

Agriculture: Panacea for Nigeria's Economic Recession

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Abstract

Agriculture creates wealth along the entire value chain through production, value addition and industrialization. Import substitution and export of commodities or processed goods conserve foreign exchange and enhance balance of trade. Agricultural enterprises include: input production and supply (fertilizers, improved seeds, farm implements, agrochemicals, day old chicks/fingerlings production and animal feed production), staple food crop and animal production, forestry and commodity processing and storage. Others are agricultural commodity marketing, agro-industry/manufacturing, agricultural commodity export and agricultural support services. Livestock (cattle, sheep, goat, rabbitry and poultry), fish catch and aquaculture are other areas of investment. Apiculture (bee keeping) is another primary commodity for investment. Key downstream commodity activities include processing into intermediate or final (finished) products, and marketing/distribution through domestic and/or export trade. Some of the available value added products for cereals include cornflakes, spaghetti (*taliya*), gruel (*kunun tsamiya*), porridge (*fate*), *Masavita* (*tsaki*), corn flour (*kamu*), confectioneries (bread, cake, chin-chin, doughnuts), etc. Other areas for value addition for cereals include couscous (*Burabisko*), *fura*, etc. Possible value addition for pulses include baked beans (canned snack), pudding (*alala*), pasta noodles, weaning foods, fritters (*kosai*), dumplings (*danwake*), soy milk, etc. For soft drinks, *zobo*, tamarind, marula, etc drinks are possible. In Nigeria many available agricultural products are not yet optimized for the economic benefits derivable from them. This is because of inadequate knowledge of available value-adding technologies coupled with poor infrastructural facilities and incoherent policies to support such undertakings, especially in rural areas. Nigeria faces two key agricultural gaps: inability to meet domestic food requirements and inability to export quality products required for market success. Productivity challenges are those of

genotypes and environment. Moving out of economic recession will require solutions to the identified gaps: production of sufficient high quality foods for Nigerian market, value addition and export to earn foreign exchange.

Introduction

Production, distribution and supply of agricultural inputs provide opportunities for viable private sector initiatives. Opportunities are increasing for agro-industries that service and sustain farm operations through production, distribution and supply of various categories of production inputs such as fertilizers and other agro-chemicals (pesticides, insecticides, herbicides and fungicides). Demand for agrochemicals is rising and provides viable opportunities for the local manufacture of agrochemicals hitherto imported from other countries. The demand for day old chicks is largely unsatisfied so also fish fingerlings and horticultural and tree crop seedlings. Seed companies witnessed a surge during the last administration mainly owing to the Growth Enhancement Scheme of government. Production and marketing of farm machinery, tools and equipment provides gainful opportunities for private sector initiatives. Food processing, marketing and trade provide further opportunities that should be exploited by the private sector (Olukunle, 2013).

In Nigeria's agriculture more than a dozen different enterprises can be readily identified. The enterprises include: input production and supply, staple food crop production, fisheries, forestry and commodity processing and storage (not *ihitkhaar*). Others are agricultural commodity marketing, agro-industry/manufacturing, agricultural commodity export and agricultural support services (Manyong *et al.*, 2005). Access to fertilizer is one of the challenges facing crop farmers in Nigeria. Lack of accurate data could have underestimated the national fertilizer demand with many putting it at 1.2m metric tons. It is estimated that 70% of Nigerian population (193.3 million) according to National Bureau of Statistics) are farmers and about 91 million hectares are available for cultivation. Nigeria targets 700,000 – 800,000 tons of fertilizers per annum. This is because we also supply the input to our neighbors whom we cannot deny. Farmers

interest has been ignited as prices of farm produce are now good, thereby giving them the purchasing power to buy fertilizers and other farm inputs.

Nigeria is the third largest importer of wheat in Africa after Egypt and Tunisia. Nigeria's import of wheat is about 3.97 million tons per annum. Couscous (*burabisko*) can be produced from millet, sorghum, maize and wheat. Grain flour is used to make corn flour (*kamu*), corn flakes, (krispies, frosties), spaghetti, breakfast cereals, etc. There is no justification in the imports of those processed foods which can be produced in the country. We therefore call upon Government to protect national products for self-sufficiency and conservation of foreign exchange. Adequate protection of our products will go a long way in increasing our gross domestic product which is essential in recovering from the economic recession. This is because agriculture is the highest contributor to the GDP (over 40%) since colonial period to date (about 29%) followed by the services sectors and the petroleum sector contributing about 15% in spite of its being the largest source of public revenue and foreign exchange earnings for the country. This suggests the low linkage of the petroleum sector with other sectors of the economy. Agriculture is pivotal to economic development and more of the efforts to revive the economy should therefore be tied to it. Modern agriculture depends heavily on engineering and technology and on the biological and physical sciences. Irrigation, drainage, conservation and other forms of natural resource management are important in agricultural development. Packaging, processing and marketing of agricultural products are closely related. Mechanization eases much of the backbreaking toil of the farmer and increases farm efficiency and productivity (Ado, 2008).

Linkage of agriculture sector to industry has been very weak. Agriculture commercialization and investment are the key strategies for promoting modernization, sustainable growth and development and reverting economic recession in Nigeria. The ban on importation of frozen chicken and beef should create additional investment opportunities for the private sector in livestock industry. Market for dairy products

appears large in Nigeria. Milk collection and processing is thus an area yearning for private sector attention (Anon., 2016).

The paper attempts to broaden the understanding of the esteemed participants on the importance of agricultural production and value addition as well as enhance the knowledge and skills in using various value adding approaches to agriculture. The theoretical presentation if utilized in practical ways can move the country out of the economic recession and provide sustainable ways to increase the economic development of Nigeria away from the oil revenue. I hope the paper will stimulate discussion through which practical experiences will be shared and utilized to move out of the harsh economic conditions we are in at present.

Nigeria's Economic Recession

Recession in English means a period of temporary economic decline during which trade and industrial activities are reduced, generally identified by a fall in gross domestic product (GDP) in two successive quarters. Wikipedia defines a recession as a business cycle contraction which results in a general slowdown in economic activity. Macroeconomic indicators such as GDP, investment spending, capacity utilization, household income and business profits, fall, while bankruptcies and unemployment rate rise. In the United Kingdom, recession is defined as a negative economic growth for two consecutive quarters. Thus recessions generally occur when there is a widespread drop in spending (an adverse demand shock). This may be triggered by various events, such as a financial crisis, an external trade shock, an adverse supply shock or the bursting of an economic bubble. Governments usually respond to recessions by adopting expansionary macroeconomic policies, such as increasing money supply, increasing government spending and decreasing taxation.

Nigeria is experiencing economic recession currently, since her first and second quarters growth in 2016 were -1.7% and -2.06%, respectively (Ahmed, 2017). Gross Domestic Product (GDP) is the monetary value of all the finished goods and services produced

within a country's borders in a specific time period. Though GDP is usually calculated on an annual basis, it can be calculated on a quarterly basis as well. GDP includes all private and public consumption, government outlays, investments and exports minus imports that occur within a defined territory. Put simply, GDP is a broad measurement of a nation's overall economic activity. According to Ahmed (2017), causes of economic recession in Nigeria are poor economic planning by the past government. Absence of concrete implementation of the economic planning is the major cause of the current recession. No doubt the present government has taken some steps, like the elimination of dollar purchase privileges for importers of 40 items including rice, cement, toothpick, private planes, poultry, meat, margarine, wheelbarrows, textiles and soaps. However, there is still poverty in the land. Some past policies had helped to widen the gap between the rich and the poor, thereby creating more economic hardship. On inflation, the current rate in Nigeria stands at 17% which is extremely high. Moreover, the interest rate is high between 26-27%. The extremely high rate discourages investments and the poor investments culminate into high rate of unemployment in the country. Finally, government charges high tax rates even in the economic recession.

Agriculture in Nigeria

Nigerian Agricultural policy regime aims at promoting food security, import substitution for the massive import of wheat, rice and fish, job creation for youth and enhancing economic diversification as contained in the Agriculture Promotion Policy (Anon., 2016) of the current administration. The guiding principles are running agriculture as a business by focusing the policy instruments in a government enabled private-sector led engagement as the main growth driver. The commercialization of agriculture includes technologies, financial services, input supply chains and market linkages that directly engage rural farmers since rural economic growth will play a critical role in the country's successful job creation, economic diversity, improved security and sustainable economic growth. This will lead the country to move out of recession.

Investors usually invest in attractive enterprises. Foreign investors are often more attracted to activities/enterprises that are capital intensive and that add value to primary output. That is why downstream activities are relatively more attractive to foreign investors. On the other hand, primary/upstream enterprises and agro services are relatively more attractive to local investors. The relative attractiveness of different enterprises indicates the comparative advantage of the different agro ecological conditions of the country.

Both upstream and downstream agricultural enterprises are fairly attractive to domestic investors. Generally, staple crop production is not at all attractive for foreign investment (except sugar cane with Chinese investors for Jigawa State) while investments in livestock production and agricultural transport service are only slightly attractive. Attractive enterprises for north central zone are staple crop production, industrial crop production, forestry, commodity processing, commodity marketing and agro-industry/manufacturing (Manyong *et al.*, 2005).

Nigeria still struggles behind South Africa, Kenya and Egypt using an average of 20kg of fertilizer per hectare, whereas those countries recorded more than 100kg of fertilizer per hectare, a situation that affects significantly the quality of the country's production per hectare. However, since the seven fertilizer blending plants out of the 32 in the country have commenced production and distribution ahead of the 2017 rain-fed farming season under the Presidential Fertilizer Initiative (PFI), the Fertilizer Producers and Suppliers Association of Nigeria (FEPSAN) hoped that the average rate of fertilizer use in the country will increase to result in increased productivity of crops. Many private sector participants are already producing urea more than the nation's demand. Notore has a production capacity of 0.5 million metric tons, Indorama has a production capacity of 1.5 million metric tons and Dangote has a production capacity of 2.8 million metric tons capacity plant all of which can produce a combined capacity of 4.7 million metric tons for the domestic demand estimated at between 500,000 and 800,000 metric tons per annum. Problems associated with fertilizers include dysfunctional laws and regulations,

no clear roles of monitoring and regulations, outdated frameworks, frequent changes in management and directives at Federal and States levels, laboratories and inspection capacity inadequate to deal with adulteration etc. Government is working to ensure that fertilizers are sold at the price of ₦5,500 per 50kg bag or even lower. The farmers' interest has been ignited this year as prices of farm produce are now good, thereby giving them the purchasing power to buy fertilizers and other farm inputs.

Foreign investors consider level of demand, availability of raw materials/inputs, and high rate of returns. These indicate economic viability of the different enterprises. Huge capital requirement is a disincentive for domestic investor involvement in input production/supply enterprises and agricultural commodity processing enterprises. Some of the agricultural commodities in Nigeria are given in Table 1.

Table 1. Agricultural commodities in which development domains have comparative advantage in the domestic, regional, or world market by development domain

Zone	Unprocessed	Processed
Northcentral	Soybean, yam, cassava, beniseed, groundnut, neem fruit, honey, mango, cashew, palm kernel, maize, sorghum, cowpea, citrus.	Soya oil and meal, canned fruit, orange juice, vegetable oil, Yam flour, cassava flour, maize flour.
Northeast	Vegetable production (tomato, pepper, onion, etc.), oil seeds production (groundnut), gum Arabic production, cereals and cotton.	Vegetable processing (tomato, pepper, onion etc.), cotton lint, gum Arabic products, cereals flour, canned fruits.
Northwest	Ginger, tomato, cotton, sorghum, groundnut, garlic, gum Arabic, soybean,	Textiles, malt, beer, groundnut oil, soya oil, tomato paste, resin, leather, biscuits, bread, smoked

	melon, sesame, maize, fish, dried vegetables (pepper, cowpea and wheat. tomatoes, okra).
Southeast	Oil Palm, cassava, yam, Palm oil, cassava chips, cassava poultry, cocoyam, plantain, toasted granules (<i>gari</i>), yam flour, banana, vegetables, ginger, fruit juice, canned fish, cocoyam timber, cashew nut, cocoa, chips, plantain chips, vegetable maize, melon, rubber and oil, cassava flour, honey, plantain copra. flour, rubber products, cashew products, and kola nut.
South-south	Cocoa, palm fruit, rubber, Cassava chips, palm oil, latex, timber, cassava, crayfish cassava toasted granules (<i>gari</i>), and shrimps, non-timber cocoa powder and chocolate and forest products palm kernel oil and cake.
Southwest	Cassava, yam, poultry, palm Cassava toasted granules (<i>gari</i>), produce, plantain, cocoa, cassava chips, plantain chips, fish kola, timber, oil palm, fish and shrimps, yam, timber, and and shrimps. chocolate.

Abridged after Manyong *et al.*, 2005

Although most of the commodities can be produced with comparative advantage in more than one zone, there are also some commodities that are specific to only one or two zones, e.g. crayfish and shrimps in the south-south zone and shrimps in the south west.

Processed products are derived from the unprocessed commodities. In the Northcentral, there are orange juice, vegetable oil, soy oil and meal and so on. In the Northeast and Northwest, processed commodities include processed vegetables, cotton lint, textile, grain flour, and leather, among others. The National Industrial Revolution Plan (NIRP) recognizes textiles and garment sector as one of the critical sectors. Comparative advantages in northcentral zone include relatively low cost of production and large central production base while the northwest has availability of irrigation facilities and

cheap labour. Maize, cassava, yam and rice rank high across the zones. Commodities specific to northern zones include maize, cowpea, millet and sorghum. Industrial crops include soybean, groundnut, cotton and beniseed (sesame), ginger, gum Arabic, cashew, citrus.

Productivity challenges are those of genotypes and environment. The genotypes are the crop seeds, livestock breeds, and fingerlings. The environmental challenge includes all inputs other than the genotypes: soil, fertilizers, climate, irrigation, crop protection, etc. Use of genetically modified crops may result in more efficient production giving higher profit to farmers. The recent authorization of genetically modified organisms (GMO) need not cause panic since the product will be clearly labeled to enable consumer choice. The responsibility of the National Biosafety Management Agency (NBMA) is to safeguard the health of Nigerians in the practice of modern biotechnology and the use of GMOs. NBMA is to ensure GMOs are safe and do not pose any adverse effect to humans, livestock and the environment. The National Inter Religious Council (NIREC) had cautioned the Federal Government and Nigerians against allowing GMO into the country. NIREC's committee to investigate the safety of GM foods said there were controversies surrounding the safety and therefore should not be adopted by the country. The National Biotechnology Development Agency (NABDA), however, said the NIREC's investigation on the safety of Genetically Modified Organisms (GMOs) is biased and should be disregarded by Nigerians. NABDA observed that NIREC Committee had no membership from the modern biotechnology promoters group. The stand of international Islamic jurists also differs from that of NIREC.

“The International Standardization of Halal Market” has already revealed one of the fundamental issues regarding GMOs. According to the round table moderator, Saim Kayadibi, Associate Professor at the International Islamic University Malaysia (IIUM), “anything that alters the nature of organisms or food, must be analysed or investigated”, before we can declare it Halal or Haram. Halal is defined as what is permitted to Muslims, whereas Haram is forbidden. Morocco standard establishes that “GMOs are

Halal as long as their origins are. This is what determines its Halal status”, indicated Abdelrahim Taibi, CEO of IMANOR, the Moroccan Institute for Standardization. Mrs. Abdul Latif, associate professor at the Faculty of Food Science and Nutrition of Malaysia has also defended this point. According to the Islamic Jurisprudence Council (IJC), foods derived from biotechnology-improved (**GMO**) crops are **halal** - fit for consumption by Muslims. Some scholars have suggested that foods derived from biotechnology-improved crops could possibly become haram (non-**halal**) if they contain DNA from forbidden foods.

Investment opportunities abound from crop production in northern Nigeria. It is, however, disheartening that out of 250 agro-allied industries and agricultural companies listed (Anon., 1999b, 2000) only 56 or 22.4% were located in northern Nigeria (the situation may be slightly different today). Similarly out of 98 agricultural companies/corporations engaged in marketing and export of agricultural commodities, only 10 or 10.2% are from the northern Nigeria! This situation in the north must be reversed for economic empowerment of its citizens. Agro-processing industries and export companies must be supported to create employment and add value to the crops produced in the region. Nigeria will not achieve reasonable economic growth, poverty alleviation and improvements in food security without productivity increases in agriculture (Ado, 2013).

Increasing the proportion of irrigated agricultural land has provided a solid base for boosting productivity and reducing the volatility of agriculture and for food security. In the whole of Africa, less than 5 percent of crop land is irrigated. Large benefit could accrue to small farmers by expansion of irrigated land to increase and stabilize the level of production while also minimizing the role of rainfall uncertainty in agriculture. Irrigation investment projects have high rates of return, exceeding 15 percent and even reaching 30 percent in sub-Saharan Africa. Significant gains in terms of welfare improvements are also expected from expanding irrigation investments. Increasing irrigation investment by 1 percent has been estimated as having reduced poverty by

approximately 5 percent in Kenya (Thurlow *et al.*, 2007). Expanding food production through enhanced productivity constitutes the cornerstone of policies, strategies and programmes seeking to attain sustainable solution for food security. This is essential to the increasing demand for food, fodder, fibre and biofuel production (Ado *et al.*, 2008).

Sources of Capital

Major constraints to agricultural production include: high cost of inputs, insufficient purchasing power of farmers, poor access to capital and markets, lack of improved tools, etc. (Ntutela *et al.*, 2007). Poor access to capital and markets, low labour productivity, lack of improved tools, and other related socio-economic factors have had a negative impact on crop production (Ado, 1993, 1997 and Shaib *et al.*, 1997). Higher value cash crops produced for international, regional or national markets often provide increased access to credit, equipment and inputs that may not be feasible with traditional food crops (Ado *et al.*, 2008). Apart from equity capital, traders depend on loans from money lenders, friends and relatives. Nigeria is blessed with two of the factors of production: land and labour. Capital should be sourced from the Federal Government development finance institutions including the Nigerian Agricultural Cooperative and Rural Development Bank, Nigerian Industrial Bank, Nigerian Bank of Commerce and Industry, commercial banks, etc. to provide equity capital and funds to finance small and medium enterprises and other viable agricultural projects to enhance the level and quality of agricultural production (Ado, 2008).

Federal Government of Nigeria Social Investment Office offers Government Enterprise and Empowerment Programme (GEEP) MarketMoni. GEEP MarketMoni loans are offered to beneficiaries through their registered market associations and or cooperatives. The program is a national social intervention programme to reach 1.6 million beneficiaries across all States and the Federal Capital Territory. MarketMoni is a microcredit loan available to traders, market women and men, artisans, enterprising youths, small scale farmers and agricultural workers nationwide. The loans range from

ten thousand naira to one hundred thousand naira (N10,000.00 – N100,000.00) repayable over six months. There is a one-time five percent (5%) administrative fee and no other charges. There are two weeks grace period and repayments are weekly through daily collections. Application forms are free (visit www.boi.ng/marketreg). Eligible cooperatives must have registration by State Government or Corporate Affairs Commission.

Graduate/Youth Farmers Empowerment Scheme is another source of Federal Government funding support for Agriculture. The Scheme would revitalize River Basin Development Authorities which were established to boost agricultural production in the Country through all year round farming. The beneficiaries will be empowered to establish their own agricultural ventures and train others.

Anchor Borrower's Programme (ABP) seeks to address the challenges of agro-financing. It creates linkages between anchor companies involved in the processing and small holder farmers. The program covers rice, wheat, ginger, maize, soya bean and cassava.

Islamic micro-finance banks (IMFB) can also provide capital as they should cater for the diverse needs of customers who are mainly micro-entrepreneurs, the vulnerable and those who are not well to do living on marginal incomes. The IMFB can seek for collaboration with Islamic Development Bank (IDB) Jeddah and can also join the Global Islamic Microfinance Forum.

Jaiz Bank can be a source of capital for agriculture through *murabaha* working capital, lease to own (*Ijara wa Iqtina*), *Ijara* service Corporate, *Murabaha* import and export finance, etc. Jaiz is now a national Bank of Nigeria as certified and licensed by the Central Bank of Nigeria. Branches will soon be established in all the 36 states of Nigeria and the Federal Capital Territory.

The Federal Ministry of Women Affairs and Social Development entered into a Memorandum of Understanding (MoU) with the Bank of Industry (BoI) to address challenges faced by women in accessing credit facilities. The MoU was meant to deepen

the credit extended to female entrepreneurs in all parts of the country who are desirous of transiting their business from micro to small scale and later to medium scale enterprise. However, an interest rate of 10% per annum is charged.

National Cooperative Financing Agency (CFAN) strategy aims at repackaging the works of ordinary farmers, artisans, traders and other informal sector workers. The strategy also provides global guarantees to cooperatives to enable them source finance through the National Cooperative Development Funds (NCDF) to enhance their activities. More information can be accessed at the Unified Cooperative Platform's website www.cooplatfom.com.

For insurance cover which may be a condition for draw down from banks, *takhafful*, which is a type of Islamic insurance where members contribute money into a pooling system in order to guarantee each other against loss or damage can be used. *Takafful* brand insurance of Jaiz bank and other Financial Institutions is based on *shariah*, Islamic religious law, and explains how it is the responsibility of individuals to cooperate and protect each other.

Agribusiness Ventures

Viable agribusiness and Standard Business Plans available for email delivery is available from “www.Agropreneurs Zone” at a small fee of N12,000 to N5,000 per business plan. Some possible ventures include:

1. Dry season Peas, Tomato and Pepper Production under irrigation- Hybrid varieties will be used to produce the crops from 2ha in conformity with good agronomic practice. Peas can be produced under irrigation during the harmattan season for export to Europe since Europe is usually frozen at that time. Cut flowers can also be produced during harmattan for export to Europe. Farming pumpkin, green vegetable, scent leafs and water leaf was reported to fetch N1.2m every six months from irrigated land.

3. Commercial Rice Production- This business focuses on producing high quality polished long grain, stone free and odorless rice which is an essential staple food in Nigeria. According to Central Bank of Nigeria, 250,000 millionaires would be made in Kebbi from commercial rice production. Following the harvest boom by farmers, agriculture is now providing money for people to go for pilgrimage. An engineer in Kano at Farm Centre, fabricates rice processing machines of different capacities.

3. Cassava Production and Chips Processing- This business focuses on producing high quality cassava products which is an essential staple food as well as industrial raw material. Cassava flour can be used in composite flour for confectionery. The flour can be processed and packaged for confectioneries and other domestic food recipes. Fuel ethanol can also be obtained from cassava and maize.

4. Maize and Soybean Production- Commercial maize and soybean farms of at least 5ha each will be established. Maize and soybean are the most important crops/raw materials used by human beings, livestock feed and food industries.

5. Plantain Plantation: Major product is plantain. Plantain ranks 3rd among starchy staples. The plantation will be established on 15ha land in the southern part of the country.

6. Moringa products manufacturing for export and domestic markets: The business will transform raw materials (i.e. moringa seeds and moringa leaves) from farm into finished products using latest cutting edge and efficient technology. The products include moringa seed, moringa oil, moringa cake, moringa leaves and moringa powder. The business will basically combine moringa plantation and processing. The moringa plantation will be established on 20ha farmland for leaves and seed production. The plantation will adopt unique design, irrigation and organic amendment technology. The processing factory will have leaf processing unit, seed processing unit and warehouse cum other buildings. All processing techniques will conform to good manufacturing practice (GMP). All products

will be certified organic and registered accordingly. Export market for moringa products is estimated to be more than US\$4 billion.

7. Broiler Processing: The enterprise will deal with production of processed and packaged chicken and giblets with state of art equipment in a clean environment. The enterprise should plan to raise 4,000 birds till maturity for 7-8 weeks to attain about 3kg per bird and also process 4,000 broilers monthly.

8. Chicken egg with seasonal broiler production. The enterprise can begin with 1,100 day old chicks or 1,000 point of lay in the first year. The enterprise will also produce 1,000 broilers to cater for seasonal demand. Sales from spent layers and poultry manure also provide additional income for the farm.

9. Nigeria's current demand for fish is estimated at 2.7 million metric tons and the country currently produces 800,000 metric tons. Nigeria has no business importing geisha, sardines and frozen fish from other countries. Fish production, processing and canning industries should be established in the country.

10. Fingerlings, Fresh and smoked catfish production. Products of the enterprise are fish seeds (fingerlings or juveniles), fresh and smoked catfish. The enterprise will produce 20-40 tons of fingerlings/juveniles, 31 tons of fresh and smoked catfish in conformity with good production practice per annum.

11. Extruded fish feed Production- a standard fish feed mill with fully installed state-of-the art equipment. The output capacity of the plant equipment will be 240-260kg/hr. The plant will be able to produce pelletized and extruded feed that is floating for improved productivity.

12. Commercial Mushroom Production: Mushroom is a vegetable food source that is consumed in Nigeria. It grows easily in tropical rain forest ecology. It is presently commonly collected in the wild, which also limits its wide consumption as many species are poisonous. Mushroom is also imported into Nigeria and is a popular component of the

menu of restaurants in Nigeria. It can be profitably produced commercially in Nigeria by rural and peri-urban dwellers. Fresh, dry and powdered edible mushrooms can be produced using state of the art equipment in a clean environment. All products will be packaged and branded. The rate of return on investment is between 60% and 100%. National Biotechnology Development Agency, Abuja can be contacted for advice.



13. Beef production - Canned beef and shredded meat (*dambun nama*) enterprises can be a viable business for both domestic and export trade. Dry meat (*kilishi*) if produced under hygienic condition using solar dryers and properly packaged can be exported to earn foreign exchange. The Raw Materials Research and Development Council had concluded research on *kilishi* and successfully exported to Germany.

14. Minor forest produce such as gum Arabic, beeswax, sheanut, sheabutter, marula, tamarind, etc. can be major foreign exchange earners. Beeswax is highly valued in candle manufacturing industries and can also be exported to earn foreign exchange. The fruits of marula can yield excellent drink, jams, jellies, as well as fresh fruits for export to Europe as the consumption pattern of Europeans is changing from old fruits to new ones. Fruits and vegetables canning and processing are some of the viable options for value addition and income generation. *Zobo* concentrate contains vitamin C among others and may be comparable to imported ribena (the vitality drink).

Second group of priority commodities include pepper, beef, oil palm, fish, melon, tomato, soy bean, onion, garlic, rubber, kola, and cocoa. A third group of commodities include ginger, goat, mutton, beniseed, cashew nut, and shear butter. Modern crop production techniques can create opportunities that can enable rural communities to increase their output and participate in mainstream value addition and export activities that provide jobs and inject new capital into the communities (Markham, 2004). Northern Nigeria produces 75–100% of maize, sorghum, millet, wheat, yams, sweet potatoes, Irish potatoes, cotton, cowpea, soybeans, groundnut and sesame grown in Nigeria. Those who say the north produces nothing, its dominant people contribute nothing to the nation but live off the sweet of others are absolutely wrong (Ado, 2005).

Some Agricultural commodities across zones (Manyong *et al.*, 2005) are shown in Table 2 below.

Table 2 Commodities with comparative advantage for investments

Primary production	Northcentral	Northeast	Northwest	Southeast	South-south	Southwest
Staple crop production	Rice	Sorghum	Millet	Yam	Yam	Yam
	Maize	Millet	Sorghum	Cassava	Cassava	Cassava
	Sorghum	Cowpea	Maize	Rice	Rice	Maize
	Cowpea	Cassava	Cowpea	Maize	Maize	Vegetables
	Yam	Rice	Cassava	Vegetable	Cocoyam	Rice
	Beniseed	Beniseed	Rice	Cowpea	Vegetables	Cowpea
		Maize	Beniseed	Soybean	Cowpea	Groundnut
		Yam	Maize	Plantain	Groundnut	Soybean
			Yam			
Industrial crop production	Soybean	Groundnut	Soybean	Cocoa	Cocoa	Pineapple
	Groundnut	Soybean	Vegetables	Oil Palm	Oil Palm	Oil palm
	Cotton	Cotton	Groundnut	Rubber	Rubber	Rubber
	Vegetables	Sorghum		Groundnut	Cashew	Cashew
	Coffee	Vegetables	Rice		Orange	Ginger
	Oil Palm	Mango				Cocoa
	Orange					
Livestock production	Cattle	Cattle	Cattle	Poultry	Cattle	Cattle
	Sheep	Sheep	Sheep	Sheep	Small ruminant	Sheep
	Goat	Goat	Goat	Goat	Rabbitry	Goat

	Poultry Piggery	Poultry Piggery	Poultry Piggery	Cattle Piggery	Poultry Piggery	Rabbitry Piggery Poultry
Fishery	Fish	Fish	Fish	Fresh fish Smoked Fish	Aquaculture	Fish Crayfish Shrimps
Forestry	Gum Arabic Ginger Cashew nut	Gum Arabic Fuel Wood Gmelina	Teak Mahogany Gmelina Ginger	Timber Teak	Timber	Ginger Cashew nut

Abridged from Manyong *et al.*, 2005

Primary agricultural production activities encompassing crop planting and harvesting and livestock production constitute upstream agricultural commodity activities from which primary commodities emerge. Following these are some essential secondary or postharvest activities that constitute downstream activities. These secondary activities add value to the primary product, improving its quality and rendering it less perishable. The downstream activities improve the market opportunities for agricultural products and promote their commercialization enhancing not only its competitiveness in the market but also the rate of return on investment.

Development of Cooperative Societies

This requires mutual cooperation among relevant commodity farmers. The members should register the cooperative with State Government or Corporate Affairs Commission. The cooperative can establish simple jointly owned enterprise for production, processing and marketing. Members of the cooperative can individually own their individual farms and production resources, but they collectively purchase their inputs and sell their outputs through a jointly owned marketing facility. The proceeds from sales of members' output are shared according to their measured contribution to the common sale basket. Registered cooperatives are a pre-requisite to getting grants, and credit facilities to improve the enterprises.

Farmers Association reduce cost of production through bulk purchase of required inputs such as chemicals and fertilizers as well as arrange the disposal of the produce as a group eliminating the middlemen who usually purchase the commodities at low prices. Any credit given the association will be the collective responsibility of the members to ensure judicious utilization as well as timely recovery of the credits.

Product Development

Developing new products or upgrading/refining existing products through new quality control measures and standards, and food safety are very important in export trade. Collaboration with National Food and Drug Administration and Control (NAFDAC) and Standards Organization of Nigeria (SON) and Nigeria Export Promotion Council (NEPC) are necessary. NAFDAC has created a business support desk to encourage small holder farmers, traders and entrepreneurs to meet with minimum regulatory standards.

Product exhibitions as part of extension technology to showcase success stories and best practices through farmer participation in field days, exchange programmes, agricultural trade fairs, local and international study tours can expose farmer groups to new knowledge and should be encouraged. Collaboration with relevant agencies: Banks, Nigeria Export Promotion Council (NEPC), Advertising Practitioners Council (APCO), NAFDAC, NGOs that support marketing development (e.g. USAID MARKETS) and Multi commodity Market Development Companies are also necessary for successful export.

Value Addition to Agriculture Products

Value addition to agricultural products is the process of increasing the economic value and consumer appeal of an agricultural commodity. Value addition technologies include processing and preservation techniques, dehydration and drying technology (solar driers), freezing technology, packaging, labeling, etc. Value addition is an important approach in today's business environment where innovation in farming and agri-food processing are important to remain competitive and to optimize returns from an enterprise. It may entail

producing a commodity for a special market, changing the form of the commodity before it is marketed, changing how a commodity is packaged and labeled for the market, and changing the way a commodity is to an existing one (APO News September, 2009). Value addition therefore creates jobs which are critically needed at this time of unemployment owing to economic recession.

Post-harvest technology including packaging, processing and storage facilities stabilize food production base as well as insure against excessive dependence on food imports (Ado, 1997). Sani *et al.* (2015) reported that processing is the conversion of raw materials either by physical or chemical means to storable or more marketable products. It is also referred to as a method of preservation to ensure availability of products during scarcity period in its fresh state or converted form. Processed products of mango, for example, include chutney, jam, juice, dried slices. Processing preserves the fruit, its products and prolongs the shelf life. Niyya Food and Drinks Company Limited has a processing factory which manufactures Farm Pride Natural Juices. The company is located at 60 kilometers on Kaduna-Abuja road. Farmers interested in processing and canning their fruits may wish to contact them.

Many small tomato processing plants are needed to produce replacement of the tomato concentrates imported from China, Vietnam, India and other countries instead of carrying raw tomato from the north to the south, usually at a loss. Small processing plants will convert the fruits into concentrates just like what is imported. This will be more profitable to farmers and provide jobs. The National Research Institute for Chemical Technology Zaria can be contacted for advice. They are already working with Katsina State government in that direction.

Investment opportunities abound in agriculture in view of the large volume of available animals and crops. Different recipes developed can be commercialized such as *fura*, *burabusko* (couscous), *kunun tsamiya* (being produced at Sharada, Kano), biscuits, *kamu*, (corn flour, being produced at Lagos), corn flakes (being produced by Nasco Company Jos), composite flour, *Garin danwake*, *alele*, baked beans, *wake da shinkafa* (jallop rice

and beans), pouno, spaghetti, pastries, etc. Even though many of these products are produced locally, a lot are imported indicating the need to increase production to satisfy local demand and even export. Improved processing and packaging are necessary to serve domestic and regional markets in Africa and beyond (Ntutela *et al.*, 2007). Canning is one of the possible investment areas for cowpea (baked beans). Research on *fura* for sale in supermarkets and export conducted at Federal Institute of Industrial Research Oshodi in early 1980s might have been ready for commercialization but not yet taken. Powdered *fura* was reported to remain good for a year while a lump will stay for six months. Yet Coker oat is imported. The *zobo* concentrate developed at the Institute for Agricultural Research Samaru is still on shelf while similar drinks are imported from other countries. *Zobo* concentrate is a refreshing drink very rich in vitamin C. The concentrate made from roselle calyx, can keep for up to two weeks without preservatives. The concentrate is diluted with water in 1:2 before use (Ado, 2012). Yet the raw roselle calyx is still exported. This is the case with many indigenous research conducted in the country, the list is endless. Local production must therefore be fully protected to create needed employment opportunities to Nigerians.

Marketing

Agriculture plays an important role in Nigeria's development, particularly through regional trade as a source of hard currency. Three basic decisions to make are: what to produce, how much to produce and for whom to produce. Anonymous (2016) stated that Nigeria faces two key agricultural gaps: inability to meet domestic food requirements and inability to export quality products required for market success. Inability to export is as a result of inefficient system of setting and enforcing standards as well as poor knowledge of target markets. Moving out of economic recession will require solutions to the identified gaps: production of sufficient high quality foods for Nigerian market and the export market to earn foreign exchange. Nigeria should partner with private investors across farmer groups and companies to develop end to end value chain solutions. The

chains will require facilitated government support such as the Graduate/Youth Farmers Empowerment Scheme to engage new generation of farmers.

For export trade, advantage can be taken of the Maigatari Model Commodities Free Trade Zone and other Export Free Zones. Priority export commodities include: cowpeas (beans), cassava (starch, chips and ethanol), ginger, sesame (beniseed), yams, horticulture (cut flowers, fruits and vegetables), beef, cotton, cocoa, cashew and oil palm. Resumption of payment of Export Expansion Grant (EEG) for non-oil exports is a welcome development. EEG is a very important incentive required for the stimulation of export oriented activities that would lead to significant growth of the non-oil export sector.

The era for production and export of raw crops such as grains, cotton, groundnut, etc has passed. Now we know we need labour with requisite technical skills and technology to transform the crops produced into high valued finished products. We should be processing increasing proportions of the commodities produced. Export of raw commodities only provides jobs to the importing countries making us simply donors to the importing countries. This is because we have donated the opportunity to engage our teeming population to gainful employment to the countries where the raw commodities were exported.

Beans from Nigeria were reported to have higher residual chemicals than permissible for export. New techniques for storage without chemicals can be adopted as well as production of Bt cowpea which requires less chemical sprays because it resists one of the insects that devastate developing pods. The variety is, however, genetically modified using *Bacillus thuringiensis* (a ubiquitous soil bacteria) genes which are harmful to the insect but harmless to man and animals. A network of investors, farmers, processors and other stakeholders to improve infrastructure to ensure that quality standards are defined and maintained across the value chain are necessary for export. That means adding more laboratories, disseminating intelligence on export markets and consumer preferences, etc. Successful execution requires working closely between FMARD with States, other

Federal Ministries, Departments and Agencies (MDAs) e.g. Power, Transportation and Trade. FMARD is to ensure that farmers and investors work in a market that is safe, competitive, and capable of enabling wealth creation in the coming years to be out of the economic recession on sustainable basis. The Agriculture Promotion Policy (APP) is committed to moving Nigerian agriculture from not only subsistence to “a business” but also to a commercial ecosystem that can produce the capabilities necessary to create sustainable jobs and wealth thereby moving the country out of recession.

Informal market systems managed by small-scale players can be upgraded significantly through improvements in technical post-harvest and effective certification systems. The Federal Government’s desire hinges on a well-structured commodity exchange as a catalyst for enhancing the effective and efficient marketing and distribution of agricultural commodities and other produce both domestically and across the nation’s borders. The Nigeria Commodity Exchange (NCX) should ginger up to actualize its mandate. Farmers Associations or Cooperatives can get in touch with commodity brokers in their localities who will help them aggregate their harvest and store them in the Nigeria Commodity Exchange (NCX) warehouses situated across the country. The farmers would be issued receipt of such a commodity and the receipt can be taken to bank as collateral to secure loan. Aside from such benefits, middlemen can no longer shortchange the farmers as the produce can now be sold on the floor of the exchange at attractive price.

An organic fertilizer plant associated with a sugarcane project would provide molasses for the production of organic fertilizer for organic crop production. Development of greenhouse vegetable production aimed at the export market will bring in foreign exchange.

Commodities with highest domestic consumer demand and greatest potential for commercialization/trade internationally especially within the West Africa sub-region, include rice, maize, sorghum, cassava, yam, millet, groundnut, poultry, vegetables, pepper, onion, garlic, beef, oil palm, fish, melon, cotton, cocoyam, cocoa, and kola

(Manyong *et al.*, 2005). The Dawanau grain market in Kano, one of the largest produce markets in West Africa, was recently flooded with new wheat, a situation that crushed the price of the commodity from thirty four thousand naira (N34,000.00) per 100kg bag to fifteen thousand naira only (N15,000.00)! This was one of the lowest recorded in recent years. However, the crash is temporary as the commodity will regain its value in the market soon. As a result of the glut and to protect farmers, Kano State government has set aside fifty million naira as interest free loan to wheat farmers across the state who need quick cash, to prevent them from selling off their produce at give-away prices, until the price stabilize in the market. Warehouse system was introduced across various locations in the State where farmers would register to keep their produce to save them from the menace of middlemen who buy the commodity very cheap.

Kano State government was tasked on pigeon pea production for export. Farmers have been called for massive pigeon pea production to meet \$100 billion market in India. The export deal had been negotiated with the Nigerian government. Market information systems, awareness and knowledge sharing through market price surveys, website, market financial linkages, use of Global System Mobile (GSM) are essential in commodity marketing. Some Websites for buying and selling agricultural products are www.tradenet.biz, www.ecobiz.ecowas.int, www.resimao.org, www.esoko.com.

In September last year, the Federal Government through the Nigerian Incentive-Based Risk Sharing System for Agricultural Lending (NIRSAL) flagged off cattle transportation by rail in Zamfara State. Rail transport can help build the economy as it offers very cheap transport to the hinterland. Farmers including cattle dealers and vegetable producers would have easier and cheaper means of transporting their products to all parts of the country to exploit wider access to markets which will increase profit margin and serve as a motivator to greater agricultural production. The Lagos to Kano railway will in the same vain assist agricultural commodity trading across the country.

International trade must be a part of sustained food security. African nations have to move towards exporting processed primary goods instead of raw commodities. We need to organize regional and continental markets better (Ado, 2008).

Agriculture as Panacea to Economic Recession

According to International Monetary Fund, for Nigeria to attain total economic recovery, it needs to create 40 million jobs for its youth before 2030. That is an average of about 3.1 million annually. This is because Nigeria is adding more young people to the job market than any other African Country. Many countries that came out of recession quickly use what their people produce with their hands. Thus the more creative we are, the more money each person can make and the better for our people and the country. Agricultural productivity, entrepreneurship, and value addition result in wealth creation in rural areas. Developing effective clusters in form of cooperatives and commodity associations that can add value to unprocessed raw materials, and promoting value chains across diverse agricultural sectors such as horticulture, food processing and packaging, food storage and transportation, food safety, distribution systems, and exports, are all central to moving out of the economic recession in Nigeria. Because the agricultural sector in Nigeria is the largest employer of labour, its growth has a large impact on poverty reduction. Agricultural growth creates income opportunities for the poor in both the farms and nonfarm economy while lowering food prices for both rural and urban poor consumers. Agriculture has a high multiplier effect through generation of high economic and social returns and enhanced economic diversification as well as social development (Ado, 2013). Recession sees local rice becoming Nigeria's darling. More and more Nigerians are opting for locally grown and processed rice in their various communities. The talks on plastic rice on social media also make local rice more preferable.

Release of one trillion capital vote reported as the highest in history is a step in the right direction of moving out recession. The amount was released for various projects including the commencement of the construction of a dual standard railway line that

would link Lagos and Kano, rehabilitation of roads, expanding irrigation facilities to boost agriculture and the upgrading of aviation infrastructure throughout the Country. The capital releases have made impact on the Nigerian economy by creating jobs, stimulating economic activities in communities and upgrading infrastructure thereby improving the wellbeing of Nigerians.

Government policy on rice has led to huge increase in local production in the last season. The Central Bank of Nigeria (CBN) Anchor Borrowers' Programme (ABP) for rice farmers resulted in bumper harvest across the country. Nigeria will achieve self-sufficiency soon and conserve foreign exchange from importation of rice. The ABP allows small holder farmers to access credit to produce rice at 9% interest rate. Under the programme, farmers are also linked with off takers who will buy-off their products. ABP looks at the entire value chain, from farm to table.

Rice ABP in Katsina State developing rice value chain by supplying credit for improved seeds, pesticides, herbicides and fertilizers. The Government also guarantees minimum price for the purchase of the paddy rice. Other crops to support are cotton, sorghum, maize, tomatoes and wheat. Bio data of all farmers and the surface area of their farms are taken to facilitate easy access to agricultural support programmes. The bio data will be linked to Bank Verification Number (BVN) data so that genuine farmers alone benefit from the programmes.

Rice farmers Association of Nigeria (RIFAN) cited constraints to rice production to include unavailability of machines like tractors and quality seed. Rice companies come to buy the paddies directly from the farm to process and package. Lake Rice is cultivated in Kebbi, milled and bagged in Imota, Lagos. Lake Rice provided good alternative to imported expired rice. The Lagos-Kebbi food production and supply template could be a model for other states to emulate and improve the economic well-being of their citizens. This indicates we shall soon come out of recession and also diversity our economy through agriculture (Abu, 2017).

West African Cotton's (WACOT's) N10 billion rice mill located in Argungu has a production capacity of 100,000 tons annually. Silos for storing 18,000 tons of paddy and a warehouse for storing additional 12,000 tons of paddy are available. When operational, it is expected to generate direct and indirect employment for 3,500 people and its procurement will reach out to 50,000 farmers. The rice mill will be completed within 16 months and when completed, it would be bigger than any rice mill in the country. Last year, a target of one million metric tons of rice was achieved in Kebbi State. Nigeria consumes an average of five million tons of rice per year. WACOT has the capacity to produce world class rice that could be compared with those produced in Thailand and India.

At secondary production level, agro industries with some investment potential include cassava processing (imagine *Gari* imported from India!), vegetable oil processing, fruit processing and flour milling. Composite flour can be produced from a suitable combination of different commodities. Tanning is specific to the north while rubber processing is common to the southeast and south-south (Manyong *et al.*, 2005).

Value chain approach focuses on enterprise commodity value chains for the development of crops, livestock and fisheries thereby creating much more wealth in agricultural production. Federal Government has prioritized rice, wheat, maize, soya beans, and tomatoes for 2016-2018 for domestic consumption. For export crops, the initial focus will be on cocoa, cassava, oil palm, sesame, and gum Arabic. From 2018 onwards, the export focuses add bananas, avocado, mango, fish, and cashew nuts (Anon., 2016). Other agriculture related exports include *tafasa* seed, roselle calyx (*zobo*), *etc.*

Conclusion

Agricultural productivity has not grown sufficiently owing to underinvestment in new technologies, constraints associated with the investment climate and lagging infrastructure. Agriculture commercialization and investment are the key strategies for promoting modernization, sustainable growth and development and reverting economic

recession in Nigeria. The ban on importation of frozen chicken and beef should create additional investment opportunities for the private sector in livestock industry. Market for dairy products appears large in Nigeria. Milk collection and processing is thus an area yearning for private sector attention. A successful approach to getting out of recession is to organize and empower farmers and to effectively link them to input and output markets. A typical chain includes producers, assemblers/traders, processors, retailers and finally consumers. Proper marketing strategies will lead to increased farmers' incomes and will facilitate increased production of processed products. There is need to design and adopt grades and standards that favour utilization of existing products and development of new products with added value. If agriculture becomes more sustainable, if it increases its productivity and becomes more resilient against the impact of climate change, this should help to reduce the number of hungry people and offer better income and job opportunities necessary to end and contain recession.

The current crises on Nigerian economy more than ever before, calls for setting a solid foundation for a more diversified and resilient economy. Focus should be on micro-economics and financial stability. There is need for diversification of productive structures and supporting real sector growth to boost employment and tackle poverty and food insecurity. Successful implementation of food security activities must happen at a local level. Communities are key to achieving food and nutrition security in Africa and we need effective decentralization of management for public investment and adequate resources allocation from central government.

Recommendations

For Nigeria to end the absolute dependence on petroleum oil revenue there will have to be a decisive rupture with the slow growth of agricultural practices that have marked the country since independence.

Commodity groups, private industries, State and Federal Agencies should support the infrastructure and long-term commitment required to develop superior animals and crops

for production and global consumption and train the next generation of animal and plant breeders to address the needs of a growing population with fewer inputs and decreasing arable land.

Nigeria must make agriculture the centerpiece of industrialization and economic take off. States must intensify efforts to create enabling environment with a focus on mitigating the factors that increase the costs of agricultural production and business transactions.

By focusing on an action-oriented process, Nigeria can accelerate agriculture-led development that leads to self-reliant productive economies capable of eradicating hunger and poverty in not only the country but even beyond. Exports from some of the crops produced can bring in foreign exchange. States governments must maintain consistent policies that protect income of local farmers from potential glut resulting from import of competing or alternative food commodities. Poverty alleviating products such as potable water, electricity, basic education, health and sanitation services should all be provided.

Agricultural vocational institutes should include training in export-oriented production, value addition and packaging.

Famers should form cooperative groups for producing different commodities and collectively procure inputs (improved seeds, quality fertilizers and crop protection products at the right time, in the right quantity and quality and for a reasonable price). The organization further enables them to negotiate for better prices or store the produce until prices increased. They can equally add value to the produce before disposal. Thus a certain level of organization among smallholder farmers can be quite beneficial in helping them access markets, improve knowledge on how to engage in transactions in competitive markets, and improved access to timely information in prices needed to respond to market incentives. Cooperatives should jointly own farms and produce good commodities to solve the problem of fragment farms which are not efficient for commercial production.

Policies that allow for the development of farmer-to-market linkages are required such as value chain approach which links farmers to markets and so the consumer market drives the value chain (IFDC, 2017).

For quick recovery from Nigerian economic recession, Small and Medium Enterprises and companies should be empowered with loans.

Strategic Grain Reserves Programme at all levels, Federal, State and Local Government should be set up. This will serve as depots for commodities purchased by governments during glut as food security buffer. This will also ensure guaranteed minimum price which induce farmers to use their available resources more intensively as well as adopt improved inputs and recommended production practices (Ado, 1997, 2008b). To sustain production without discouraging farmers, the government remains a buyer of last resort.

Trade to other countries need to be formalized. Smuggling and informal trading should be properly checked. Federal and States Agriculture Ministries should create the enabling environment for farmers to carry out production of crop and livestock and fisheries profitably.

Rail transport can help build the economy as it offers very cheap transport to the hinterland. Farmers including cattle dealers and vegetable producers would have easier and cheaper means of transporting their products to all parts of the country to exploit wider access to markets which will increase profit margin and serve as a motivator to greater agricultural production. There is urgent need to integrate agriculture with other sectors (industry and services).

To encourage local production for foreign markets, the Federal Government should continue with the Export Expansion Grant (EEG). Government Ministries, Departments and Agencies should be compelled to patronize Nigerian products to further boost local production.

To boost crop production, soil fertility maps and fertilizer formulations that are soil and crop specific should be followed.

Islamic Microfinance Banks (MFB) such as the *Tijarah* MFB of Bauchi should be established as much as possible in each Local Government Council.

Training women with the best methods of processing, packaging and value addition on agricultural produce such as groundnut, soya beans, sugarcane, wheat, rice, maize, baobab and beans for sustainable profitability should be considered. This will go a long way in enhancing the economic wellbeing of the families.

There is need to design and adopt grades and standards that favour utilization of existing products and development of new products with added value.

CBNs restriction of 41 items Nigeria can produce locally should not be reviewed in a hurry. More of the items produced locally should be added to protect domestic products and create employment to youths.

Government should strengthen financial institutions to encourage savings and take steps to raise productivity so that individuals have surplus to save. Increased resources must be devoted to more sustainable technologies that support more intensive agriculture that assist farmers to increase the resilience of their food production systems and to cope with climate change.

Agriculture must be supported with subsidies not on the inputs but on the produce as is the case in Europe and the US. The European Union subsidizes sugar beet to the tune of more than one billion dollars per annum, selling at below the cost of production. Cotton market is heavily distorted by the US subsidies to its cotton farmers making it hard for African's to make the crop profitable (Ado, 2005; BBC World, 2005).

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