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CONCERNS ON AGRICULTURE, FOOD AND NUTRITION SECURITY IN EAST AFRICA

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ABSTRACT: *This is a paper review of work presented at the Machakos University second International Conference in Kenya. Using library research and reflection, document and content analysis were used to generate data, The East African region covered in the paper is that of the six countries set up as the East African Community in 2000. Their economies are reliant on agriculture with low agricultural productivity demonstrating some inabilities in poverty reduction as the majority of the farmers are smallholder farmers engaging mostly women labor. Food and nutrition security are not assured. The agricultural commodities for exports are not so competitive because of the low agricultural value chain with little value addition. The countries are sliding into being net importers of food despite having a huge potential for agriculture and the natural resources possessed. A green revolution, alignment of research and value addition of agricultural commodities including better infrastructure and markets will better their economies.*

KEY WORDS: agriculture, community, food and nutrition security, productivity, value addition.

INTRODUCTION

Agriculture is the source of food, raw materials for industries, employment, domestic income, foreign exchange, national defense and also attracts some form of recreation (tourism) in many developing countries (Binkley & Hammonds 1970). Globally, the area of land available is about 57, 900, 000 sq. miles (148,224,000 sq. km) that will still carry a global population of 8, 177, 100, 000 by 2025 (World Almanac 1992, pp 300, 822). There are over 500 million smallholder farms globally, each of which may be about 2 ha in size (Hoeffler *et al.* 2014). The continent of Africa covers the area of 11,700,000 sq. miles (29,952,000 sq.km) and will have a population of 1, 642,900,000 (1.62 billion) by 2025 (World Almanac 1992). Africa is an extremely rich continent with an enormous development potential. However, only talking about that potential could not feed today´s population of 1.1 billion people and which, according to UN statistics, is expected to increase to 2.4 billion by 2050. Food production needs to increase by sixty percent in the next fifteen years or so to cope with demand (Food Agriculture Organization 2019). Nonetheless, there are still huge areas of arable land in Africa, south of Sahara. About 200 million hectares (ha) or

almost half of the world's land reserve for agriculture is available on the continent. Even more important are the possibilities for more effective and more sustainable use of the land already cultivated. About seventy percent of today´s job opportunities are, as mentioned earlier, found in the rural areas. African agriculture is at least fifty percent managed by female farmers. There are about 33 million farms with an area of less than two ha each. This is underutilization of the agricultural potential. The average age of African farmers is today very high, but at the same time sixty percent of Africans are less than 24 years of age thus are youth. The number of young Africans that every year could enter the labor market is enormous and was by 2015 estimated to be 330 million. Against that background, it is easy to understand why a number of young Africans try to leave for say Europe to seek new opportunities. Shall that trend be changed? The African agriculture must, no doubt, be developed to give hope for the future, even if not all young Africans will see a role of their own in that field as also has been the case in Europe (Gerremo 2018).

METHODOLOGY

The paper is a review which was presented at the Machakos University Second International Conference held in April 2019 in Kenya. Library research and reflection were prior done at Kyambogo University in Uganda and used document and content analysis. Themes and subcategories were used for analysis through open and axial coding. The subheadings used in the presentation emanated from the analysis used on documents and content encountered during the literature search.

T**he current East Africa**

The East African Community was revived on 7th July, 2000 and currently consists of six countries. Other neighboring countries such as Somalia and Democratic Republic of the Congo may become members as time unfolds. Table 1 shows the current six members.

Table 1: Current East African Community Countries with some indicators of the agriculture potential

COUNTRY	**AREA IN SQ.KM**	**POPULATION** (2016-2018)	**% AGRIC. OF GDP**	**LABOUR % IN AGRIC.**	**2018, PER CAPITA GDP(INCOME) US$ (NOMINAL)**
BURUNDI	27,834	10,524,117	50%	90%	US $ 307
KENYA	580,367	49,125,325	22%	75%	US $ 1,865
RWANDA	26,338	11,262,564	32.5%	90%	US $ 800
SOUTH SUDAN	1,886,068	39,578,828	39%	80%	US $ 307
TANZANIA	947, 303	55,572,201	24.5%	50%	US $ 1,090
UGANDA	241,038	44,270,563	43.5%	84%	US $ 717
OVERALL	2,467,202	168,848,000	35.25%	78.2%	US $ 848

Sources: World Almanac 1992: 300, 822; International Monetary Fund (IMF), 2018.

Table 1 shows the potential of agriculture in East Africa where nearly eighty percent of the population is engaged in it. There are concerns about underutilization of the potential, low participation of the youth and overburdening of the women who do more than seventy percent of the farm work without adequate incentives for them. The agricultural productivity is low and poverty is not reducing fast enough. The resulting nominal GDP per capita levels for the countries are generally low, ranging from US$ 307 as the lowest to 1,865 as the highest.

For instance, in Uganda, land under cultivation is forty percent of the potential arable land projected at eighty percent of the country's land area (Ministry of Agriculture, Animal Industry and Fisheries & Ministry of Finance, Planning and Economic Development, 2000). This means more land can be cultivated but is not being cultivated. Whatever is cultivated is not used efficiently. Use of improved inputs is low among farmers. For example, few farmers use fertilizers on their farms and were hardly used on the smallholder farms which are the majority. Of the high percentage of the women who participate in farm work, their productivity is low and confined mainly to food production for the family. Women have poor access to improved inputs and credit. Most of them do not own land and respond poorly to market incentives. Many of them have little or no education with little or no training in agriculture. There are several gender relations which negatively influence women productivity in agriculture such as no land rights/poverty (Food Agriculture Organization 2006).

In Uganda, the youth participation in agriculture is low and the yet seventy percent of the population is 31,000,000 youth (Uganda Bureau of Statistics 2016). The figure includes all the youth in school and out of school. They contribute to a large part of the unemployed in the country. The most effective way to start improving the situation for developing countries such as the East African ones and to combat poverty is through appropriate agricultural development enhanced by teaching agriculture in schools and agricultural extension services. This is also true if focus is on the young Africans of today especially for the future of agriculture. Such ambitions, giving priority to the agricultural sector, can create new jobs, increase incomes, and improve the nutritional status which are all important ingredients in order to become middle-income countries (Gerremo 2018).

Challenges in agriculture of the East African countries

Across Africa, agricultural productivity remains dismal thus undermining Africa's overall farm output, income, food security and nutrition security (Mbabazi *et al*. 2016). All the productivity indicators are generally low. According to Färe *et al* (1985), those indicators include output and income which in farm productivity would include output per unit area (hectare), output per unit of labor (person), output per unit cost (shilling); and income per hectare, income per person, and income per shilling. Across East African countries, these indicators are low. The contribution of agriculture in these countries ranges between twenty three percent and fifty percent. The gross domestic product (GDP) in East Africa is declining because of the low productivity and the limited value addition to agricultural commodities reducing competitiveness, yet agriculture is the main source of income. The debt burdens for the countries are increasing with greater volumes of imports needed.

Agriculture in East Africa is dominated by the staple foods such as maize, rice, sorghum, millet, cassava, yams and sweet potatoes. The cash crops include coffee, cotton, oil palm, sugar, tea and tobacco. There are a few commercial farms as estates but eighty percent of the farmers are smallholder farmers. Production on their farms depends on rain thus farms suffer vagaries of weather. There is limited irrigation on estate farms and none on smallholder farms. Expansion of production is through more land put under cultivation. Postharvest losses get to thirty percent of the total production which comes to the value of US dollars 4 million per annum for the whole of Africa (Mbabazi *et al*. 2016). The subsistence agriculture widely practiced has weak productivity growth.

Basic issues in East African agriculture

African leaders and their governments at all levels of leadership must whole-heartedly take on the issue of agricultural development in order to become the force of change which is now needed to create a modern African society by earning more foreign exchange for paying for imports. This can, however, only be done gradually but still with the final goal in sight. The long-term outstanding issues in African societies which undermine agricultural productivity and value addition are still diseases, ignorance, poverty and squalor. They stifle investment in production by nationals. Added over the years are corruption, climate change and environmental degradation.

To achieve growth, strategies are needed where government officials work hand in hand with farmers, their organizations and the private sector to which the farmers belong. The links between research, university education and extension services need to be strengthened. This requires a clear role for the private sector and close cooperation with government officials and other representatives for various development efforts in the society. There is need to balance investment in the declared development priorities of commercial farming, irrigation, industrialization including value addition, service industry and ICT (information, communication and technology).

The development of markets, for especially competitive products, are of utmost importance. Focus has so far primarily been on the supply side and on short-term self-sufficiency in food. However, increased attention must be given to local, regional and export market development and to value addition of agricultural produce often neglected. Altogether, these are gigantic but quite necessary tasks for the African leaders if they really want to take on the challenge to create wealth for the growing populations, of which already now more than fifty percent live in towns and cities.

These issues need to be seriously and constructively discussed to create visions and give hope to the young African population! Europe has, even with its colonial heritage, great possibilities to support the African countries in a number of important agricultural areas. Europe of today is built on basic values like democracy, gender equality and human rights and now also with strong views on the need for global sustainability.

Low productivity in agriculture without value addition has failed to reduce poverty and has limited inclusive economic growth. Agricultural sector in East Africa needs to shift from being a comparative advantage in the global economy to supplying more competitive products. This will

have to be through land reform, value chains for markets for smallholder farmers, appropriate use of biotechnology and research, use of ICT for information, knowledge and market research. Conducive environment will be necessary for inclusiveness and the competitiveness desired.

Agricultural productivity status and its implications on livelihoods

The African Union´s Malabo Declaration from 2014 once again underlined the priority of agriculture as key for Africa´s development. In that declaration, African leaders confirmed their obligations from the Maputo Declaration in 2003, that at least ten percent of public investments shall go to agriculture with the ambition to reach at least six percent growth every year in each of the countries in order to create the necessary growth for development. Africa's agriculture must be developed. The future will require a competitive, business oriented but also socially adapted agricultural sector in order to create wealth, increase job opportunities and improve the living standards. To be successful, knowledge development as well as innovative thinking will be of great importance. Better coordination between farmers, their organizations and the private sector, to which they belong, is needed but including researchers, extension staff, and related groups within the civil society as well as representatives from the public sector. With limited resources available, the plans for agricultural development must be implemented gradually. This is, no doubt, a challenge that requires strong and legitimate African leadership. Agriculture must again become a priority area in the support to African countries by the international community and donors (Gerremo 2018).

In the East African countries, modest efforts can be seen to strengthen especially commercial agriculture. What remains disturbing is the low productivity exacerbated by drought with occasional floods (climate change effects) and lack of adequate capacity for value addition. Smallholder farmers who are still the majority are unable to do both backward integration (factor inputs to produce exports) and forward integration (providing competitive inputs for other countries to use) to bring about the needed competitiveness (Conde *et al*. 2017). In Uganda, Table 2 shows how low productivity can persist and remains so even today.

Table 2: Crop yields on smallholder farms and on research stations 1992

CROP	YIELD IN KG/HA ON SMALLHOLDER FARMS	YIELDS IN KG/HA ON RSEARCH STATION
Coffee robusta	1,150	2,000
Coffee arabica	750	1,250
Tea (Green leaf)	5,000	8,500
Cocoa (dry)	350	595
Matoke	8,500	14,450-25,000
Cassava	8,750	15,000-25,000
Cotton	550	1,000
Maize	1,700	2,890
Beans	750	1,275
Groundnuts	800	1,400
Soya beans	100	200
Simsim	400	700
Sweet potatoes	4,000	7,000
Finger millet	1,400	2,400
Sorghum	1,400	2,400
Paddy (rice)	1,500	2,550
Tobacco (Flue)	950	1,615
Tobacco (Fire)	800	1,360

Source: Bank of Uganda (1992)

In Table 2, yields on smallholder farms are by far lower than yields on research stations. Yields are thirty to forty percent lower with no guarantee of value addition. This is where the East African countries get challenges on competitiveness. These yields remain persistently low. The key explanations are poor husbandry, lack of irrigation, low use of improved inputs such as fertilizers, insecticides, pesticides, limited access to technical advice, poor access to credit, poor transport & communication, poor marketing infrastructure, and insecure land tenure rights. In Uganda, three percent of the farmers are known to use fertilizers especially on commercial farms. In Kenya, the percentage of farmers who use fertilizers is generally believed to be higher (about fifteen percent) and in Rwanda up to ten percent of the farmers use fertilizers (Rusagura 2018; Kelly and Murekezi 2000). The increase and more efficient use of especially inorganic fertilizer is expected to contribute four percent of the five point three percent (5.3%) growth of the agriculture sector. Inorganic fertilizers are among the inputs which contribute to increased agricultural productivity. In other countries of the region, the percentages ought to be equally low or not clearly known.

Lessons from the global green revolution to East African Countries

During the 1960s, East Asia benefited from the green revolution. The focus was on wheat and rice. The two cereals yielded four times more (Mbabazi *et al*. 2016). Successes of the green revolution in Asia are good lessons to East African Countries.

In cropping, high yielding varieties of wheat and rice were used. Integrated pest management was a success with good use of pesticides. Soil management was good which allowed effective fertilizer use to allow multiple cropping practices. These were preceded by education of the farmers who operated under supportive economic and policy environment which enabled access to inputs. Land reform was enabled assuring security of tenure and agricultural credit. Government interventions were enabled on credit, inputs and prices. It was possible to reach the poor and remote rural populations. Farmers were supported with manageable agricultural loans. Since the markets functioned optimally, farmers were rewarded for whatever investments they incurred. These were the lessons that showed in the success of the green revolution that could similarly drive success in the East African countries.

In Africa and by implication areas in East Africa, yields have been constantly declining. The population has been growing, for instance, at a fast rate of three point two percent (3.2%) in Uganda (Uganda Bureau of Statistics 2016). Policy distortions are commonly seen. Weak institutions can be seen and are not operating optimally. Poor infrastructures are still seen despite interventions in addressing them. The extreme weather conditions have become more frequent meting out unmanageable effects which even research has not yet found quick solutions to. There have been situations of political instability which have not allowed optimum productivity and value addition to occur thus negatively affecting building the needed competitiveness.

Production in East Africa has largely been through putting more land area under cultivation rather than intensive land use. Poor crop husbandry is done with nutrient mining. In some areas, the soils have been degraded, desertification is seen with loss of forests, wetlands and pastures. There are serious sustainability issues on productivity leading to strains on foreign exchange reserves. In addition, the other problems, for some time in East African countries, have been inadequate ecological adaptation of research, ignoring some staple foods in research, poor tailoring of technologies to agro-ecological systems. Nerica rice and cassava variety were the only ones found most adaptable. There have been inadequacies on policies in taxation which prevented adoption on inputs, poor price policies for stable incomes and lack of incentives to invest. The policy environment has not been conducive for local investors.

The drivers of the green revolution in East African countries will have to be the following factors namely: plant breeding to give high yielding varieties, management of soils, research focusing, high quality grains, irrigation, and smart agriculture which entails adaptation, mitigation and resilience. In addition, there must be a conducive environment for agricultural value chain integration for better domestic and foreign exchange earnings.

Food security in the East African Countries

World Health Organization defined food security as existing when all people at all times have access to adequate, safe, and nutritious food to maintain a healthy and active life (McKenna 2014)). Food security is built on three pillars according to WHO namely food availability: sufficient quantities of food available on a consistent basis; food access: having sufficient resources to obtain appropriate foods for a nutritious diet; food use: appropriate use based on

knowledge of basic nutrition and care, as well as adequate water and sanitation. It is further about food intake, stability, availability and food accessibility, which can also be put into four pillars namely availability, access, utilization and stability. The food supply in the East African countries varies seasonally. The common threats to food security in the region are circumstances of war, drought, floods, army worm, locusts and diseases, cassava diseases such as mosaic and environmental degradation. Generally, food available depends on what is produced and harvested in different areas with minimum losses. Famine has been frequent which has caused a lot of suffering in some communities especially in drier parts of the East African countries.

Provision of food security for East African countries is one of the greatest concerns of the agricultural sectors of the six countries. In 1980, food was really in short supply for forty six percent of Uganda's population, which was for six million people (McNamara, 1990). The countries in the region from to time since then have seen food insecurity persisting in many areas. Clark and Haswell (1967) in their estimates of food per capita requirements for adults of a normal weight put 700kg per person per year. World Bank (1993) estimated a food supply of 960 kg per capita in Uganda from crops alone with plantains in the diet but without plantains the estimate stood at 500kg food per capita which was the figure pegged to areas that normally did not grow and use plantains. Semi-arid areas of East Africa often consumed less than 500kg of food per capita per year. This figure was often exacerbated by harsh weather leading to low productivity with its obvious effects (McNamara 1990). Table 3 shows the contribution of the different foods to food per capita in Uganda. The national figure for food per capita per year is 960 kg with bananas in the diet. Without bananas in the diet, the figure stood at around 500 kg. Under severe conditions of drought and other exacerbating circumstances, food per capita falls below 500 kg. The normal average is 700 kg (Clarke & Haswell, 1967).

Table 3: Food per capita in Uganda 1993

Food Item	**% in Diet**	**Kg of per capita per year**
Bananas	50%	480
Cassava	22%	211.2
Sweet potato	13%	124.8
Cowpeas/pulses	3%	28.8
Oil seed	2%	19.2
Cereals	10%	96
	100%	**960**

Source: World Bank (1993)

In Uganda, there are regional differences on food supply and so in access. Table 4 gives an idea of what situations Uganda has encountered on food security across regions based on some items from food crops and livestock. Generally, under favorable conditions food security in Uganda falls within the expected average of 700kg food per capita.

Table 4 shows that food can be available throughout Uganda in good quantities without any crisis across regions as demonstrated by the 1995 output figures. All regions were above the food crisis level. Western Uganda showed the best results, followed by Central Uganda, then Eastern Uganda and by Northern Uganda which was affected by a war situation but never hit a crisis level at the time. Carbohydrate supplies were best in Eastern and Northern Uganda. Protein sources were high in Northern Uganda except for milk and plantains supplies which were highest in Western Uganda.

Table 4: Regional differences across regions of Uganda in kg of food per capita 1995

Food Item	Eastern Uganda	Northern Uganda	Western Uganda	Central Uganda	National (UGANDA)
Pulses	27	39	19	15	25
Cereals	117	143	61	23	86
Roots	452	513	270	187	356
Oil seeds	15	29	5	3	13
Plantains	278	62	689	689	427
Milk	14	13	29	24	7
Meat	7	8	7	7	7
Poultry	0.53	0.77	0.35	0.41	0.52
Total	911.53	745.77	1080.35	946.35	934.52

Source: *Bank of Uganda, Food security and Exports 1995*

Nutrition security in the East African Countries

Nutrition security is an integral part of food security and is about daily food intake, food availability, caring capacity, health status and environment (World Health Organization (WHO), 2000 https://www.who.int <nutrition>topics accessed on 2/4/2019). Table 5 shows regional nutrient level differences in Uganda in 1995.

In the East African countries, nutrition security is variable across countries and regions. It is affected by agricultural productivity thus food supply which is a part of food security. In Uganda, Table 5 shows how there are some differences across regions in Uganda just to illustrate the point on nutrition security in East Africa. The carbohydrate supply was high in Eastern and Northern Uganda thus meeting the daily requirement while it was low in Western and Central Uganda at that time. The protein supply was below requirement though not that bad in Northern Uganda. Fats were high and adequate to meet the daily requirement in Western and Central but rather low for Eastern. Nutrition security in Uganda is not at crisis generally. There are seasons which become a challenge caused by protracted drought and occasional floods, bad harvest because of pests & diseases and instances of war disrupting the population. This situation goes true for the rest of the East African countries. The cost of food is high by season and variable in communities.

Table 5: Regional Differences in Uganda on Daily Food Nutrient Levels consumed Per Person 1995

Nutrient Level	Eastern UG	Northern UG	Western UG	Central UG	National UG
I. Energy food(cal)					
Consumed	2608	2495	2181	2353	2400
Requirement	2420	2420	2420	2420	2420
% of Requirement	108%	103%	90%	97%	99%
II. Proteins (gm)					
Consumed	51.37	45.66	52.80	49.95	50
Requirement	57.6	57.6	57.6	57.6	57.6
% of Requirement	89%	79%	92%	87%	86%
III. Fats (gm)					
Consumed	15.95	16.57	21.26	22.51	19
Requirement	20.3	20.3	20.3	20.3	20.3
% of Requirement	79%	82%	105%	111%	94%

Source: *Bank of Uganda, Food security and Exports 1995*

CONCLUSIONS

Across East African countries, it is important to acknowledge that the problems that afflict developing countries of the world and the African continent also do deeply constrain modernization of life expected in the twenty-first century. Such problems include disease, ignorance, poverty and squalor which lead to poorly performing economies despite the great potential for development that exists. There is good arable land, water resources and considerably favorable weather despite climate change effects on agriculture the mainstay of the economies of the East African countries.

The performance of agriculture has been deeply constrained by key factors such as poor husbandry, lack of irrigation, low use of improved inputs, limited access to technical advice, poor access to credit, poor infrastructure (roads, rail, water and air) thus poor transport and communication for accessing profitable markets, and also insecure land tenure rights. Lack of power and industries have also led to low or no value addition to agricultural commodities which cannot compete well globally for better prices despite the good comparative advantage in agriculture possessed by East African countries.

Agricultural productivity in the region is low with a low level of value addition and processing of agricultural commodities. Such a situation negates poverty reduction and inclusive growth. It perpetuates low incomes thus food and nutrition insecurity because the agricultural output is low.

It leads to poor export performance which earns little or no foreign exchange for the purchase of the needed capital goods such as equipment and machinery. In fact, quantities of food imported are increasing and swallowing the little foreign exchange earned from a few exports sold by the countries of the region. There is great need to integrate agricultural value chain to increase the competitiveness of agricultural commodities.

Recommendations

There is need for a green revolution in the agriculture of the East African countries. This needs big data. That is why the agricultural sector needs to get relevant research to drive agriculture in the necessary areas to increase agricultural productivity and integrate the value chain. The drivers of the revolution will have to be plant breeding for high yielding varieties, soil improvement through appropriate use of fertilizers, research focusing, high quality grains/planting materials, irrigation that can increase income by over sixty percent, smart agriculture, use of appropriate insecticides and pesticides, market access with pertinent regulations and governance, use of ICT for value chains and land use management, and the ultimate use of biotechnology (Mbabazi *et al*. 2016). These multifarious elements will be the ingredients of a successful green revolution in East Africa.

The dominance of the staple foods such as maize, rice, sorghum, millet, cassava, yams and sweet potatoes needs an investigation to improve the dismal nature of agricultural productivity in the region. The integration of the agricultural value chain must come in for cash crops such as coffee, cotton, cocoa, oil palm, sugar, tea and other potential ones. That will earn more money domestically and foreign exchange from other markets and hopefully reduce poverty through more competitiveness of the products globally.

The dominance of smallholder farmers in the agricultural sector needs more research to generate big data that will enable them to reduce poverty and improve inclusive growth in the economy. There is need to reach the poor and rural populations. High population growth needs to be controlled.

In addition, there is need to adopt multiple cropping practices, improve security of land tenure, create supportive economic and policy environment, put in place functioning profitable markets with good infrastructure facilities, educating farmers, assuring access to affordable improved inputs, enabling rewards for investments and providing appropriate government interventions (credit, prices and inputs).

It is the responsibility of leaders to fight corruption and block policy distortions, salvage weak institutions, deploy, oversee and protect experts to support agriculture, ensure political stability to attract both domestic and international investors, protect foreign exchange reserves for all and regulate use of environment for increased agricultural productivity and sustainability. Working together, we shall find solutions to get the Africa we all want.

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