii) Creation of non-farm employment and income generation opportunities in agricultural dependent economies. This is realized more at the initial stages of agro-industrialization when most of the processes are labor-intensive. These types of agro-industries have helped to increase employment opportunities, especially for women. Reduction of non-tariff barriers to markets that are related to food safety, because processing removes most of the pathogens contributing to food safety concerns increasing the ability to exploit Global Value Chains.

Figure 4: An estimation of value distribution in the high value addition cotton – textile chain (After COMESA, 2009)
9) From the above discussion, it is clear that agro-industries play a great role in increasing participation in national, regional and global value chains. It is important to elaborate this point further, because as the middle class with higher incomes expand, even in LICs, diversification and differentiation of products demanded by consumers increase. In this case, agro-industries are critical in enabling the agricultural sectors to take advantage of these characteristics of the market by providing ways and means to offer diverse and differentiated products dictated by demand for convenience, ready-to-use, and safety. For example, in Kenya, the proportion of food purchased from supermarkets is increasing with increasing urbanization, and it is estimated that the rate will raise from 38.2% in 2002 to 51.8% in 2015 (Traill, 2006). This is mainly because Nairobi supermarkets sell processed food much cheaper than do traditional shops (Neven et al., 2009). A 2003 urban survey by Tegemeo Institute estimated that 7 times more people are buying processed foods from large supermarkets than from small supermarkets in Nairobi. In South Africa supermarkets represent less than 2% of all food retail outlets, and yet share 50-60% of the total food retail (Weatherspoon et al., 2005).

10) The factors discussed above are very important in the context of the EAC, now constituting a common market of more than 125 million people with a combined GDP of about US$ 44 billion (EAC Report, 2010). The common market is an important instrument for ensuring food security in the region, as reflected in Article 45 of the Protocol on Establishment of East African Community Common Market (2010), under which the Partner States undertake to:
   a) increase agricultural production and productivity;
   b) achieve food and nutrition security;
   c) promote investments in agriculture and food security;
   d) develop effective agricultural markets and marketing systems in the Community; and
   e) promote agro-processing and value addition to agricultural products.

11) Therefore, the review summarized in this paper was designed to assess the opportunities in agro-industries and investment needed to support trade-based food security in the EAC Region.

1.2 The Purpose and Methodology

12) The purpose of the review is to produce evidence to support the development of investment briefs for development of agro-industry for food staples in the EAC Region. This review is designed to generate the evidence to show how investment in agro-industries can facilitate regional value chains leading to increased production of staple food commodities in areas of high and medium potential for production; followed by efficient supply of such commodities and products to major centres of consumption. Specifically, the assessment had the following objectives:

   a) Reviewing the current status of agro-processing in EAC region – a review of the existing agro-industry capacity in the region and the proportion of this capacity that is dedicated to selected strategic food staples, namely maize and livestock products (milk and meat).

   b) Identifying investment opportunities in the Agro-industry sector in the EAC Region.

13) The data collection process included the following:

   a) Desk Study: Relevant documents and reports that included research studies, government statistics, public sector documents, and technical and assessment reports on food staples in EAC, were collected and reviewed. This information was complemented by information and report obtained through the internet. In nearly all the research questions pursued by this study, such as trends in the development of agro-industry, installed capacity, capacity utilization among others, there was...
very little data available from national, regional and international sources such as FAO and UNIDO. The fact that most agro-industries are privately-held companies, explains why even public organizations that attempt to build statistical databases have problems to obtain the information they need.

b) Because of limited availability of data, the assessment was done more intensively for maize and livestock (meat and milk) processing. Shortage of data and information is caused by three main reasons: (i) agro-industries for other commodities are not very much developed in the region; (ii) there are very few and far apart efforts to collect and maintain consistent statistics on agro-industries; and (iii) data collection about agro-industries is frustrated by unwillingness by private owners to publish information about their enterprises.

c) **Survey of Key Informants** was conducted on a case study basis along the value chain that included two commodities; livestock (milk and meat) and Maize. The study team consulted key informants during ground truthing exercise in the EAC region to capture key issues and concerns of the sector and provide baseline status information with respect to the current agro-processing capacities and potential in the sector. During the ground truthing exercise, 15 (9 in Uganda and 6 in Kenya) livestock and maize processing facilities were visited and discussions were held with owners and/or managers of these facilities. In Uganda the following districts were visited: Jinja, Iganga, Mbale, Bukwo, and Kapchorwa. In Kenya Bungoma and Kitale were visited. Another team visited Kahama area in Northwest Tanzania.

### 1.3 Outline of the Report

The report contains three other chapters. Chapter 2 assesses the current levels of agro-industry development and performance for case studies of maize and livestock products (milk and meat) in selected East Africa countries. Chapter 3 discusses the investment opportunities in the Agro-industry in the EAC Region. The final chapter concludes on the major findings of this study and provides recommendations on what should be done to sustain agro-industry growth and development in the EAC region.
2 Current Level of Agro-industry Development and Performance in the EAC Region

2.1 Estimates of Agro-industries Capacities and Development Trends

15) Agro-processing is categorized into three stages namely, primary, secondary and tertiary processing, defined as follows:

a) Primary agro-processing refers to the processing of materials of agricultural origin without any alterations in shape, size and form. Such processes include: cleaning, grading, drying, shelling, and threshing. These activities are mainly carried-out on the farm and only transform the commodity into a slightly different form prior to packaging, storage and marketing or further processing at secondary level. However, this stage is often not counted as part of agro-industries.

b) Secondary agro-processing operations entail increasing value and preservation of a commodity and the physical form or appearance of the commodity is often totally changed from the original. Basically, it is the transformation of commodities into more convenient forms for use. Such processes include for example, grinding, pressing, ginning, milling, cutting and mixing, such as in transformation of paddy to rice, oilseeds to oil, fruit to juice, milk to cheese, wheat to flour, live animal to meat, fibre to fabric, or groundnuts to butter.

c) Tertiary agro-processing is the transformation of agro-products into highly differentiated products. Tertiary processes include: baking, homogenization, Ultra Heat Treatment (UHT), weaving and extraction. Tertiary processes yield for example bread and biscuits, ketchup and garments. Beyond tertiary agro processing, there are other processes such as chemical alteration and texturization. These processes are not necessary categorized as tertiary, nonetheless, they are utilized in manufacture and processing of textured vegetable foods and instant foods.

16) Four indicators can be used to assess the extent of agro-industry development:

a) Agro-industries value added in the total agricultural GDP is perhaps the most important indicator because it measures the proportion of agricultural produce that is processed to value added products before reaching the domestic or export market;

b) Proportion of the agricultural labour employed in agro-industries which would also measure level of employment in agro-industries;

c) Agro-industries value added in the total value of agricultural exports which will measure the extent of value retention and therefore building of wealth in the country or region; and

d) Agro-industries value added in the total manufactured value added.

17) To put the discussion in this section in context, Figure 5 presents estimated comparison of the current agricultural GDP as a percentage of the total GDP, on the one hand, and agricultural labour\(^1\) as proportion of total labour force, on the other. The data shows that the size of the agricultural sector in terms of GDP is about half its size in terms of employment. This is an indication of the low productivity of the sector in general, and low value addition in particular.

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\(^1\) Agricultural labor is the number of economically active persons engaged in agriculture, hunting, forestry or fishing. (WRI, 2010)
18) One measure that is used to present agro-industries value added in the total agricultural GDP is the share of processed products in comparison to total agricultural production. Table 1 below shows the share of agro-industries value added as a proportion of agricultural GDP for the EAC Countries:

<table>
<thead>
<tr>
<th>Country</th>
<th>Agro-Industry Value (000 USD)</th>
<th>Total Agricultural Production (000 USD)</th>
<th>% of Agricultural Production that is Processed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uganda</td>
<td>940,425</td>
<td>4,010,000</td>
<td>23</td>
</tr>
<tr>
<td>Kenya</td>
<td>2,936,905</td>
<td>6,760,000</td>
<td>43</td>
</tr>
<tr>
<td>Tanzania</td>
<td>1,422,138</td>
<td>5,710,000</td>
<td>25</td>
</tr>
<tr>
<td>Rwanda</td>
<td>81,292</td>
<td>1,970,000</td>
<td>4</td>
</tr>
<tr>
<td>Burundi</td>
<td>62,413</td>
<td>440,000</td>
<td>14</td>
</tr>
<tr>
<td>TOTAL</td>
<td>5,443,173</td>
<td>18,890,000</td>
<td>28</td>
</tr>
</tbody>
</table>

19) Across the Sub-Saharan Africa region in general the proportion of Agricultural value added in the total Agricultural GDP is estimated at 15%, compared to 80% in developed economies (World Bank, 2008). As shown in Table 1 above, the estimated figure for the EAC Region about 28%.

20) Finally, considering agro-industries value added in the total manufactured value added, it has been reported that the general trend in the LICs is that more than 50% of total MVA is contributed by agro-industries as shown in Figure 6 (see for example FAO & UNIDO, 2009 - page 49). In the EAC Region the available data shows that on average, 66%² of the total MVA is contributed by agro-

² Authors’ average based on data from statistical abstracts, ITC, World Bank, and EAC documents.
industries. With respect to agro-industries value added’ in the total value of industrial exports, the trends in the EAC Region show that the contribution of Agro-industries has been increasing, as shown in Figure 6 below. However, 78% of agricultural exports are primary and secondary products (Meijerik and Roza, 2007). With respect to agro-industries value added in the total value of agricultural exports, the trends in the EAC region have remained stable (92%) for the period between 2007 -2009 (ITC, 2010).

![Figure 6: Contribution of agricultural value added to MVA East Africa (ITC, 2010)](image)

A preliminary ranking of food staple commodities of the EAC Region according to three criteria: (i) number of farmers involved in the production of the commodity, times (ii) value of annual production, and times (iii) average rank in the priorities of the five member states of the EAC, indicated that the 20 top commodities are as shown in Table 2. The three criteria used in the ranking process are important because they indicate the commodities with the highest potential for poverty reduction as well as the highest prioritisation of the governments of the region. Only maize was ranked number one by each criterion indicating that it is the most important commodity in the region.

Table 2: Top 20 Commodities produced in the EAC with respect to relevance to food security and reduction of poverty

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Rank</th>
<th>Commodity</th>
<th>Rank</th>
<th>Commodity</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maize</td>
<td>1</td>
<td>Irish potatoes</td>
<td>8</td>
<td>Honey</td>
<td>13</td>
</tr>
<tr>
<td>Cassava</td>
<td>1</td>
<td>Sorghum</td>
<td>9</td>
<td>Pineapples</td>
<td>16</td>
</tr>
<tr>
<td>Dairy Cattle</td>
<td>3</td>
<td>Groundnut</td>
<td>10</td>
<td>Coconut</td>
<td>17</td>
</tr>
<tr>
<td>Plantains/ Bananas</td>
<td>4</td>
<td>Rice</td>
<td>11</td>
<td>Cow peas</td>
<td>18</td>
</tr>
<tr>
<td>Beef cattle</td>
<td>5</td>
<td>Fish culture</td>
<td>12</td>
<td>Sugarcane</td>
<td>19</td>
</tr>
<tr>
<td>Sweet potatoes</td>
<td>6</td>
<td>Soya bean</td>
<td>13</td>
<td>Cashew nut</td>
<td>20</td>
</tr>
<tr>
<td>Dry Beans</td>
<td>7</td>
<td>Sheep (mutton)</td>
<td>14</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Kilimo Trust, 2011.

3 In this report, this is defined as the value addition attributable to agro-industry processing, particularly primary, secondary, and tertiary processing of agricultural products

4 Authors’ average based on data from the International Trade Centre, 2011
22) Figure 7 presents a comparison of estimated value produced by smallholders using world prices to compare major clusters of commodities. The data was assembled from different national and international statistical reports. Production by small holders was calculated for each of the EAC member countries by multiplying the reported average yields achieved by smallholders, by the estimated area of production by smallholders. It must be emphasized that this analysis is limited by paucity of data but it is considered indicative enough for judging the importance of commodities. It is no surprise that cereals came top, but it is interesting to note that starchy crops which are rarely talked about in agro-industry strategies are very close second. These are followed by dairy and meat both of which are highly perishable commodities.

![Figure 7: Total Annual Value Produced by Smallholders in EAC (FAOSTAT, 2009)](image)

23) It is projected that by 2030, the demand for agricultural and in particular food products in the EAC will be almost triple the current demand (Riddell et al. (2006)). Table 3 shows this trend. This implies that the Agro-industry capacity must match this growth in demand as urbanization increases.

| Table 3: Projected Demand for Agricultural and Food Products in East Africa in 2015 and 2030 (US$ million) |
|-------------------------------------------------|-----------------|-----------------|-----------------|
|                                                   | 1997/1999 | 2015 | 2030 |
| Cereals                                          | 2,667     | 4,340 | 6,628 |
| Non-Cereal Food Crops                            | 6,843     | 11,641| 17,479|
| Staple food Crops                                | 6,855     | 11,218| 16,672|
| Non-food Crops                                   | 270       | 375   | 938  |
| Livestock                                        | 4,479     | 7,307 | 11,372|
| All Food Commodities                             | 13,989    | 23,285| 35,479|
| All Agricultural Commodities                     | 14,259    | 23,860| 36,437|

Source: Riddell et al. (2006)
2.2 Agro-industries in the EAC Region with Respect to Cereals

2.2.1 Scale categories

24) The issue of what constitutes a small or medium or large scale enterprise is a major concern in the literature. Different authors have usually given different definitions to this category. The definition of firms by size varies among researchers. Some attempt to use the capital assets while others use skill of labour and turnover level. Others define SMEs in terms of their legal status and method of production.

25) For example, the European Commission (EC) defined SMEs largely in terms of the number of employees, where firms with 0 to 9 employees are categorized as micro-enterprises, those with 10 to 99 employees as small enterprises, and where the number of employees in 100 to 499 employees then the firm is categorized as a medium enterprise. This is closely similar to the categorization by UNIDO. The World Bank on the other hand considers firms with fixed assets (excluding land) less than US$ 250,000 in value as Small Scale Enterprises.

26) However, such categorization will be more applicable to industrialized countries. The classification more applicable to developing countries would be: Large-firms with 100 or more workers, Medium-firms with 20-99 workers, Small-firms with 5-19 workers, and Micro-firms with less than 5 workers.

27) Furthermore, categorizing firms based on only number of employees can be grossly misleading in poor countries given the abundant availability of cheap labor. Therefore in this report, agro-processing firms are categorized based on throughput capacity (MT/day) and number of employees. On the basis of this the following categories are found in the EAC:

   a) Micro Scale Enterprise (MSE): In milling of cereals, these enterprises normally have capacity of less than 0.5 MT/day. They do not operate on a daily basis as they are normally operated as services to farmers who bring grain for milling at a fee. Most of these enterprises are not formally registered. They are mainly cottage operations processing for home and local consumption. They hardly formally employ any labour but rather are operated by the owners.

   b) Very Small Scale Enterprise (VSE): These enterprises operate in the formal market places/townships and have access to improved processing equipment and machinery. They also operate on demand at a fee. The milling capacity is normally between 0.5 and 1.0 MT/day, and they have formal employee to a maximum of seven.

   c) Small Scale Enterprise (SS): These enterprises are generally more established, often registered with a business licence. The milling capacity can be as high as 50 MT/day, and they employ 10 - 25 people. However, management is still by owners.

   d) Medium Scale Enterprise (MS): These enterprises are often characterized by the decentralization of power to an additional management layer. There are more MS in Kenya, in the surveyed districts of Kitale, Bungoma than in the Ugandan districts of Jinja, Iganga, Kapchorwa, Mbale, Bukwo, Kamuli and Tanzania in the district of Kahama. The milling capacity is often 51 – 149 MT/day with 26 – 100 employees.

   e) Large Scale Enterprise (LS): These enterprises are not only characterized by the decentralization of power to an additional management layer but also benefit from economies of scale. The milling capacity per day is ≥ 150 MT. They employ more than 101 people.

2.2.2 Installed capacity and capacity utilisation of secondary processing facilities for maize

28) Aligning production and agro-industrial processing in a sense that exploits EAC strengths is crucial for the success for the region. In other words linking production to agro-processing capabilities is critical to minimize idle equipment and machinery, reducing post harvest losses, and creating decent
employment. Figure 8 summarizes the existing milling capacities versus the maize produced in Kenya, Tanzania and Uganda in 2008. It is interesting to note that the milling capacity/year for maize is almost the same as the total annual production. This is both as a result of the importance attached to maize as the leading staple commodity in the EAC Region and the advanced adoption of hammer mills for SMEs. It is also an indication of the importance of the size of the market of an agricultural product in driving the development and investment in the agro-industry required to produce such a product.

29) **The “missing” MSE:** Figure 9 shows that the installed capacity for processing cereals and perhaps other commodities is skewed towards small scale enterprises. There is also a significant proportion of the installed capacity that is in the form of large scale. The MSE are missing from the picture and this is a major reason for the under-developed agro-industry sector.

![Figure 8: Comparison of installed capacity and annual production](image)

![Figure 9: Sizes of installed capacity and rate of utilization in selected case studies](image)
2.3 Agro-industries in the EAC Region with Respect to Livestock Products

2.3.1 Livestock value chains in the EAC Region

30) An extensive assessment of poverty in East Africa, conducted by ILRI in 2002 found out that areas where livestock is the main source of livelihoods are often the ones with highest incidences of poverty in East Africa (Thorntom et al., 2002). In Tanzania, for example, agro-pastoral and pastoral areas account for 95% of the cattle population, yet most agro-pastoral and pastoral households live below the poverty line of US$ 1 per day. At the same time, estimates made using available statistics of livestock, average rates of off take and world prices gives a total value annual trade in livestock and livestock products of about US$ 5 billion. If realized, this would be about 12% of the reported GDP of the EAC member countries combined. Given that there are case studies which show that the current statistics on livestock could be an under-estimate, it is clear that a significant proportion of wealth in East Africa is held in the form of livestock.

2.3.2 Agro-industry capacity and its rate of utilisation - processing of meat

31) Processing of livestock into meat products is very limited in the region and is often limited to slaughter. This is because of the very limited development of the value chain as a result of little or non-existent commercial production by pastoralist who are the main suppliers of livestock for meat. Therefore, despite the fact that livestock raising is practiced by the majority of people and nearly the entire population of the areas with the highest poverty and food insecurity levels, marketed meat products contributes very little to the GDP. From the market side, livestock products are affected by probably the stringiest non-tariff barriers in the world market.

32) In general most (85%) processing of beef and small ruminants meat is conducted by owned slaughter slabs, abattoirs, and rarely slaughter houses close to the areas of consumption in rural trading centres, towns and cities. Therefore, most of the transportation from production area to the market area, of especially beef cattle is “on-hooves”. There is limited processing by large scale slaughter and meat packing factories. Slaughter slabs are linked to butcheries which then sell directly to consumers. There are 31 modern slaughter houses in the EAC Region. The main secondary agro-processing for meat, is in the production of sausages, canned meat and minced meat. Secondary meat processing in the EAC region is still in its infancy stage.

33) Table 4 summarizes the available meat processing capabilities in the EAC Region, with respect to formal abattoirs and slaughter houses. It can be noted that there is idle processing capacity of 860,500 tons/year. Unlike Kenya and Uganda, Tanzania produces more than it can process by an estimated 760,000 tons per year. This presents an investment opportunity in meat processing in Tanzania. Uganda and Kenya are yet to match production to processing capabilities.

<table>
<thead>
<tr>
<th>Country</th>
<th>Beef Carcass (MT/year)</th>
<th>Installed Capacity (MT/year)</th>
<th>Excess/Shortage Capacity (MT/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uganda</td>
<td>106,000</td>
<td>394,000</td>
<td>(488,000)</td>
</tr>
<tr>
<td>Kenya</td>
<td>367,500</td>
<td>1,500,000</td>
<td>(1,132,500)</td>
</tr>
<tr>
<td>Tanzania</td>
<td>850,000</td>
<td>90,000</td>
<td>760,000</td>
</tr>
<tr>
<td>Rwanda</td>
<td>36,920</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Burundi</td>
<td>7,020</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>1,367,440</td>
<td>7,292,472</td>
<td>(860,500)</td>
</tr>
</tbody>
</table>
2.3.3 Agro-industry capacity and its rate of utilisation - dairy products

34) EAC as a region produced about 6 billion litres of fresh cow milk in 2007 roughly equal to one-quarter of the total for all of Africa (FAO, 2008). Figure 10 shows the trend of national milk production estimates for the EAC member states between 1975 and 2007.

![Milk Production in EAC Countries, millions of liters whole fresh cow milk, 1975 - 2007](image)

**Figure 10:** Milk Production in the EAC Region (Source: FAOSTAT, 2009)

35) Most milk processing plants in EAC operate far below the maximum installed capacity. On average, utilization capacity of dairy plants in the EAC Region is 26%. The total installed milk processing capacity in Kenya, Uganda and Tanzania is 3.5 million litres/day. The weighted utilization capacity in Kenya, Uganda and Tanzania is about 1 million litres per day. Table 5 summarizes the current status of the dairy sector in the EAC Region (litres/day). Based on the milk production estimates in the preceding section, the EAC Region is in shortage of milk processing facilities.

<table>
<thead>
<tr>
<th>Country</th>
<th>No. of dairy processing facilities</th>
<th>National milk production (litres/day)</th>
<th>Milk delivered for secondary and tertiary processing (litres/day)</th>
<th>Installed Secondary and Tertiary Milk Processing Capacity (litres/day)</th>
<th>Weighted Milk Capacity Utilization (litres/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>SS</td>
<td>MS</td>
<td>SS</td>
</tr>
<tr>
<td>Uganda</td>
<td>16</td>
<td>1,831,827</td>
<td>281,453</td>
<td>1,000</td>
<td>734,466</td>
</tr>
<tr>
<td>Kenya</td>
<td>34</td>
<td>3,800,000</td>
<td>593,500</td>
<td>1,000</td>
<td>2,162,200</td>
</tr>
<tr>
<td>Tanzania</td>
<td>35</td>
<td>1,500,000</td>
<td>58,680</td>
<td>7,700</td>
<td>498,300</td>
</tr>
<tr>
<td>Sub-Total</td>
<td></td>
<td></td>
<td>9,700</td>
<td>3,394,966</td>
<td>1,574</td>
</tr>
<tr>
<td>Total</td>
<td>85</td>
<td>7,131,827</td>
<td>933,633</td>
<td>3,404,666</td>
<td>924,261</td>
</tr>
</tbody>
</table>

Table 5: Capacity and Capacity Utilisation Dairy Sector in Selected Countries in the EAC Region (2009)
2.4 Implications of the Size of Investment required in Agro-Processing Facilities

2.4.1 Agro-processing in general

36) Apart from primary processing of cereals and milk, the region has a serious shortage of agro-processing capacities in all aspects. Processing to branded secondary and tertiary products is hardly happening in the EAC region. Analysis of 40 major food commodities produced in the EAC as a block has shown that the region has comparative advantage compared to importation from global lead producers, in nearly 30 of these commodities. These include: most meats, beans (dry, soya and French), fruits (such as citrus, mangoes and pineapples), spices (such as ginger, cloves and vanilla), cashew and coco nuts; sunflower; vegetables (such as cabbage and carrots); cassava; sugarcane; dairy milk, potatoes, and cereals (sorghum, wheat and barley). The EAC as a block is also among the top 20 producers in the world for most of these commodities. This therefore presents a tremendous opportunity with respect to un-met demand for agro-processing. The investment opportunities are discussed further in chapter 3.

2.4.2 Equipment manufacturing and supply

37) The importation of Agro-industry equipment and machinery to developing countries has a series of negative side effects. Foreign exchange is usually scarce, while the equipment and machinery is rather expensive. Moreover spare parts also have to be imported as well as some or almost all machinery and equipment consumables. In case where the equipment and machinery do not suit the intended need, they are shelved. In some cases, the lack of technicians or equipment users’ manuals leads to equipment and machinery neglect. During the ground truthing exercise, many challenges with imported equipment and machinery were identified. In some cases, processors could not find technicians that knew how to run equipment and machinery thus they were reluctant to use them out of fear to damage expensive apparatus. For example in Mbale, Uganda, a processor showed us a ‘graveyard’ of equipment and machinery that require minimal repairs or only some maintenance which cannot be deployed due to lack of technical personnel.

38) The relationship between equipment manufacturers and equipment users is getting more and more complex. For example, some of the successive millers in Kitale, Kenya have good linkages with equipment manufacturers in Italy and Germany. Interestingly this cordial relationship has been built over years because a family member is facilitated to maintain it in exchange for ease of access to service of equipment and/or human resource development for their maize milling business. Another example is from Kampala Uganda. In exchange for scouting, and repair services for machinery and equipment, one of the leading ice cream processors is paying tuition fees in European Universities for kids of the technical personnel. This is a win-win situation for the parties involved.

39) Also, foreign aid in the form of equipment and machinery sometimes has negative effects. It rarely meets more than a small part of the demand, and often a developing country may have a variety of equipment received from various donor countries, each in small quantities. This makes it difficult to have uniform equipment and machinery thus issues of standardization and maintenance are difficult. High sophistication of the equipment does not necessarily mean high output value. Commercial instruments are sometimes designed to cater for multi-purpose needs of industry and research, while an instrument often can be significantly simplified, according to the needs of the sector. Sophisticated equipment is not always comprehensible to users, and often not even to technicians. Relying on the results of a given technology without any understanding how they are obtained decreases the value of the product because marketers have headaches selling such products.
40) One of the approaches to overcome the problems in supply, maintenance and use, is development of low-cost and/or locally produced alternatives. However, one of the main challenges of small scale equipment manufacturers is the lack of the ability to fabricate and/or reproduce standardized technologies, equipment and machinery. As a result, it is very hard to rely on local technology manufacturers’ equipment and machinery. In order to replicate and deploy technologies for widespread commercial application, there is need to establish enabling infrastructure that the EAC currently lacks. For maximum benefit to accrue, there is a need to establish complementary one-stop computer aided design and manufacturing centres in key agro-processing growth areas, each complete with; a materials physical testing laboratory and fully fledged instrumentation unit. Table 6 summarizes some of the equipment and machinery needed for primary, secondary and tertiary processing of Maize and cereals, and livestock products (Meat and milk).

Table 6: Selected Equipment and Machinery needed for Processing of Meat and Milk

<table>
<thead>
<tr>
<th>Equipment &amp; Machinery</th>
<th>Commodity</th>
<th>Grain</th>
<th>Maize</th>
<th>Livestock Products</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary processing</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grain cleaning, grain huskers, on farm grain driers, grain breaking, grain sieving, grain mixer, Suction winnowers, grain handlers, loaders, grain silo storage, grain sampler, moisture meter</td>
<td>Slicer, dicers, brine mixer, chillers, blast freezers, thermometers, weighing scale, deboning knives, weighing scale, stainless steel, stainless steel working tables, stainless steel hanging hooks, trolleys</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Secondary processing</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grain flakers, driers, hammer mill, De-hullers, Bran brushes, rollers, cereal flour Feeders, Grain Elevators, packaging machine</td>
<td>Bowl cutter, vacuum Stuffers, mincers, band saw, smoking chamber, mixers, boilers, vacuum tumblers, measuring scales, retorts, Piston stuffers, Injectors, Manual sausage linking equipment, Clipping machine, Shredders, Vacuum skin packaging machine, Shrink tunnels and dip tanks, Labelling machine, Roll lifting equipment</td>
<td>Pasteurizers, Cream separators, Centrifugal pump, Fermentation rooms, Vacuum evaporators, Yoghurt filling machines, Milk filling machines, cooking mixers, cheese cutting presses, cheese moulds, cheese cutters, cheese basket and trolleys, cheese vats, bag trolleys, Cheese presses, Cheese pumps, Can seaming machines, butter churns, Cream pasteurizers, Butter forming machines, Butter packing machines,</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Tertiary processing</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bakery, Pressure cookers/ Boilers, Packaging machine</td>
<td>canning machine, smoke houses, Modified atmosphere tray sealers</td>
<td>Sterilizers, Vacuum packing machines, Homogenizers, Ice cream blast freezers</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2.4.3 R & D

41) Much of Sub-Saharan Africa relies on science and technologies developed elsewhere for development. The problem is rooted primarily (but not exclusively) in the lack of public funding of R & D in tertiary institutions and also in education systems. The Centre for Global Development reported in its February 2008 working paper, that over the past half century, tertiary education has transformed from being a domain for elites to a global industry enrolling millions of students every year. The same trend is observed in tertiary agricultural education where the number of African universities teaching agricultural sciences grew from 20 to nearly 150 from 1960 to 1990 (Temu, 2008). Despite these figures gross enrollment ratio in African countries still lag far behind those in developed countries.
Important differences between developed and developing countries lies in the poorly funded R&D to generate knowledge relevant for developing countries. In many African countries, R&D is foreign funded. Poor funding has also led to using learning materials developed or based on foreign knowledge thus the graduate are irrelevant in the environment they are trained to serve. Recently in Uganda, the President initiated the Presidential Fund to fund local researchers. In the EAC Region, governments need to commit public funding for R&D so as to attract the private sector to invest too.

2.4.4 Human resource requirements

42) There is a general shortage of skills needed in the agro-industry development, installation, operation and maintenance in the region (Dahlman et al. 1987). The main causes of this state of affairs include: limited quantity and quality education in science subjects, inadequate coverage of skill required in agro-industries in vocational training, and the poor development of agro-industries which leads to fewer job opportunities.

43) Therefore skills development should be a priority investment by any programme designed to accelerate the development of thriving agro-industries (Lall, 1996). Existing agro-industries have a big role to play because skills development requires learning-by-doing. Experience is needed also to know what is wanted and what is possible in the way of products and processes. Acquiring this experience is not automatic, but rather a slow process of learning-by-doing and discovering what works in the local context through experimentation. Learning-by-doing is necessary, but not sufficient. Acquiring technological capabilities also requires conscious effort on the part of Agro-industries to monitor what is being done, to try new processes and products, to keep track of developments throughout the world, to accumulate added skills and to increase the ability to respond to new pressures and opportunities (Dahlman et al. 1987).

44) Development of practical skills is vitally important because the key requirement is in operation and maintenance which require technical skills more than anything else (Figure 11) as opposed to exclusively higher professional qualifications (UPI, 2009).

![Figure 11: Education and skills mix required for thriving agro-industries](image-url)
2.4.5 Supporting Infrastructure

45) The EAC Region needs substantial investments in distribution services and infrastructure development. This is especially relevant in that, increasingly, buyers require consistency in volumes and quality delivered and timing, as well as just in shape delivery. Figure 12 shows the location of agro-industries in the EAC Region. It can be deduced that most of the processing facilities are located along the major transportation corridors. Therefore, most of the areas with high potential in agricultural production are not served with agro-processing capacity. Therefore, the following investments are needed in the rural areas of production of raw materials to support the development of thriving agro-industries:

a) For grain commodities the most important infrastructure required include: bulking and storage facilities, standard cleaning and drying systems, rural electrification.

b) For perishable commodities the most important infrastructure required include: cold storage facilities, primary processing to extend shelf life and reduce bulkiness, rural electrification, and refrigerated transportation vehicles.

46) Inadequate transport infrastructure and poor management of transport in the EAC region is the major obstacle to agro-industrial development. Transport costs are very high and often account for up to 80% of the cost of procuring raw materials by agro-processors. Therefore, strategies for development of agro-industries should be two pronged: (a) effective utilization of existing infrastructure, and (b) development of supportive infrastructure in the rural areas where major commodities are produced. Such a strategy will require the harmonization of three key strategies which are currently developed and implemented independent of each other: (a) industrialization strategy; (b) agricultural strategy; and (c) infrastructure development strategies.

2.4.6 Enhancing Food Safety and Quality Assurance for value-added food products

47) Investments in quality and food safety assurance systems are key factors that will open doors for EAC producers. Strengthening the technical support institutions thereby: (i) creating a critical mass of national Hazard Analysis at Critical Points (HACCP) and Good Hygienic Practices (specialists/auditors); and (ii) upgrading the capacity of public laboratories (with equipment and technical assistance), are steps in the right direction towards agro-industry development.
3 Investment Opportunities in Agro-Industries in the EAC Region

3.1 Past and On-going Efforts

3.1.1 Private sector priorities

48) Figure 13 presents results of a survey of 150 major agro-processors in the EAC Region with respect to commodities handled. As expected maize leads by the frequency of number of investors handling this commodity. It is followed by wheat and oil crops, but both register around only a half of the frequency of investment in maize processing. The general picture is that past and current investment has targeted major staples of cereal and oil crops and there would therefore be a large un-met demand for the processing of perishables.

![Bar chart showing commodity processing frequency](image.png)

**Figure 13:** Private agro-processors who have invested in the processing of different commodities

49) The low frequency of investment in tea and sugar processing can be explained by the factor that processing facilities for these commodities tend to be large in size. For example, the following investments have been made recently in sugar processing:

a) A US$ 8.5 million investment in 2010 by the East African Development Bank in the Kakira Sugar Works of Uganda to facilitate expansion of power generation from bagasse.

b) A US$ 35 million was invested by Mumias Sugar Company of Kenya, also to expand electricity generation from bagasse from 3 to 35 MW.

c) Also in Kenya, the Kwale International Sugar Company Ltd (KISCOL), is investing USD 270 million on a project expected to be commissioned in 2011.
This appraisal has shown that small scale primary milling of maize is highly industrialized and to some extent this has been the reason that maize is considered the leading staple in the region (Box 1). The same trend is now being observed with small motorized pumps for lifting water for irrigation. The main factors behind the mechanization of milling and the recent accelerated adoption of mobile motorized pumps, include the following:

a) Low capital requirement,
b) Sharing among many users, with clear and fair distribution of costs, and
c) Scalability - mainly the ability to be used under any condition with very little prior preparation.

### Box 1: Hammer mills drove adoption of maize in Eastern Africa

African maize production received a boost with the introduction of the hammer mill in the 1920s. Hammer mills gave a processing cost advantage to maize over small grains, since maize could be dumped into the hopper for grinding, while millet and sorghum husks required de-hulling first. The smallest hammer mill with a 3 kW diesel engine will produce about 150 kg of coarse flour per hour – a huge revolution compared to manual grinding.

After: Smale and Jayne, 2003

### 3.1.2 Supportive initiatives by the public sector

#### 51) Examples from Uganda:

a) In the annual budget, the Government of Uganda is providing funding to support loan facility to stimulate commercial farming and agro-processing. The strategy is to support investment capital for agro-processing facilities located in rural areas.

b) Another major initiative of the Government of Uganda is the R&D program designed to develop products and processing technology for reducing post harvest losses and increasing the shelf life of the plantains and bananas produced in Uganda.

c) Uganda Meat Export Development is being initiated with a grant of NOK 22.5 million NORAD and Nortura both of Norway.

d) A US$ 40 million is being invested to develop the Uganda Modern Halal Abattoir being set up near Kampala by the Uganda Investment Authority.

e) A project supported by IFAD and the World Bank with a US$130 million loan and grants is establishing a facility for plantation with smallholder out-growers in the production of oil palm as well as setting up modern plants processing and refining of edible oil, and a soap plant in Jinja.

f) IFAD is investing another US$ 60 million in a project supporting the production and processing of traditional vegetable oil by SME agro-processors. This project has for example supported the establishment of about 30 SME agro-industries in Northern Uganda.

g) Uganda Integrated Programme (UIP) is investing US$ 6.3 million in a joint venture between the government of Uganda and UNIDO, aimed at enhancing competitiveness of agro-industries of SMEs working in food, textiles and leather industries.

h) Markets and Agricultural Trade Improvement Project-1 (MATIP-1) is a 5-year (2009-2014) project of the Government of Uganda focused at improving the processing of highly perishable commodities; namely fish, fruits, meats and vegetables. The project is supported by the African Development Bank.
52) Examples from Tanzania:

   a) **An Agro-processing Training Centre in Zanzibar**: This is a USD $2.3 million facility being developed with the support of South Korea. It is designed to facilitate transfer of know-how and skills from South Korea with respect to small and medium scale food processing.

   b) **Marketing infrastructure, value addition and rural finance support programme** with US$ 170.5 million of which US $ 90.6 million is provided by IFAD as a loan approved in 2010. The program’s development objective is to enhance the incomes and food security of the target group sustainably through increased access to financial services and markets. Details are available at: [http://operations.ifad.org/web/ifad/operations/country/projects/tags/tanzania](http://operations.ifad.org/web/ifad/operations/country/projects/tags/tanzania)

   c) **District agricultural sector investment projects (DASIPs)** – covering all districts in Tanzania, directs government and donor funding to investment planned by communities at the local level. Primary agro-processing facilities are priority investment in most of the initiatives supported. Apart from the government, DASIPs are supported by a US$ 52.5 million loan and a US$ 10.20 million grant from the African Development Bank.

   d) **Agricultural sector development programme (ASDP) (sector development budget support)**: is a programme of US$ 315.56 million contributed by ADF (US$ 59.87 million), World Bank (US$ 90 million), European Union (US$ 8.5), Japanese Embassy (US$ 3 million), Development Cooperation of Ireland (1 million), IFAD (36 million), Government of Tanzania (US$ 28.7), and beneficiaries (US$ 23.2 million). The programme has supported agro-processing with respect to provisions of slaughter slabs, agro-processing units (for dairy produce, vegetable and fruits especially cashew nuts).

53) Example from Rwanda:

   a) **Smallholder cash and export crops development project** is focusing on marketing, storage, and agro-processing, and is funded to the tune of US$ 25 million including an IFAD loan of US$ 16.3 million. The main objective is to assist coffee and tea growers who produce and process Arabica coffee and high-quality tea in specialized cooperatives.

   b) **Livestock infrastructure support programme (LISP)**: with a US$ 35 million loan from the African Development Fund (ADF). The goal of the Programme is to create an enabling environment that will stimulate the development of a modern livestock industry in Rwanda through value addition and access to markets in order to encourage diversification of the economy, sustain growth, create jobs and alleviate poverty.

54) Examples from Kenya:

   a) **Smallholder horticulture marketing programme** - a marketing, storage, and processing programme with a total investment of US$ 26.6 million, contributed by IFAD loan of US$ 23.4 million and an IFAD grant of US$ 500,000. The programme is targeting investment in value chains and market-supporting infrastructure, and helped to improve the supply of inputs and the functioning of market chains. It also built the capacity of private-sector service providers, and government institutions.

   b) **Kenya agricultural productivity and agribusiness project (KAPAP)**: funded by IDA (USD 82 million) and the Government of Kenya (USD 14 million) under the framework of the Agricultural
Sector Development Strategy (ASDS). It has a component of agribusiness and market development which supports linking of rural agro-processing with off-grid energy sources to further facilitate value addition. It also supports the empowerment of public and private stakeholders along selected agricultural commodity value chains to plan, design and establish sustainable agribusinesses.

c) **Sugar processing development:** the Mumias Sugar received a USD $ 35 million soft loan from PROPARCO in 2008 to expand its cogeneration plant which uses bagasse, a by-product of sugarcane to generate electricity. This funding was aimed at expanding its electricity generation capacity from 3 MW to 35 MW. The construction of a US$ 280 million sugar factory in Kwale was started in early 2011.

d) **The Kenya dairy sector competitiveness program (KDSCP):** funded by the USAID at a cost of USD 9 million since 2008, the program aims at improving the competitiveness of the dairy industry. The program supports the development of quality standards for dairy products and supports policy reform initiatives. It promotes the market expansion of milk and other dairy products. It also helps to build business to business linkages between small businesses, processors and large businesses as well as building capacity of various players in the dairy value chain.

e) **Dry lands livestock development program:** also funded by USAID at an estimated cost is USD 10 million, the program is designed to enhance productivity and market competitiveness of livestock and livestock products in the arid and semi-arid areas of Kenya in order to increase production for local consumption market and export trade. With respect to value addition the program explores opportunities for engaging small holder pastoralists to produce higher value live stock products including camel dairy products, traditionally processed meat and hides and skins for leather products.

55) **Example from Burundi:**

**Value Chain development Programme** started in 2010 with a US$ 73.8 million loan and US$ 39.6 million grant from IFAD. The Programme will help reduce the country’s grain and dairy deficit through greater professionalization and organization among smallholder agricultural producers within viable agricultural value chains. The project will assist public and private institutions, civil society and organizations of the rural poor people in forming quality partnerships to promote main value chains such as rice and milk and six other secondary value chains.

3.2 **Priorities for Agro-industry development in the EAC**

56) **Supply of agro-processing equipment:**

a) As indicated by the few examples given above, investment in agro-processing and packaging is expanding. However, locally produced machinery and equipment account for only a very small proportion with nearly all advanced equipment imported. The source of such machinery and equipment has historically been Europe, but recently Asian countries have captured an increasing share of the market due to low prices and reduced transport costs making their equipment attractive especially to small-scale processors.

b) However, with the East Africa Common market in place there is a great opportunity and it is now more viable to build a local manufacturing capacity to supply the necessary machinery and equipment. The starting point should be the support of mutually reinforcing SME equipment manufactures for SME agro-processors leading to a critical mass of manufacturers of low cost but efficient equipment.
c) Although R&D is not the only driver of innovation, it plays a crucial role including building local capacity to search for, import, and absorb knowledge and technologies from other countries. Therefore, the currently little public and private R&D on agro-industries is a major obstacle to the development of this sector. There is an urgent need to build linkages between NARES, the private sector (from inputs suppliers to retailers of differentiated agricultural products), development supporting organizations, and other public institutions especially those undertaking industrial research. This should be designed to accelerate the use of existing knowledge and technologies while expanding indigenous capacity for innovation.

57) **Improvement of last mile infrastructure** especially warehouse, power supply and roads is the most critical to agro-processing because high transaction costs related to lack of such infrastructure is the largest contributor to low capacity utilization and efficiency of even the existing low agro-processing capacities. Therefore, solving these problems should be priority number one for public sector investment aimed at facilitating the development of agro-industries in the region.

58) **Expand pool of skilled entrepreneurs and labor:** Generally speaking, East Africa’s agro-industrial sector is characterized by relatively poor quality of labor force manifested by inadequate technical and managerial skills and a general lack of entrepreneurial cadre exposed to advanced agro-industrial management and culture (EAC, 2000). There is little vocational training deliberately focusing on agro-industries, leading to inadequate technician skills required to operate and maintain agro-processing plants and equipment. This inadequacy coupled with the fact that most of the technology used by the agro-industries is imported leads to poor maintenance and performance of equipment.

59) **Remove financing obstacles:**

There is generally a huge shortage of investment capital due to limitations in financial institutions, which hinders growth and development of agro-industries.

a) Medium scale agro-processing industries have very limited access to formal long-term credit due to very high direct and transaction costs of accessing financing, with respect to:
   i) High interest rates;
   ii) Very complex and lengthy loan application processes, and
   iii) Very short period to maturity of bank loans.

b) Therefore, many agro-processors are severely constrained in their ability to invest in new equipment or machinery. Most use mainly retained earnings or savings to finance such investments (Figure 14).

c) It is encouraging to see initial government initiatives to deal with this problem such as the agro-industrialization fund of the Uganda Government.

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**Figure 14:** Savings are the major source of capital funding for equipment (after Mado, T. (2010))
3.3 Identified Agro-industry Opportunities in the EAC with respect to Cereals and Livestock

60) From the ground-truthing exercise in the case study countries (Uganda and Kenya), the future of the agro-processing industry in the EAC region lies in small-scale to medium-scale enterprises. However, as one moves from secondary to tertiary processing, the focus shifts to SMEs to large scale due to size of the available technologies. The EAC should focus on creating an enabling environment to support increase in productivity levels, skills development, liaising policy and legal framework to favor the agro-industry, technological developments and improvement of physical infrastructure to support investments. The following investment opportunities have been identified:

a) In primary and secondary processing of dairy products: Infrastructure for packing, storage and transportation; Manufacture and/or supply of machinery and equipment; Cold chain support; and Improvement packaging and storage of finished meat products.

b) In the primary and secondary processing of maize and other cereals: cereal drying and grading, pre-cleaning processes and technologies, bulking and warehouse storage, Manufacture and/or importation of machinery and equipment, skills development, Quality control and standardization, Packaging.

c) In general processing of meat products: Infrastructure for packaging, storage and transportation; Manufacture and/or supply of machinery and equipment; Cold chain support; Construction of abattoirs.

d) In the tertiary processing of maize and other cereals: Infrastructure for transportation, certification and fortification.

e) In equipment development, manufacturing and supply: driers, de-hullers, samplers, moisture meters, hammer mills, roller mills, winnowers, slicers, trolleys, coolers, bowl cutters, band saw, tumblers, pasteurizers, centrifuges, shredders, mixers, homogenizers, sterilizers.
4 Recommendation and Investment Briefs

4.1 Conclusions

61) **Importance of agro-industries in the EAC Region:** The report revealed the following characteristics:
   a) Agricultural value added contributes more than 80% of the total manufacturing in the EAC Region;
   b) However, only about 28% of the agricultural produce in the region, is processed;
   c) Food processing accounts for 40% of the value added by agro-industries, and about 30% of the total manufacturing in the region;
   d) However, the highest proportion of the installed capacity for food processing is for primary processing only.

62) Therefore, agro-industries development programmes should focus on the following:
   a) **Rural-based primary and secondary processing,** especially to increase the length of stable shelf-life of major perishable commodities which should be the highest priority at the moment. This is because larger agro-industries are difficult to locate in rural areas for a number of reasons, while it is neither cost-effective nor effective in reducing post-harvest losses if perishable commodities are transported for long distances before processing. This opens up opportunities for small to medium scale agro-processing industries.
   b) **Tertiary processing of cereals to high valued differentiated products** is the second most important opportunity due to the relatively advanced primary and secondary processing of cereals already existing. There is therefore an opportunity for further processing into highly differentiated consumer and industrial products.

63) **Low utilization of installed capacity:** Agro-industries in the EAC are largely operating at low levels of capacity utilization, with most operating at 30–50%. This is due to a combination of factors such as (i) unreliable supply of good quality raw materials and inputs; (ii) the scatter of the small quantities produced by each smallholder farmer; and (iii) long distances between areas of production and location of agro-industries coupled by poor state of transportation infrastructure (see section 2.3). For reasons of access to power and other industrial inputs, most large agro-processing facilities are located in urban areas, sometimes very far from the major production areas. This increases the distances to which raw and bulk materials have to be transported to the processing plant.

64) **Limited technical skill base to run agro-processing facilities:** There is little vocational training deliberately focusing on agro-industries, leading to inadequate technician skills required to operate and maintain agro-processing plants and equipment. This inadequacy coupled with the fact that most of the technology used by the agro-industries is imported leads to poor maintenance and performance of equipment.

65) **Inadequate R&D:** Although R&D is not the only driver of innovation, it plays a crucial role including building local capacity to search for, import, and absorb knowledge and technologies from other countries. Therefore, the currently little public and private R&D on agro-industries is a major obstacle to the development of this sector. There is an urgent need to build linkages between NARES, the private sector (from inputs suppliers to retailers of differentiated agricultural products), development supporting organizations, and other public institutions especially those undertaking industrial research. This should be designed to accelerate the use of existing knowledge and technologies while expanding indigenous capacity for the generation of new knowledge and technologies.
66) **Un-conducive business environment:** Even with the EAC common market regional trade in agricultural products continue to face a multitude of non tariff barriers. A recent study commissioned by the World Bank showed, for example that "total domestic marketing costs of maize between farm-gate and capital wholesale markets averaged US$54 per ton in Uganda, US $80 per ton in Kenya, and US$91 per ton in Tanzania". While each additional day a shipment is delayed reduces trade by at least 1 per cent, time-sensitive products, such as fresh agricultural produce, are reduced by 6 times that amount. In addition, low taxes and duties, on imported food products that directly compete with locally manufactured agro-products, make local industries less competitive. This is further compounded by importation and manufacture of sub-standard products that find their way on to the market.

67) **Limited supportive infrastructure** was found to be a critical constraint to the development of agro-industries both from the perspective of supply of raw materials and marketing and trade of finished products. It was interesting to note that major agro-industries are located along the major transportation corridors, which in the EAC also coincide with main transmission lines for grid electrical power. Therefore, data from Tanzania show that rice and maize producing areas with power and road infrastructure seem to have attracted the most private investment in storage and primary processing facilities.

### 4.2 Recommended Priorities

68) **Supply of agro-processing equipment:** with the starting point being the support of mutually reinforcing SME equipment manufacturers for SME agro-processors leading to a critical mass of manufacturers of low cost but efficient equipment. R&D should be the key area of support by the public sector.

69) **Improvement of last mile infrastructure** especially warehouse/cold storage, power supply, and roads is the most critical to agro-processing.

70) **Expand pool of skilled entrepreneurs and labor** by expanding vocational training deliberately focusing on agro-industries, to produce technician skilled to operate and maintain agro-processing plants and equipment.

71) **Remove financing obstacles:** Innovative financing mechanisms are required to deal with the problem of lack of capital financing.

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4.3 Investment Briefs for each of the Priorities

4.3.1 Supply of agro-processing equipment

72) Currently, the sub-sector for manufacturing agro-processing machinery and equipment in the EAC Region is limited to manual and motorized shellers and threshers for cereals and pulses. There is complete lack of manufacturing of complete factory-scale machinery and equipment for agro-processing. However, there is capacity of large scale workshops that can be converted into a formidable network for manufacturing more advanced factory-scale machinery and equipment.

73) Therefore, this investment brief is proposing an initiative designed to build the capacity and networking of large size fabrication workshops existing in the region, to enable them to adopt innovative approaches and technologies to the manufacturing of factory-scale machinery and equipment for agro-processing.

74) This will essentially require the establishment of a revolving fund capable of providing interest free matching funds to the owners of workshops, who are willing to form a network partnership. It is estimated that a single network will require about US$2 million returnable over five years. This means that if at least twenty such networks of fabrication workshops are established a fund of around US$ 50 million will be required.

75) The most important step will be the assessment and planning which will include the following:
   a) Extensive survey of large fabrication workshops operating in the EAC Region to identify the best candidates for up-grading to enhance capacity for the manufacture of factory-scale machinery and equipment for agro-processing.
   b) Participatory planning with the selected and willing firms. The aim will be to agree on upgrading required and formation of necessary and sufficient networks of workshops capable of manufacturing quality equipment.
   c) It is estimated that about US$ 500,000 will be required for assessment and planning.

76) The next step will be to negotiate licenses with owners of proven technologies and designs of the identified machinery with viable markets in the EAC. This will focus on obtaining access to technology that has been developed by public R&D institutions at national, regional and international level. However, support of donors will also be sought to pay for licenses for technologies from the private sector.

77) This initiative will undertake the following to facilitate the formation of the envisaged manufacturing businesses by networks of fabrication workshops:

   a) Developing demonstrational networks to show how existing fabrication capacities can be leveraged with limited introduction of modern technologies. The initiative will:
      i) Identify under-exploited workshop capacities;
      ii) Precisely conceptualize the manufacturing enterprises which can be built by networking workshops with complementary capacities; and then
      iii) Work with the private sector to demonstrate that it is practically viable to manufacture factory-scale machinery of international standards, this way.

   b) Technical assistance and services: The initiative will provide technical assistance and a variety of services to support the private sector. This will include independent quality control, technology transfer, and market studies.
4.3.2 Improvement of last mile infrastructure: *with special focus on power supply*

78) An agro-industry cannot operate efficiently and profitably unless it is linked to optimum key infrastructure. As already discussed in this and other reports, the most critical is the last mile infrastructure in the rural areas especially to facilitate storage and primary processing. In the rural areas, lack of electrical power is perhaps the main constraint to development of SME agro-processing. The shortage of power is mainly due to limited private sector investment in small scale power generation. This investment brief is about integrating agro-processing and power generation as already practiced in the sugar industry.

79) Agro-processing by its nature produces large volumes of biomass “waste” in one location and often it is difficult to dispose the waste in an environmentally sustainable way. At the same time, technology is now available for turning this “waste” into power through either combustion of dry biomass to produce steam for generating electricity, or anaerobic digestion of wet biomass to produce biogas and then burning this in combustion engines to produce electricity. Power generation efficiency is still low at less than 25%, but given the cost of extending power grids to remote areas, off-grid small-scale power generation integrated with agro-processing in rural areas could be cheaper compared to transportation of bulky unprocessed raw materials to urban areas to reach agro-processing plants connected to the national grid.

80) The biggest challenge is the cost of investment which range between (US$1.5 - 3.0 million per MW). However, the cost of electricity would be very competitive at about 0.15 US$/kWh, which is the same as the cost of grid electricity in the EAC Region. Therefore, the most important requirement is the financing of the capital investment (see 4.3.4).

81) **The Objective** will be to integrate agro-processing development with biomass-based electrification in rural areas. The starting point will be to raise awareness of the feasibility and economic viability of such a strategy.

82) **Approach**: to achieve the objective, the aim will be to establish public-private partnerships to install medium-scale biomass power generation by existing agro-industries that produce large amount of bio-waste, starting with rice millers. The private partners will include agro-industries owners and suppliers of power generators. The aim will be to install at least 10 such power generation plants of at least 1 MW capacity for proof-of-concept pilot stage. Therefore, the project will require about US$ 35 million but with most contributed by private sector.

4.3.3 Expand pool of skilled entrepreneurs and labour

83) The vocational training in the EAC is generally outdated and excessively biased against skills for operating and maintaining industrial machinery and equipment although tailoring is the most popular (Figure 1.5). There is therefore a need for investment to revamp the system in general but also to mainstream the development of skills for new and current industries. Agro-processing is one of those industries for which vocational training needs to be expanded.

84) This investment brief outlines an approach for providing skills training through partnership between formal Vocational Training Centres/Colleges (VTCs) and agro-processing firms. Under such an approach, which is practiced in many countries around the world, most of the training is provided “on-the-job” by the firms but complemented and backstopped by formal VTCs.
Figure 15: Skills covered by current vocational training in Tanzania

85) The description in this investment brief covers only the aspect of establishing vocational training for agro-processing within existing or planned formal VTCs. Also, because of the costs involved, VTCs will specialize in one commodity and its products.

86) The main purpose of the investment will be to build capacity of VTCs to provide vocational training with respect to agro-processing skills and entrepreneurship. Specific objectives are to:
   a) Develop and/or improve the capacity of trainers with respect to agro-processing;
   b) Up-grade training facilities and technologies of VTCs to provide adequate training in practical skills demanded by the agro-processing industry; and
   c) Build effective partnerships between VTCs and agro-processing firms for continuous development of vocational skills of workers in agro-processing.

87) The implementation approach will include the following steps:
   a) Assessment and Planning:
      i) Extensive survey of VTCs existing in the EAC Region and identify the best candidates for up-grading to enhance capacity to provide vocational training with respect to agro-processing. This survey will be conducted over a period of 1 year by experts with in-depth knowledge of the skills demand of agro-processing firms.
      ii) Participatory planning with the selected and willing VTCs, supported by vocational training experts and authorities. The aim will be to agree on upgrading required, identify the partner firms to participate in the project, and agree on sharing the costs of building the necessary and sufficient partnerships between VTCs and firms for sustainable vocational training with respect to agro-processing.
      iii) It is estimated that about US$ 200,000 will be required for assessment and planning.

   b) Establishing Training Facilities: the most important investment per VTC will include training laboratories, workshops, and model agro-processing plants. The costs are estimated as shown in Table 7.
### Table 7: Investment required to established specialized vocational training in agro-processing in an existing VTC

<table>
<thead>
<tr>
<th>Investment aspect</th>
<th>Estimated Amount (US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buildings aprox. 200 m² @ US$ 450/m²</td>
<td>90,000</td>
</tr>
<tr>
<td>Specialized workshop equipment and installations</td>
<td>175,000</td>
</tr>
<tr>
<td>Food processing pilot plant – (specialized)</td>
<td>325,000</td>
</tr>
<tr>
<td>Total for one VTC</td>
<td>590,000</td>
</tr>
</tbody>
</table>

c) **Training of Tutors** will be the other cost aspect of this development because such tutors are missing at the moment. On the basis of teacher training costs in the EAC, it is estimated that about US$ 5,000 will be required per tutor. Assuming that about 10 VTCs will be mobilized to specialize in agro-processing training and each will require at least two qualified tutors - the project cost for creating this critical mass of tutors will be US$ 100,000.

88) Therefore, establishing a critical mass of VTCs providing high quality vocational training in agro-processing the EAC region will require an investment of about US$ 6 million.

### 4.3.4 Expanded financing of capital investment

89) Investment in agro-industries is characterized by long gestation period and can only be amortized over several years. At the moment, the majority of medium-scale agro-processing enterprises do not have access to financing of such investment. This is because:

a) The level of investment is too large for the common investment approach taken in the EAC by small enterprises, who prefer to use own funds and savings;

b) On the other hand, the level of investment is also too small to attract equity investors and FDIs;

c) Most of the SMEs are averse to equity investors because of the fear of losing control of one’s enterprise and assets;

d) They are also averse to using bank loans for investment capital because of the fear that if the business fails, the investor could lose her assets pledged for collateral; and

e) Financial institutions are often reluctant to provide such financing because they perceive the risks of term lending to agriculture in general and in agri-SMEs in particular to be too high.

90) The East Africa Common Market provides a great opportunity in the form of a regional market with 127 million people, a GDP of US$ 73 billion, and average GDP per capita of US$ $506. The expanded market enhances viability of investment in medium scale agro-processing.

91) With the above in mind, the intervention proposed in this investment brief seeks to expand innovative and acceptable financing opportunities to agro-industries sectors in the EAC Region. The ultimate aim is to provide the medium size enterprises with wider and easier access to capital financing. Given the constraints discussed above, lease financing would be the most viable approach for SMEs. It also has the added advantage that it eliminates the need for collateral since the financing institution remains the owner until full payment has been achieved.

92) This investment brief does not deal with the capital required to run such Lease Financing Facilities (LFF) in the EAC, but rather proposes the process of preparing a Business Plan to convince investors, and financial institutions to establish special LFFs for SME agro-industries.

93) Financing from the LFFs will be extended on competitive terms that would include periods of 5-10 years; grace period on principal payment during implementation stage; and interest rates reflective of second-hand market of the respective equipment and agro-processing facilities.
94) The envisaged LFF will be differentiated from nearly all potential competitors by a holistic approach with specific focus on the entire agricultural value chain, supporting capital investment for post-harvest processing and SME agro-industries, in value chains where production has been optimized and markets are assured. The implementation will link and leverage technical assistance to ensure developmental impacts over and above financial returns on investment. Furthermore, the approach will be unique by supporting a combination of (i) primary agro-processing by producers themselves; (ii) SME agro-processors; and with (iii) strong linkages to large agro-industries, for efficient forward linkages to market opportunities for differentiated products, and back-ward linkages to drive productivity and profitability for the producers.

95) To fully develop this model, it is estimated that about US$ 500,000 will be required to meet the cost of undertaking an analysis to estimate the financial requirements for a critical mass of LFF to meet the demand for investment in SME agro-processing. The main outputs from this work will include: LFF funding strategy; products and their price and marketing; the loan underwriting standards; and portfolio risk management by participating investors and financial institutions. The analysis will include the following:

a) An on-the-ground assessment of the SME agri-industries sector in the EAC Region to:
   i) Ascertain the appropriate size of the proposed LFF and the expected key terms and conditions of its loans (interest rate, tenor, etc.);
   ii) Determine the level of interest that existing or prospective SMEs in agro-processing sectors would have in the proposed facility; and
   iii) Evaluate competition from other sources of financing.

b) Commission a Financial Model and Management Tools:
   i) A financial model for assessing performance of LFF over time and its ability to repay its capital providers;
   ii) An accounting system and software to be used for reporting and portfolio management;
   iii) Credit underwriting standards; and
   iv) Legal analysis of the pertinent regulatory and other issues in setting up a LFF in the EAC.
References


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Kilimo Trust is a regional organization dedicated to developing agricultural value chains to make markets work for the reduction of poverty in the EAC Region. It is a leading champion of using the East African Common Market as a platform for attaining food security in the region as well as the creation of wealth and reduction of poverty through agriculture. The Trust has six years of experience in agriculture for development through 50 projects and three programmes supported and implemented in the EAC Region.

Kilimo Trust is focused on developing and promoting regional solutions for local problems by providing leadership and hands-on implementation of programmes and projects on behalf of, or in partnership with, governments, international and regional organizations, and the private sector. Its initiatives, programmes and projects are mainly regional (EAC), but occasionally Africa-wide. For its partners the Trust provides the following:

• A Regional Platform for building synergies and achieving spillover effects;
• An Independent African Legal Entity with technical capabilities of international standards;
• A Strong and Independent Board delivering very high quality of governance and high level of accountability;
• A Diligent Management Team with vast experience in project management and implementation; and
• An Experience with the EAC’s Agriculture.

The impact focus is increased incomes of substantial number of households involved in farming and other agri-SMEs in the EAC region. For this to happen, the Trust operates at a strategic regional level with a focus at developing and promoting regional solutions to local problems. It is very focussed on (i) opportunities and constraints that are important to the stakeholders; (ii) working on few strategic commodity sectors and relevant regional value chains; and (iii) linking SME producers and other operators to national and regional markets. For these, the Trust designs and implements sector development programmes which respond to market opportunities in ways that can potentially revolutionize a sector and/or value chain(s). This is driven by critical and robust analysis and diagnosis of opportunities and constraints in strategic agricultural value chains.