GOVERNMENT COLLEGE IBADAN OLD BOYS ASSOCIATION (GCIOBA)

2018 Reunion

Public Lecture

Food Security

Production, Storage and Processing

by

Dr Lalekan Are

Patron, GCIOBA

Former CEO Ogun-Oshun River Basin Development Authority

Professor of Agronomy, University of Sierra Leone

Deputy Executive Secretary, West Africa Rice Development Association

Deputy Directors Cocoa Research Institute of Nigeria.

@ Lalekan Are Hall, Government College Ibadan

Date: Friday, 19 October 2018 **Time:** 11.00 a.m.

Introduction

I am very delighted to accept the kind invitation of the National Executive Committee (NEC) of the Government College Ibadan Old Boys Association (GCIOBA) to deliver the 2018 Public Lecture with the theme: ***Food Security: Production, Storage and Processing.*** Put lightly, I believe you have asked me to examine how we survive as a nation that cannot feed itself in the midst of abundant natural resources. Please pardon me if you observe that my focus throughout the paper is mainly on crops based on my qualifications, expertise and working experience.

When you drive on the Lagos-Ibadan expressway, you begin to wonder where the food eaten by Western Nigerians comes from. To those of you not familiar with the scenery, may I explain that you see mainly an array of secondary bush, kola nut trees, plantain and banana suckers, thousands of palm trees and forest trees interspersed here and there with irregularly- shaped, small cultivated plots of land called farms, which are generally not more than 0.5 to 1 ha in size. Let me quickly inform you that these subsistent farmers assisted by members of their families live in villages dotted here and there in the bush that you drive past. Most of them are old, being over 55 years of age. These farming families own and operate between 1 and 3 such small farms around their villages. Their farms are linked with one another by a myriad of winding, narrow bush paths. In the Nigerian circumstance, the small farm holder still constitutes over 80 per cent of our farming popu1aion and hence agricultural development and innovation will have to be woven mainly around him for a long time to come.

Like the Nigerian farmer in the forest, I believe that Nigerian agricultural policymakers must have been misinformed quite a few times too, but, ironically, the Nigerians that they serve have always been a lucky set of humans who miraculously escape with light bruises during periods of near-disaster situations.

In the light of my experiences as an agriculturalist, I must say that I agree with the late Prof. H.A. Oluwasanmi who stated in October 1961 in his World Food Day Lecture, and I quote: "I believe we talk too much, give too many lectures, hold too many Seminars and Workshops, pontificate unceasingly (and sometimes ignorantly) about agriculture without managing to achieve nearly as much as our rhetoric would lead the unwary to expect." If the agricultural policies of the Federal and State Governments were right, then I submit that our basic food items would not only be inexpensive but should also be easy to come by in sufficient quantities and in wholesome nutritious condition for every Nigerian family at all times.

Even though agriculture is the major occupation of Nigerians, with about 55 per cent of our workforce directly or indirectly involved and depending on it for their livelihood, it is still largely embraced by smallholders, many of who are subsistent. With their smallholding of 1.-2 hectares and the low technology which relied on cutlasses, hoes, axes and shifting cultivation, the system then provided almost sufficient basic food items for the rural and urban population. Nigeria was relatively self-sufficient in the main basic carbohydrate food items (maize, yam, cassava, cocoyam, plantain, sorghum), vegetable oil (palm oil, melon oil, groundnut oil), beans (cowpea, *awuje),* fruits (oranges, pawpaw, banana, mangoes, guava) and several vegetables *(soko,* bitter leaf, *ugu, ebolo, amunututu,* spinach). Then food importation was restricted to mainly non-traditional food items such as sugar, milk, wheat flour and stockfish.

Before the oil boom era of the 1970s and early 1980s and the adoption of the Udoji salary scheme for Nigerian workers, agriculture was the mainstay of the Nigerian economy, providing the major source of foreign exchange earnings from the exports of cocoa, rubber, palm products, groundnuts, ginger, leather and cotton; employment, income and sufficient food for our population, as well as raw materials for our agro-based industries such as tyre factories (Dunlop), Bournvita (Cadbury),

Oroyo-refined vegetable oil from palm oil (Lever Brothers); and market for industrial goods. With time, the contribution of agriculture to Gross Domestic Product (GDP) declined steadily from 63.3 per cent in 1960-61 to 19.8 per cent in 1978-79 (Oluwasanmi, 1981) and rose to 37.05 per cent in 2009 before declining again to just 21.18 per cent in 2016.

For quite some time, however, Nigeria has been experiencing food shortages. This is more pronounced especially during the period long after crop harvest. While the rate of increase in food production in developing countries is about 1 per cent per year, the annual population growth rate in Nigeria is estimated to be about 2.5 per cent. It is therefore clear that Nigeria's average annual population growth has outstripped the rate of increase in food production. There is indeed a food crisis in the sense that the proportion of the salary of an average wage earner spent on food by him and his family is very high and is estimated to be between 50 and 60 per cent. This contrasts sharply with only 15 to 20 per cent for the wage earner in the US. Our food crisis is not only that of short supply of some food items but also in the changing pattern of our consumption, resulting in excessive demand for such food items such as rice, wheat, sugar, milk, eggs and fish products like stockfish and caviar, to mention the most prominent of them all. With this swing away from our traditional starchy foods to prestige grains like rice and wheat, we readily resorted to a 'crash programme' of massive food importation. Without doubt, food importation has taken its toll on the economic dilemma of Nigeria and the depreciation of our currency — the naira.

We should also bear in mind that although total food production has been on the increase lately, competing demands for some of the basic food items by man, his animals, as well as his industrial machines have made such food items unaffordable or not readily available at certain periods of the year. For instance, locally produced maize can no longer satisfy the food demands of Nigerians since the same maize is needed as the main raw material by:

(i) Feed mills — for the production of poultry feed.

(ii) Flour mills — to produce maize flour in place of wheat flour when wheat importation was banned.

(iii) Breweries — to produce maize grit, a substitute for barley whose importation was also banned.

(iv) For direct consumption by farm animals — e.g. goats, sheep and cattle.

(v) Industry — for the production of starch and oil, etc.

Even where food is available in Nigeria, the prices for many food items are unaffordable, especially for the low income group of Nigerians, as food prices have shot up between the 1990s and now. The average Nigerian has therefore neither been taking enough calories to sustain an active economically productive lifestyle, nor has he been eating a balanced diet to maintain good health.

The most important reasons for the high food prices include the following:

(i) The fluctuating high price of acquiring foreign exchange needed for procuring farm inputs.

(ii) Extremely high cost of farm machinery and equipment

(iii) Dwindling farmers' yields since most of them cannot afford adequate inputs to sustain high yields.

(iv) Many farmers pay rent on their farmlands.

(v) Available planting materials and livestock have low yield potential, hence there is low output per unit area farmed. For instance, the best available open-pollinated composite maize varieties commonly planted by Nigerian farmers, with seeds saved from a previous. harvest, yield

only 2 to a maximum of 2.5 tonne maize grains per hectare (ha), while the available hybrid maize varieties can yield 5 to 8 tonne of grains per hectare.

(vi) A high percentage of the small-scale farmers are old and hence there is declining productivity on the farms. About 48 per cent of our population are below 18 years of age and most of them are in school. Another 7 per cent are above 65 years of age. The Nigerian workforce of ages 19 to 64 years, which include most of our rural dwellers constitute 45 per cent of our entire population.

(vii) High cost of hiring farm labour does not ensure that farming operations are carried out on time, e.g. weeding is often not done early enough to prevent reduction in crop yield.

(viii) High cost of transportation due to the deplorable state of rural feeder roads and high cost of fuel.

(ix) The bandwagon effect. This is because the prices of every marketable item has shot up; hence the price of farm produce has gone up too since the farmer buys his other needs from the same market.

There is clearly a gap between food production and the food demand of Nigerians, even though Nigeria is blessed with abundant arable agriculture land (50 per cent of which is yet untouched), suitable climate with temperatures generally above 18°C all year round, other environmental conditions suitable for raising a wide variety of agricultural products, natural and material resources, as well as a virile and forward-looking population to encourage the production of sufficient food for domestic use, surpluses for its agro-based industries, and for export to earn much-needed foreign exchange. Is it not therefore embarrassing that Nigeria is on the food deficit list and having to import many basic food items which the country can readily produce? Although Nigeria has a dry period varying in duration and intensity from the southern part of the country to

the north where it is longest (4 to 5 months), Nigeria is blessed with abundant water resources to cultivate its over 71 million hectares of cultivable land all year round with supplemental irrigation water from reservoirs of dams, large rivers, as well as high yielding boreholes.

It is instructive to note that Nigeria has an adequate land bank for agricultural development and that we have become proud producers of highly qualified manpower in all aspects of agricultural research, production, planning, development and marketing. With these abundant resources, what then is responsible for the food crisis in Nigeria? Or, as clearly put by the current Minister of Agriculture, Chief Audu Ogbeh, *"We cannot afford $5 million a day for rice shipments in the country which has gone on for 40 years."* It is even more embarrassing that the rice imported is of doubtful nutritional value as some of the grains have been stored for upward of 10 years as part of the strategic reserve of the exporting countries, Chief Ogbeh lamented. Why should we continue to put pressure on our foreign exchange by expending $2 billion yearly on rice importation? At independence in 1960, Nigeria was the world leading producer of palm oil. It now imports about 450,000 tonne of palm oil worth N116.3 billion in 2017. This embarrassing situation jolted the Senate which at its sitting in February 2018 urged the Federal Government to out rightly ban palm oil importation and reverse the ugly trend through investments in the local palm industry and protect local production from unnecessary imports.

Some factors contributing to the present food crisis are:

(i) Changing pattern of our consumption: This has resulted in excessive demand for such food items as rice, wheat, sugar, milk, eggs and fish products like caviar (for the elite). We have therefore moved from our traditional starchy foods to prestige grains like rice and wheat and animal proteins. This is partly responsible for our high import bills.

(ii) Poor storage/preservation systems: Poor storage systems continue to ensure the permanence of the 'season of plenty' (just after harvest) and the 'season of scarcity' (long after harvest). A sizeable proportion of harvested, perishable food items never reach our dining tables or consumers due to poor handling when they are fresh and due to poor or no preservation at all. They are lost to insects, rodents, mites, fungi and bacteria. We should accord adequate and appropriate storage top priority for our tubers, grains, legumes, fruits and vegetables, as well as animal and fish products. This strategy will immediately increase food availability by drastically reducing food losses.

(iii) Lack of sufficient infrastructure like all season feeder roads and safe potable water: Good roads provide access to agricultural lands, assist to get inputs to farms as well as encourage smooth evacuation of farm produce in good time to markets and consumers. Poor roads in rural areas render the lifespan of vehicles and agricultural equipment shorter, increase the idle time of the equipment, and consequently make the cost of production higher; and hence the selling price of harvested produce is also high. Safe potable water wipes out the incidence of guinea worm and other water-borne diseases such as diarrhoea and typhoid fever, reduces absenteeism from farm operations and increases the productive lives of farmers.

(iv) Devastation of our traditional food supply system through the following:
(a) The oil boom era of the 1970s encouraged rural-urban migration to industries and commercial outfit.

(b) The free-primary education schemes of the former Western (from 1956) and Eastern Regions of Nigeria and later of the Federal Government from 1976 reduced available farm labour.

(c) The Nigerian civil war of 1967-1970 sent over 1 million youths to enlist in the army in the former Biafra (Eastern Nigeria) and the Federal Army was also enlarged from a mere 8,000 men to over 500,000.

The above (a to c) depleted farming families of able-bodied young men, thus leaving mainly the old and aged people in the rural areas to carry out farm operations and so there is declining productivity on the farms. This is probably the most important singular factor with the greatest negative effect on food production.

(v) Non-use of appropriate technology: This led to the consequent loss of the advantages inherent in the use of fertilizers and pesticides for growing crops, as well as for stored produce.

(vi) **The use of poor-yielding crop and animal varieties by our farmers:** This keeps yields low; hence crop farming, in particular, is not necessarily a profitable economic venture. Unfortunately, farmers, by and large, plant seeds saved from a previous harvest; therefore, their yields are worse than they would have got had they used improved seeds. The use of good, improved seeds alone by farmers could double maize production in just one cropping season and thus assist to arrest both the skyrocketing prices and maize scarcity.

(vii) **We have not taken sufficient advantage of irrigation:** Irrigation reduces losses occasioned by unexpected dry spells, and also elonates the growing season.

(viii) **Lack of continuity in government agricultural policies and plans:** It is on record that since the early 1970s, government after government has tried to raise the level of our national food production by embarking on one programme or the other. Cases of the National Accelerated Food Production Programme (NAFPP), Agricultural Development Programme (ADP), Operation Feed the Nation (OFN), River Basin Development Authority (RBDA), Green Revolution, Go Back to

the Land Programme and the Directorate of Food, Roads and Rural Infrastructure (DFFRI) come readily to mind. The disturbing fact is that each programme is wound up as soon as a new regime takes over the government. In essence, changes to government at the Federal and State levels invariably swept away previous agricultural policies and programmes, as well as the policy initiators and most of the chief implementors. Also, they sometimes result in the direct or indirect incapacitation of existing organizations and their statutory functions in favour of new parallel organizations with exactly the same functions; e.g. the case of River Basin Development Authorities (RBDAs) virtually incapacitated by the setting up of the Directorate of Food, Roads and Rural Infrastructure (DFFRI) comes readily to mind. There has therefore never been continuity in the implementation of our agricultural policies and plans. For instance, between 1960 and 1989, Nigeria had 8 regimes under Tafawa Balewa, Aguiyi Ironsi, Yakubu Gowon, Murtala Muhammed, Olusegun Obasanjo, Shehu Shagari, Muhammadu Buhari and Ibrahim Babangida at the Federal level. It is even worse at the Region/State level where there had been 12 to 14 different administrations within the same period.

ix) Competitive demands for certain food items: These include maize, sorghum and cassava by humans, animals and industries, as earlier spelt out.

In an attempt to meet the food needs of our ever-increasing population, Nigeria and Nigerians since independence seem to have developed a high propensity for embarking on crash programmes, most of which never solved our problems due to poor implementation, but which, not surprisingly, crashed badly. Please remember the Farm Settlement Scheme of the former Western Region of Nigeria. This was followed in the latter part of the 1970s by the much publicized Operation Feed the Nation (OFN) and later from 1980 to 1983 by the Green Revolution programme of the civilian administration of President Shehu Shagari.

We need to realize that modern agriculture is big business, hence agricultural development needs careful planning and thorough implementation to achieve the desired set goals/targets. Our strategies should therefore provide for: **A.** immediate, and **B.** long-term solutions.

Production

A. Immediate Solutions

These should be aimed primarily at not only quickly increasing food supply and agricultural productivity but also more importantly at minimizing food losses as a means of increasing food availability. This strategy should, within a period of three to five years after the commencement of the implementation of the programme, make Nigeria self-sufficient in its basic starchy food items such as yam, maize, cassava, guinea corn, etc.

(i) Horizontal development approach

This will immediately help to bring more land into cultivation in order to quickly increase food production. This can be achieved by assisting existing farmers in land clearing to at least double their holdings. The Federal Ministry of Agriculture accepted this approach when it intended to add 250,000 ha to cultivated land between 1981 and 1985 but, unfortunately, only cleared 12,449.94 ha in 19 states of the federation between 1979 and 1983. This effort should be renewed at both the Federal and State levels for meaningful impact.

We must emphasize that only lands with good soils to support high crop yields need to be cleared and that only tried hands who would not cart away valuable topsoil needed for plant growth should be contracted for land clearing.

(ii) Access to cheap land

To increase hectarage cultivated through accessibility to cheap land for agricultural development, I suggest compulsory acquisition of all unused land suitable for agriculture by State Governments at not more than N500/ha from the owners. Would-be farmers could then lease land for agriculture at a maximum of N100/ha per year. For new farmers wishing to take advantage of this scheme, 50 per cent of land clearing charges should also be written off by State Governments. This could prove a big incentive to attract large investments to agriculture, as well as lure youths into farming.

(iii) **Intensive development approach/provision of certified seeds.**

This should increase yield/output per unit area cultivated with the use of improved plant/livestock materials and the adoption of cultural practices for the maintenance of high yields and improving soil structure and fertility.

Up to now, the National Seed Service (NSS) and other certified seed companies and producing agencies produce only about 40 per cent of the certified seeds needed by Nigerian crop farmers. Consequently, most crop farmers still save seeds for future planting from previous harvests. It is therefore not surprising that the average yield of most crops planted in Nigeria is low. The NSS needs to be better funded and provided with adequate facilities to cope with this problem in order to be in a position to discharge its mandate admirably. If adequately supported by the Federal Government, it should be the major source of foundation seeds for private seed companies as well as the State Ministries of Agriculture in the production of certified seeds.

The International Institute for Tropical Agriculture (IITA), Ibadan is known to have developed hybrid maize varieties whose yields average about 5 tonne per ha. If, therefore, sufficient quantities of certified seeds of these hybrid maize varieties were to be quickly produced, IITA should make available breeder seeds to NSS and the National Cereals Research Institute (NCRI), Badeggi, to multiply and distribute into foundation seeds and thereafter distribute these to Ministry of Agriculture and Natural Resources (MANR), other institutes and private seed companies for the production of certified seeds which will be made available to maize farmers.

Nigeria's maize production can be tripled within the next 2 years. This will put a stop to the present massive maize importation which constitutes a big drain on our limited foreign exchange reserve.

IITA has developed improved seeds and planting materials for other crops such as yam and cassava that could more than double farmers' productivity, as well as other technologies such as inoculum production which raises the production of legumes such as soya bean by about 20 per cent.

Are (1983) had calculated, Nigeria's expected total production of sorghum, beans, yam, maize, cassava and rice in 1983 and showed that when plant protection measures such as technologies that control weeds are applied, Nigeria could quickly become self-sufficient in these major food items.

(iv) Need to vote more money for agriculture in the annual budgets

The various tiers of government vote little money for agriculture in their yearly budgets even though some of them claim that agriculture is one of their top priorities. This has been the case for a long time. For instance, the money budgeted for agriculture in our first three National Development Plans confirm this (see Table 1).

Table 1: Plan Allocations to Agriculture In Nigeria: 1962-1980

Plan Period	**Total Plan Size (Naira)**	**Allocation to** Agriculture **(Naira)**	**Percentage to Agricul-ture**	**Allocation to Other Sectors**
1st Plan • 1962-1968	2.2 billion	183.8 million	13.8	85.2
2nd Plan 1970-1974	3.2 billion	215.33 million	10.5	89.5
3rd Plan 1975-1980	30.0 billion	3.0 billion	10.0	90.0

Source: Olusi (2018).

While 13.8 per cent was budgeted for agriculture in the 1962-1968 plan, the percentage declined to 10.5 per cent and 10.0 per cent in the 1970-1974 and 1975-1980 plans respectively. Most state governments pay lip service to agricultural development as very little money is voted for agriculture in their yearly budgets. For instance, the Kwara State 2018 budget had an allocation of only 2.92 per cent for agriculture. This low allocation prompted women farmers in Kwara State, on June 25, 2018, under the aegis of Small Scale Women Farmers Organisation of Nigeria, and a consortium of civil society organizations, to condemn the continued decline in funding for agriculture by their state government. They reminded the Kwara State Government that their allocation fell far short of the 10 per cent recommended by the Maputo Declaration assented to by African leaders.

It is an even more unpardonable neglect to see the Senate and House of Representatives only submitting their harmonized budget, whose draft they got on November 17, 2017, on Wednesday May 23, 2018 to the President; i.e. the draft budget spent more than 6 months in the legislature.

The 2018 budget was signed into law only on June 20, 2018. The fallout of this is that since much of our agriculture is still rainfed, the Southern States where the rains start as early as March and most crop plantings are done in the field as from April are deprived of financial input at the appropriate time to support high agricultural production in those States. Please note that this does not adversely affect the Northern States as planting is normally done in June when the rains become steady. In fact, the 2018 planting season was flagged off on Wednesday June 27, 2018.

(v) **Youths in agriculture**

Realizing that the active farming population has aged, now is the time to attract the youths, including university graduates, to agriculture as a vocation and business. The new farms will have to be mechanized to avoid the drudgery associated with the use of primitive farm tools such as hoes, cutlasses, axes, etc. and the farms must be large enough to guarantee high returns for a good way of life. The youths should therefore be encouraged to go into sustainable agriculture using modern management approaches, technology and innovation as well as training in entrepreneurship to ensure profitability in their agricultural business. The rural setting must be provided with social amenities to make them stay on the land.

In previous studies at Ogun Oshun River Basin Development Authority (OORBDA), 1980-1984, a holding of 4 hectares (10 acres was found to be the minimum economic unit needed to assure

profitability and comfort. With the depreciation of the naira, however a holding of 8 hectares (20 acres) is recommended for each would be farmer practising rainfed agriculture and 4 hectares (10 acres) on irrigated farmlands.

To get started, State Governments should appeal to Local Government to persuade their people to give land in sufficient quantities to settle the new farmers. Realizing that a tractor with its implements can successfully operate 40 hectares (100 acres), five farmers will have to be settled on each 40-hectare-farm and the tractor with its implements will be given to them as a loan in kind and the cost should be repayable over a minimum of five years. On May 11, 2018, the Minister of Agriculture and Rural Development at the SMART Model farm site by John Deere Tractors Manufacturing Company at Gwagwalada Local Government Area 1, Abuja launched the introduction of a new programme called 'Agriculture Implement and Mechanization Scheme (AIMS)" which will focus attention on agricultural mechanization and the provision of farm implements based on Public-Private Partnership (PPP) that will assist big and small farmers to have access to hire and own tractors. He stated further that the tractors, which are capable of working for 15 hours in farms, will be acquired from John Deere International. Definitely, the acquisition of the tractors would go a long way in increasing agricultural productivites as well as reducing the risk of manual farming, thereby making farming attractive to Nigerian youths. The youths going into agriculture must therefore be supported to tap heavily into this programme.

In addition, mechanical support in terms of land clearing should be done by the State Government free of charge. Also, financial support by way of easy access to loans should be facilitated by the government through the Bank of Agriculture, Bank of Industry (Bol) and the Central Bank of Nigeria (CBN) through its successful Anchor Borrowers Scheme.

Youth engagement in agriculture as a business will help to improve family nutrition, reduce prices of food items, promote raw materials for agro-based industries, reduce crime rate, enhance food security and self-reliance and help reduce unemployment.

(vi) Boosting cocoa production through the rehabilitation of Ainelonado cacao farms with **chupons from coppiced trees**

Up to the early 1970s, the three leading cocoa producing countries were:
No. 1 Ghana

No. 2 Nigeria

No. 3 Brazil

Together, the 3 countries produced close to 80 per cent of the world cocoa beans. The production picture has however changed dramatically and Table 2 shows the present leading cocoa-producing countries.

Table 2: World Cocoa Production in 2012/2013

	Metric Tonne (MT)	**Percentage of World Production**
World	3.900,000	
Ivory Coast	1.443,000	37
Ghana	819,000	21
Indonesia	429,000	11
Nigeria	234,000	6
Cameroon	234,000	6

Nigeria's production has declined terribly partly because it relies mainly on the old West Africa Amelonado T38 (N38) which in fact produces about 85 per cent of Africa cacao beans (Akande, 2014).

The Amelonado, the first introduced cacao variety with popular appeal, is the cocoa of commerce in Nigeria. It is slow-growing and takes 5 years to come into commercial production with low yields, although under good management it could be high yielding. Its peak of production (the main crop) is in November, with the minor production in May-June. It is however extremely susceptible to the West Africa strains of cacao viruses. The improved cacao varieties such as F3 Amazon, etc, which were a result of the West African Cocoa Research Institute (WACRI) and Cocoa Research Institute of Nigeria (CRIN) breeding programmes, have been planted but on lesser hectarage in Nigeria than the Amelonado.

These improved varieties are faster- growing and quicker maturing and reach commercial production in 3 years with very much higher yields and are also highly tolerant to the prevailing diseases.

Rather than invest solely in new cocoa plantations growing the seedlings of F3 Amazon and the CRIN newly produced genotypes with good establishment ability high level of disease tolerance/resistance/escape, high yield and other desirable commercial qualities, it is suggested that the old Amelonado trees be coppiced in November and the regenerated chupons budded in March with improved cacao varieties such as F3 Amazon, etc, of the following year for good establishment.

To coppice, each tree has to be cut down at a point 12 inches above soil level and the cut surfaces are to be protected with red paint. Since the exposure of the coppiced area is likely to increase attacks by insect pests, it is further suggested that plantain shade trees should also be planted in March. It is to be noted that the condition or age of the coppiced Amelonado trees has no effect on the regeneration and growth of the chupons. This therefore suggests that trees of any age can be rehabilitated through a process of regeneration with good results (Are and Jacob, 1970). Since each coppiced Amelonado cacao tree can regenerate 10 to 31 chupons, within 30 days after coppicing, one should only select 3 to 4 virile chupons for budding with improved cacao varieties. Later, budded chupons should be reduced to a maximum of 2 per coppiced stump.

Research shows that budded plants were found to give 100 per cent success while lower percentage successes (26.7 to 80.0 per cent) were scored with grafted chupons from coppiced stumps. Moreover, budding is cheaper and easier than grafting to teach illiterate farmers who will have to carry out the operations on their farms. At the CRIN in 1968/69, the best budders were in fact illiterates with many years of experience. In addition, it must be borne in mind that more improved strands of cacao can be produced by adopting budding technique since a bud wood has many buds, each of which is capable of producing a plant.

The advantages of using chupons from coppiced Amelonado cacao trees are:

(a) Budded chupons begin to flower and produce cocoa pods in 18 months as against three years even when improved cacao seedlings are planted to establish a new cacao *farm.*

(b) If a cacao farm to be rehabilitated using this method is divided into three and only a third of the trees are coppiced and budded each year, it means that there will be no break in the revenue i accruing to the farmer each year.

(c) Since each coppiced tree carries 2 virile budded chupons of improved cacao varieties, the yield of cocoa per unit area rehabilitated will be over 2 times when compared with the yield obtainable from the old Amelonado trees, thus boosting the total revenue of the farmer.

(d) The wide-scale adoption of the system will increase the total cocoa production in Nigeria in the shortest possible time.

This approach has been successfully adopted by other cocoa growing countries with similar moribund cocoa farms It was successfully used at the Gambari Experimental Station (GES) of Cocoa Research Institute of Nigeria (CRIN) at Ibadan, on Sao Tome Island and for rehabilitating a 40 acre block of low yielding, mature cacao at Apoje, Ogun State, Nigeria by the then Western Nigeria Development Corporation (WNDC) in 1971.

(vii) **Rural roads and transportation**

All season good rural roads are essential for getting farm input to farmers as well as for evacuating farm produce after harvest to marketing centres which are usually in faraway bigger towns and çities. The present neglect of rural roads has made them so bad that the cost of transporting farm produce to marketing centres ha increased to unbearable levels. This, coupled with high fuel cost, has for instance increased the cost of moving 30 tonne of cassava from Iseyin, in Oyo State, from N10,000 to N15,000 in just 2 years.

Farm gate prices of agricultural produce are still within the reach of most Nigerians. However, after being transported from the remote farms to the marketing centres, which are usually in the bigger towns and cities, prices become unbearably high. The reasons for this situation are not far-fetched. Rural roads, wherever they exist, have uneven surfaces and are poorly maintained. Improper and careless handling of farm produce when they are being assembled for transportation leads to damage. For instance, the throwing of yam tubers when they are being packed leads to bruising. The situation is compounded by the fact that the vehicles (usually lorries) used for conveying the produce from the centres of production to marketing centres are not specially fitted for that purpose.

In the case of yam tubers, heating occurs during transportation, owing to poor ventilation, hence rotting eventually takes its toll. This alone could account for 5 to 1.0 per cent loss of tomatoes in transit to marketing centres. In short, the middleman who collects and transports agricultural produce to marketing centres reckons with these preventable hazards in fixing his selling price. To quickly remedy this situation, many more farm roads have to be built and will need to be properly maintained.

(viii) **Easy access to credit facilities**

Credit should be made available to farmers in order to stimulate increased agricultural productivity. Government should therefore continue to encourage specialized financial institutions such as Bank of Agriculture, Bank of Industry (BoI), as well as commercial banks to grant loans to farmers directly or through their cooperative societies and/or farmers' organizations for agricultural projects and agro-allied industries at lower attractive interest rates. There should also be longer periods of moratorium before repayment would start. Loans, however, should no longer be granted to urban absentee farmers, most of who utilize such loans for purposes other than agricultural production. It is reassuring that the Governor of the Central Bank of Nigeria (CBN), Mr Godwin Emefiele noted at the inauguration of the Sunti Golden Sugar Estates owned by Flower Mills of Nigeria in Niger State in March 2018 that any individual or company that wanted to go into agricultural and agro-allied production should count on the support of CBN. For instance, CBN invested over N25 billion into the Sunti Golden Sugar Estates through a consortium of banks at a single digit interest rate repayable over a period of 10 years. On completion, the factory will save Nigeria about $100 million in foreign exchange annually and is also aimed at achieving self-sufficiency in the production of sugar.

(ix) **Self-sufficiency in rice**

A source put the paddy rice produced in 2017 at 15.9 million tonne. If the outturn of our rice meals were to be the ideal 72 per cent, the total milled rice produced would have been 11.448 million tonne. But since only the modern giant rice mills can achieve the 72 per cent outturn, and most of the rice is produced invariably by the smallholder rice farmers with inefficient milling machines, it is felt that an average outturn of 45 per cent is probably realistic. Consequently, the milled rice produced in 2017 is estimated to be 7.155 million tonne.

However, according to the Rice Farmers Association of Nigeria, the annual consumption demand for rice is about 7.9 million tonne anc that was at the middle of 2017, local rice production increased to about 6 million tonne (Trenchard Ibia, 2018). By the time the rice harvest of July to December 2017 is added to the total rice production in 2017 we certainly must have exceeded the 7.9 million tonne rice demand.

Clearly the impediment to achieving rice self-sufficiency lies in the utilization of appropriate rice milling machines in sufficient quantities. The Federal Government aligns with this approach, hence the announcement of the Minster of State for Agriculture and Rural Development, Mr Heineken Lokpobiri, on Wednesday April 25, 2018 that the Federal Executive Council had approved the establishment of 10 very large rice mills to enhance the milling capacity of the rice value chain in Nigeria in Bayelsa, Kebbi, Zamfara, Ogun, Anambra Kogi, Benue, Bauchi, Kaduna and Niger States at a total cost of N10.7 billion. These milling machines will be handed over to the private sector to manage with a pay-back plan within a given time frame as will be agreed between the Bank of Agriculture and the operators of the rice mills.

Even though Nigeria needs 100 very large mills to cope with the paddy rice now produced, there are only 21 functional large mills. In addition to the 10 newly approved large mills by the Federal Executive Council (FEC) for 10 out of the over 30 states currently producing rice in Nigeria, Lagos State is installing probably the largest rice mill in Africa at Imota in Ikorodu with a production capacity of 32,000 tonne per hour. This should come on stream by February 2019. Although our local rice is fresh with a good aroma, 'Brand Nigeria' generally does not sell as well as 'Brand Imported' in Nigeria and to Nigerians. The word imported has become a symbol of higher quality to Nigerians. Sadly, this is why Lake Rice, a product of collaboration between the Lagos State government and Kebbi State, was being repackaged and sold as 'Foreign Brand' at higher prices. This is also the case with Abakaliki rice, known for its rich nutritive value, which experiences scarcity of the product in Ebonyi and neighbouring states like Rivers State. According to feelers, the belief that the rice is not produced in commercial quantities and not sufficient enough to serve local consumers has been underplayed as it dawned on farmers and Ebonyi government officials that the rice is actually mopped up, repackaged and disguised as foreign rice. For Kano State, the State Chairman of All Farmers Association of Nigeria (AFAN), Farouk Rabi'u Mudi, confirmed to *The Guardian* (February 11, 2018) that a larger percentage of rice branded as foreign after repackaging are rice produced locally.

Nigeria can achieve self-sufficiency in rice production, if the locally produced rice is adequately defended, the tariff regime effectively enforced and its price falls below that of imported rice, as locally produced, well-packaged rice is offered for sale in our markets at higher prices than imported rice.

(x) Cassava

Nigeria already produces enough cassava for the needs of its human population. In fact, it was reported in the *Nigerian Tribune* of January 9, 2018 that for many years, cassava farmers have been in a glut situation and in 2017, many people did not plant cassava because of the glut since the excess raw cassava would rot very quickly Realizing that there are other competing needs for cassava, the Nigeria Cassava Growers Association (NCGA) have concluded plans to produce an additional 2 million tonne of cassava to meet industrial demands through the cultivation of additional 100,000 hectares. This proposal has been sent by NCGA to the Nigerian Incentive-Based Risk Sharing System for Agricultural Lending (NIRSAL) for approval.

This will guarantee the local production of some industrial cassava derivatives in sufficient amounts to meet our needs.

(xi) **Yam production**

There is no doubt in my mind that Nigeria is self-sufficient in yam production. We, however, need to focus on processing to considerable reduce high losses due to spoilage after harvest. I was amazed when I saw a documentary on *Channels* Television detailing the yarn producing area of Benue State shipping out 130 trailer loads of fresh yam tubers to other parts of Nigeria daily from November to March of the following year. I read later that the Commissioner for Agriculture rightly decided that their attention should be focused henceforth on the processing of the tubers as this would add value by creating thousands of jobs, reducing losses due to spoilage, as well as earning more income for farmers.

Recently, a Technical Committee on Yam Exportation headed by Prof. Simon Irtwang was set up to finalize the export of fresh yam tubers to the United States of America (USA) and the United Kingdom (UK). The first attempt to effect yam export to the 2 countries suffered some setback as the quality of the exports was called to question and the consignments were rejected by both countries.

Prof. li-twang was quoted by *The Nation* of February 16, 2018 as saying that having learnt from the challenges of the first consignment, his Committee was hopeful that the second consignment would achieve 100 per cent success. He also advised that yam farmers and traders needed to know which yam species were good for export as not all species were acceptable to buyers. In addition, he counselled that farmers and traders needed to know how to select, store and preserve yam tubers to increase their freshness and ability to stay long without decaying.

(xii) Institutionalize use of composite flour for bakery products

As there is still a big gap between the amount of wheat produced in Nigeria and the high imports of wheat needed to meet our needs, the huge expenditure of scarce foreign exchange on wheat importation can be immediately considerably reduced if we promote the use of composite flours for making bread and bakery products. The composite flours could be a mixture of wheat and non-wheat flours which include sorghum, millet, maize or cassava flour and they can be added up to 25 per cent of the wheat flour without affecting the quality and acceptability of the finished bread and bakery products. The first cassava-wheat composite flour bread was first successfully produced by the Federal Institute of Industrial Research (FIIRO) in 1982.

On my first visit to Addis Ababa, Ethiopia in 1976, I observed that the bread that was served was a bit heavy but very tasty. On enquiry, I was informed that all bread in Ethiopia was made from composite flours of maize and wheat in order to cut down on money spent on wheat importation. I therefore suggest that the use of composite flours for bread and bakery products must be enforced by the Federal Government as a policy and must be seen against the broader background of self-sufficiency in food supply, reduction of foreign exchange to be spent on wheat imports, the stimulation of local and national agriculture and subsequent benefits for the farmers and the creation of skills and employment at the small-scale industry level for the production and utilization of composite flours for bread and bakery products.

(xiii) Storage

Storage is a strategy for reducing food losses as a means of increasing food availability. Since agricultural production is still mainly rainfed, Nigeria's food production pattern has a recognizable 'season of plenty' immediately after harvest, followed by a 'season of scarcity' long after harvest, referred to as 'hungry season' in Sierra Leone (Are, 1971). This alternation is also one of 'Good Quality Produce' at cheaper prices with 'Poorer Quality Produce' at higher prices.

The process of keeping agricultural produce/products for future use as food, fuel, fibre, or for sale, is known as storage. However, the keeping of agricultural produce in good condition for future use is called preservation. Storage and preservation therefore help to keep farm produce from getting spoilt. Durable crops such as maize, sorghum, millet, paddy rice, cowpea, beans, palm kernel and groundnut are stored with low moisture content to keep well, as well as to discourage the growth of mycotoxins which constitute human health hazard, while perishable crops such as yam, cassava, fruits and vegetables, as well as animal products such as milk, egg, meat and fish are to be stored in as near a state as their fresh form. For instance, if not well kept, wilted vegetables, although safe for human consumption, may have reduced levels of vitamins in them.

A good storage procedure starts at the time of harvest. Careful harvesting methods ensure less bruising and so help to keep the materials intact as most fungi and insects do not find it easy to attack undamaged agricultural produce. However, damage to grains during shelling or threshing using local methods could be very high. Agboola (1983) reported that 30 to 50 per cent of the 15 million tonne of yams produced annually in Nigeria at that time, valued then at N3.375 billion, were lost to poor post-harvest storage. Inadequate or lack of storage facilities for most food crops has led to large losses which create apparent scarcity at certain times of the year. Provision of adequate and good storage facilities for our agricultural produce immediately after harvest should promote (Are, 1983):

(a) Increase in food availability;

(b) A steady supply of wholesome food for human consumption all year round and especially during the long dry season;

(c) Adequate planting materials at a later date during the following planting season;

(d) Surpluses for meeting emergency situations such as local crop failure due to severe drought as was experienced in 1987/1988, and destruction caused by floods, fires, etc

(e) The maintenance of a fair price structure, thus preventing sharp fluctuations in food prices;

(f) A steady and adequate release of agricultural produce for exports as well as agro-based processing factories; and

(g) Employment opportunities for many Nigerians.

Storage losses are high for the more perishable agricultural produce like plantains, banana, fruits, tomatoes, leafy vegetables, cassava, yams and fish. To arrest the high food storage losses, bulk storage and appropriate drying devices will have to be installed. Provision of storage facilities should not be the sole responsibility of the Nigerian Grains Board whose facilities are grossly inadequate to cope with the storage of available grains. Food storage should be the business of Nigerian individuals, cooperative societies, farmers associations and private companies. They should be encouraged to invest in the provision of drying and storage facilities. The Bank of Agriculture and the Bank of Industry should, therefore, as a matter of priority, extend their soft loans for agriculture to this specialized area. Investors can benefit from the accumulated storage knowledge available at the Nigerian Stored Products Research Institute (NSPRI) to devise and erect appropriate storage facilities. For instance, NSPRI's technology of crop storage under inert atmosphere could be widely adopted as maize, beans, rice and sorghum have been successfully stored for between 6 months and over 2 years using this method (Agboola, 1983). More money should be invested in research into storage problems to bring about improvement. I also wish to suggest that generous financial allocations be made annually to NSPRI and other interested university departments and research institutes involved in storage problems.

(xiv) Processing of agricultural produce

Immediately after harvest, excess food items above the needs of the population abound. Visits to our markets in the evenings reveal drooping leafy vegetables, fresh fish and meat with foul odour and fruits which have already started to show signs of spoilage. Since facilities to hold the excess food items in storage at any point in time are inadequate, the establishment of many more processing factories to turn raw perishable agricultural produce into ready-to-serve products must be given priority attention. It will increase total available food, provide employment opportunities for more people, assist in stabilizing the prices of essential food items, as well as keep food quality (nutrition wise) high. Some products undergo changes to adapt them to the householders' or users' needs and tastes. Some commodities such as grains, livestock and sugar cane cannot be used at all without processing. Processing may include canning and drying and the extraction and bottling of juices. Processing may therefore help to increase shelf-life value and reduce bulk.

To properly appreciate the challenge of our engineers and food technologists in trying to find solutions to food processing problems, it is appropriate at this point to cast our minds back to the

achievements of our forefathers/mothers in this area of specialty. Although our forefathers/mothers did not have the benefit of formal Western-type education, they acquired much knowledge from experience, probably mainly by trial and error. Many of them with native intelligence made marvelous contributions in the special area of food technology. Our forefathers/mothers may not have been engineers in the strict sense, but they were inventors of repute. For instance, they realized that heavy losses would be incurred in their effort to store yam, maize, cassava, etc. under ambient temperatures. They therefore processed these food items and developed, for instance, *elubo* (yam flour) from yam tubers, gari, fufu and *lafun* (cassava flour) from cassava tubers, while *ogi, elekute* and *adun* were made from maize. All the newly produced food items had added value, proved more easily storable and had reasonably long shelf lives. Most of these food items are still being processed today the same way our forefathers/mothers did. Please note that all the newly processed food items had neither additives nor preservatives. They were therefore wholesome and healthy products.

Innovations are known to have been made only in very few cases. In this wise, the pioneering efforts of Professor M.O. Adeniji, former Dean, Faculty of Agriculture and Forestry University of Ibadan, in the area of post-harvest pathology and food preservation by the establishment of Agricola Food Processing Industry in Ibadan between 1970 and 1980, which gave birth to the storage, processing and packaging of beans, *elubo* and gari in polythene bags of various sizes — 1 kg, 2 kg, 5 kg, 10 kg and 25 kg — must be acknowledged.

The contribution of the Federal Institute for Industrial Research, Oshodi (FIIRO) in the field of processing agricultural produce also deserves commendation. Weaning food and breakfast cereals such as soy-ogi, gari, cassava flour, odourless fufu, glucose syrup, bottling and preservation of palm wine, confectionery and ethanol, adhesives, cassava starch, instant pounded yam flour, fruit juices, edible mushroom and high nutrient density biscuits are now produced by FIIRO using modern processing methods (Prof. Gloria Elemo, 2018). FIIRO's *ogi*, first produced by Dr Akinrele of FIIRO, is blended with soya beans to increase the protein value of this basic food. It is also noteworthy that FIIRO's *soy-ogi* is available in three forms: for adults, pregnant women and children. The proportion of soya bean in each type of soy-ogi varies with the daily protein requirement of the three categories of people catered for (Are, 1983).

Recent studies have shown that FIIRO is a technology provider to over 65 per cent of Micro, Small and Medium Enterprises (MSMEs) operating in the south-west geo-political zone and about 70 per cent of all the technology incubatees in the Technology Incubation Centres in 27 states of the federation are using FIIRO technologies.

FIIRO has made significant contributions to job creation in Nigeria, especially through the MSMEs that are operating by using FIIRO technologies. Recently, as reported by Prof. Elemo, FIIRO, in cooperation with CBN, developed a proposal for the training and empowerment of 100 unemployed youths in each of the 774 Local Government Areas (LGAs) in Nigeria and matched with technologies developed by FIIRO.

It is envisaged that these 77,400 national technoentrepreneurs would get a grant of N1.5 million each to set up their production enterprises within their own LGA using local raw materials available within their LGA. It is also envisaged that each of these entrepreneurs would engage 15 workers — both direct and indirect workers. Consequently, about 1.2 million jobs would be created. If this exercise is repeated over a period of 4 years, about 5 million sustainable jobs would be created (Prof. Gloria Elemo, 2018).

The original gari manufacturing machine invented by FIIRO is sold all over the world. Happily, many local companies have joined in this effort of producing more machines tailored to the needs of gari processors. In order to arrest the fluctuating prices of both the raw cassava and the finished products, the Ogun-Oshun River Basin Development Authority (OORBDA) which has irrigation facilities, for instance, entered into cooperative agreements with FIIRO and the Nigerian Starch Mills (NSM) at Ihiala, Anambra State for a steady weekly supply of 10 and 40 tonne of cassava for processing into garri and starch respectively; This kind of arrangement needs to be entered into between RBDAS and processing companies in order to assure steady flow of raw materials, as well as a reasonable selling price of the processed items to consumers.

Nigeria needs many more agro-based industries to profitably utilize the research findings of commercial interest by FIIRO and similar organizations. Processing opportunities are wide open. Juice can be made from our oranges, grapefruits, tomatoes, guava, mange pawpaw and pineapples. Pawpaw, mango and pineapple slices can be preserved too. A good example was the Lafia Canning Factory at Ibadan which processed fruits, particularly pineapples into juice and slices. It is again noted that many of these fruits go to waste just after harvest.

At this juncture, I wish to commend the contribution of Ola Ola who produced the first acceptable authentic pounded yam flour in commercial quantities, which is now available for sale in many parts of the world, notably, in Nigeria, United Kingdom, Canada and United States of America. Investors must also tap into simple processing machines developed by IITA that add value to crops like yam, cowpea and cassava.

From good health point of view, high standards in processing, through an efficient and strict quality control device aimed at preventing nutritionally and bacteriologically damaged final products from flooding the market must be maintained. *The Punch* Editorial: of January 21, 2018: "Nigeria's Plethora of Food-Borne Hazards quoting Prof. Hussaini Makun, a Professor of Biochemistry at the Federal University of Technology Minna, called attention to the fact that 80.7 per cent of the food items — maize, groundnuts, millets, sorghum, melon spices, beans and cocoa seeds — consumed by Nigerians have heavy presence of mycotoxins and wondered what efforts the National Agency for Food and Drug Administration and Control (NAFDAC) are making to ensure that agricultural products are safe for consumption. The Editorial asked whether NAFDAC officials visit markets to check the safety of food items on display. It is necessary for NAFDAC to spell out what actions it will take to arrest this menace as quality control measures must be put in place to guarantee the production and utilization of food safe for human consumption. Efficient storage facilities must back up processing plants to ensure their operation almost all year round and therefore make them profitable ventures, as well as guarantee steady employment to processing factory workers.

B. **Long-Term Solutions**

This section focuses attention on what can be continuously done, but for a long time, with a view to finding lasting solutions to the food supply situation in Nigeria. The long-term policies to be put in place will have to be implemented from now for the next 10 to 15 years, irrespective of who or which party rules Nigeria, if our desired goal of food self-sufficiency should become a permanent feature of our heritage.

Permanent solutions eluded us in the past firstly because we fail to think BIG, and secondly because when we make plans for today, we only provide answers for yesterday when they are implemented. We therefore never really plan for the future. Moreover, there must no longer be 'policy somersaults'.

I believe that at least 10 per cent of the Federal Government's annual budget should be committed to agriculture, water resources and rural development for the next ten years, and released fully and on time. This will ensure the installation of basic infrastructure and modern amenities in the rural areas and thus generate self-sufficiency in food, as well as excess agricultural raw materials for our agro-based industries. Nigerians need reorientation to the competing demands for our limited financial resources.

The following long-term policies are therefore proposed for serious consideration and immediate adoption.

(i) Provision of infrastructure and social amenities in the rural areas

The clarion call, "Go back to the land" has again been given by the present administration. The same call was made by previous civilian and military administrations. We need to ask ourselves why these calls have never really been heeded, and yet many of us need to return to the rural areas if enough food must be produced to feed our ever increasing population.

We must admit that the rural setting is not inviting. It is also a socially sterile setting. Most rural areas lack basic infrastructure and social amenities. For instance, most of the feeder roads, if and where they exist, are impassable during the rainy season. Reasonably good all-season feeder roads are essential for carting inputs to farms and for evacuating harvested produce.

We need to realize that rural water supply is probably the most important aspect of rural development. Efforts should therefore be directed at the provision of safe and easy-to-get potable water for rural dwellers with the sole aim of improving their health, productivity and general standard of living (Are and Fatokun, 1982). Martins (1983) reported that water supply in Nigeria's rural communities is from river beds, streams, wells, rainwater and pipe-borne water. In Oluyole Local Government in Ibadan area of Oyo State, only 2.26 per cent of the villages received pipe-borne water. However, very many local governments are now sinking boreholes for the production of safe potable water for their communities.

From available data, per capita supplies of pipe-borne water in Nigeria range from 0.01 litres in Anambra State to 39.10 litres in Oyo State (Martins, 1983). This range is a far cry from the 120 litres commonly accepted as per-capita supply. In the rural community where the situation is far worse than in urban centres, women and children walk long distances to and from the source of water, especially in the dry season.

In a case study of 14 villages served with potable water from a borehole located at the Eniosa Farmer-Based Project of Ogun-Oshun River Basin Development Authority near Ibadan, the incidence of guinea worm has been wiped out, while diarrhoea and water-borne diseases are a thing of the past. The attendance of the participating farmers is more regular and their productivity has been on the increase.

Other infrastructure and social amenities that rural communities should have include: schools, hospitals (or health centres), modern housing, banks, markets, shops, storage depots, processing factories, extension service units, machine shops, electricity and recreational facilities such as cinemas, playing fields, restaurants, etc. While every village cannot be provided with these amenities because of the constraints of money and manpower, it is suggested that a few centrally located rural centres should be fitted with these amenities with a view to providing the services needed to support agricultural production, storage and processing for a number of villages with a population of between 5,000 and 20,000 farmers. Such a centre would then be designated a "Rural Town" (Oluwasanmi, 1981). Thus, it would no longer be necessary for a farmer to travel more than a few kilometres to reach fertilizer, storage and seed depots, as well as recreational, educational, health and repair facilities. Oluwasanmi (1981) further suggested that "Rural Towns", as far as possible, should be based on existing fair-sized villages.

To get "Rural Towns" off the ground, there is the need to create Rural Development Action Programmes within the present Federal Ministry of Agriculture, Water Resources and Rural Development. The Rural Development Division of the Federal Ministry should be fused with the River Basin Development Authorities (RBDAs) which already have specialists in engineering (civil, mechanic, electrical, water), hydrology architecture, etc, to execute the programme. The set-up could be further strengthened with specialists in areas such as medicine and allied health fields, and town planning to achieve quick results.

For instance, this Division could design modern, simple and reasonably priced houses for rural dwellers. It could also plan well-laid out villages with residential, commercial, industrial and recreational areas clearly designated.

The Local Governments will also have to play more prominent roles as agents of change. Most Local Governments are starved of funds especially by their State Governments.

Their main objective should be the provision of necessary infrastructure and amenities to improve the state of rural infrastructure and utilities with a view to attracting agro-based industries and all round development to their areas. Consequently, the Local Governments will be in a position to collect more taxes directly from investors and indirectly from those gainfully employed in such ventures.

Since independence, we have witnessed continuing and intensified massive desertion of rural areas by young, able-bodied and educated members of our society. This is partly due to the attractive income of urban occupation, but mainly as a result of concentration of modem amenities in the cities and large towns. The introduction of free primary education, the civil war of 1967 to 1970, increase in the number of industries located in cities and the return of professional politicians since 1999 also account for the depletion of the farming population especially with regard to young able-bodied Nigerians. Unless we can attract young Nigerians back to the farms, we will not achieve food self- sufficiency since we cannot depend mainly on an ageing population of farmers to produce the food of a rapidly expanding Nigerian population. Thus, as Alhaji Adegoke Adelabu (1952) has reported in his book, *Africa in Ebullition,* our slogan should be "Stay on the Farm".

ShobaKonsult (1982), in its perception study of Ofiki (in the northern part of Oyo State) and Mokoloki (in Owode Local Government Area of Ogun State) Agricultural Projects of the Ogun-Oshun River Basin Development Authority (OORBDA), revealed that the OORBDP Projects have breathed new life into both settlements, and especially to Mokoloki which had been in a depressed state for long.

(a) The Projects have created job opportunities for the indigenes of both areas.

(b) Influx of people into both settlements now makes it possible for some of the local people to earn some income through house rents.

(c) The roads leading to Project sites are constantly maintained by OORBDA. The OORBDA has also constructed a completely new road to link Ogunbona and Orogbo-Lumodi in the Mokoloki area.

(d) Large quantities of cheap, good rice from the OORBDA Itoikin Project became available to Ofiki people, as well as fish from the Project Pond.

(e) The sale of farm produce and other goods has increased since the influx of people into both settlements.

(f) Farming has been made easier for the participating farmers by the use of modem implements and tractors.

(g) At Mokoloki, the Project farms yield some naturally-occurring vegetables whose growth was encouraged by the fertilizer applied to the soil. These vegetables were considered a bonus to the farmers.

The above clearly indicated that rural communities seem to value the broader socio-economic impact of the OORBDA Farm Projects much more than the direct benefits of agricultural enterprises.

***(ii)* Land use and land resources maps**

Essentially, the Land Use Decree of 1978 vests ownership of land in the State Governor, although the individual still clings to user rights of all lands. In practice though, especially in Southern Nigeria, ultimate ownership of land still appears to rest with the family or the village community. This makes the release of the vast unused land in Nigeria to agricultural development cumbersome. Even where the government would like to invest heavily on unused land for agricultural activities with a view to turning the same developed land to the original owners at no cost to that community, families and village communities of the affected areas still demand crop compensation as of right. Because of this, a bona fide farmer still finds it difficult and expensive to lay hands on suitable unused land for farming purposes.

Although it is reported that 34.0 million hectares are farmed in Nigeria (Aribisala, 1983), this can be considered an intelligent guess at best. It is necessary to determine precisely how much land is actually fanned and how much is unused. For a start, a perimeter survey of all farms and unused lands should be embarked upon. This should be followed by topographic maps at scales of 1:10,000 and detailed soil surveys of all lands. Consequently, land use maps can be prepared. Without the preparation of land use maps, an agricultural investor will continue to act in the dark as he will not know which crop is best suited for the land he wants to farm and, consequently, he cannot guarantee high yields and profitability for his investment. The preparation of a land use map is therefore a must in order to sustain high agricultural production.

Although a minimum of 20 years will be needed to achieve this objective, a start must be made right away. When the above mentioned goals are achieved, we shall then have a precise knowledge of our soils and thus be in the position to confidently recommend appropriate fertilizers at adequate levels to farmers throughout Nigeria. You can now know why the armada of fertilizers brought into Nigeria failed to result in bumper harvests. As reported by Oluwasanmi (1981), we were acting in the dark.

In order to have basic agricultural statistics for planners and policy makers, the Federal Division of Agricultural Statistics should collect and collate accurate information on land devoted to each crop, crop yields, hectarage farmed per farmer, number of farmers per local government, types of farmers, distribution of livestock, size of farming families, etc.

(iii) Investments In agriculture

Experience in Nigeria has shown that, invariably, government farms neither pay nor yield the expected returns in terms of abundant and cheap supply of food and raw materials for agro-based industries.

The reasons are not far-fetched. Government farms are regarded only partly as production units but mainly as avenues for discharging a social function to the benefiting community. So they indulge in o establishment, thereby raising production costs to unbearable levels. Invariably, the right calibre of persons are not appointed as chief executives since a 'Son of the Soil' or a 'Staunch Political Supporter' must be found for such posts. Where a capable chief executive is installed, undue and unabated interference from the Governing Board and the overseeing Ministry in the day-to-day operations has been found to kill initiative, does not allow plans to be followed, and eventually dampens the morale of the dedicated staff. For example, during the civilian regime of 1979 to 1983, the Boards of River Basin Development Authorities acted as if they were the management. They also prevented, in most cases, the use of in-house capability to design and construct small earth dams. Everything, including clearing of land for farms, even where some RBDAs owned heavy duty land clearing equipment, had to be awarded to contractors. In effect, costs skyrocketed and transfer of technology was prevented. It is gratifying to note that the current Federal Minister of Agriculture, Water Resources and Rural Development is an advocate of the development of in-house capability by the RBDAS.

In the light of the above, our governments should concentrate on the provision of infrastructure and basic amenities in rural areas and disengage themselves from direct farming operations. Rather, governments, as in the case of RBDAS, should act as catylysts for stimulating agricultural production and integrated rural development through a concept of "Farmer-based" projects and a motivation strategy. A "Farmer-based" Irrigated Mixed Farm Project is considered an agricultural production unit in which a group of farmers in a given community are settled as irrigated farmer plot owners who pay partly for the capital expenses, but fully for the recurrent inputs supplied to them and their plots. Each participating farmer is allocated 4 hectares of developed land. Such farmers own the net proceeds from the irrigated farm plots (Are, 1982). This approach which is being successfully implemented by OORBDA has:

(a) Assisted to bring more land under cultivation;

(b) Increased the farm size of participating farmers;

(c) Made the use of agricultural machinery e.g. tractors, ploughs, harrows, ridgers, combine-harvesters, planters, etc, possible at minimal cost to the small farmer.

(d) Increased the total output per farmer with increased net revenue returns. For instance at Oogi and Iwo in Oyo State and Lasilo in Ogun State, some farmers who harvested 6 tonne of white maize received over #2,400 each from a crop of maize in the 1983 planting season, when maize was sold at #400 per tonne. According to Novus Agro Nigeria Commodity Index of January 4, 2018, a tonne of white maize sold for #200,000 and N230,000 at Ogbete Market, Enugu State and Igbudu Market, Delta State respectively. At today's prices, the OORBDA farmers would have received at least #1,200,000 for their 6 tonne of white maize crop;

(e) Brought commercialization to the rural areas where the schemes are located; and

(f) Prevented OORBDA from incurring financial losses from farm operations due to the nonchalant attitude of some farmers.

Governments could invest directly or through their Parastatals, such as RBDAS, Agricultural Development Agencies, etc, in joint ventures with private companies and individuals in areas like storage and processing with a view to minimizing losses to foods already produced.

Governments should limit their share equity in such ventures to between 15 and 20 per cent so as to leave management control in the hands of private companies and individuals who are likely to give such commercial ventures the attention required for economic success.

The present federal administration must be commended for its good agricultural initiatives, one of which is the CBN Anchor Borrowers Scheme which has seen the emergence of thousands of smallholder farmers that have been empowered to boost agricultural production. The salutary effect is that very many more farmers are producing more efficiently under supervised good management.

(iv) Agricultural exports

Before oil was found in large quantities, agricultural exports sustained and grew the Nigerian economy and brought about tangible development all over Nigeria. This is no longer so as total non-oil exports constitute only about 10 per cent of all exports. In 2017, for instance, total non-oil exports fetched Nigeria a total of $2.34 billion (Table 3).

Table 3: Nigeria's Non-Oil Export Earnings in 2017

Sectors	**$**	**As Percentage of Total Earnings**
Agricultural	852.23 million	42.60
Manufacturing	553.70 million	27.68
Industrial Products	307.00 million	15.35
Food Products	146.16 million	7.31
Transport	0.41 million	0.02
Total	2.34 billion	

Source: Central Bank of Nigeria Economic Report, obtained from *The Punch* of March 25, 2018.

Taken together, the agricultural sector and the food products sector contributed about half of the total non-oil export earnings, 49.91 per cent, to be precise. We need to step up this through increased agricultural production and processing to add value.

Summary

Although Nigeria is endowed with abundant land, water and human resources, its agricultural production after independence did not provide sufficient quantity of food at reasonable prices for its population, neither was Nigeria able to supply adequate raw materials for its agro-based industries.

For a long time, the food production aspect of Nigeria's agricultural development was neglected. Attempts to correct this imbalance in the past led to the adoption of ad hoc measures which unfortunately failed to provide satisfying solutions. Rather, Nigeria food import bills rose astronomically. Ironically, most of the food items imported, namely maize, rice, palm oil, groundnut oil, tomatoes, etc, represent those that Nigeria used to be self- sufficient in, as well as those that the country is in a position to produce adequate quantities.

To achieve self-sufficiency in food, the immediate solutions seem to lie in quickly increasing food supply and minimizing food losses as a means of increasing food availability. This can be achieved through the provision of adequate and good storage facilities, the establishment of many more processing factories, the construction of all season farm roads to facilitate quick transportation, distribution of farm inputs and marketing of farm produce, the availability of adequate quantities of certified seeds and planting materials, utilization of appropriate farming technologies, as well as good management techniques, and the expansion of individual farm holding through assisted land clearing programmes.

The long-term solutions suggested include:

(i) The provision of basic infrastructure and social amenities, e.g. potable water, schools, health centres, banks, electricity, storage depots, processing factories and recreational facilities in the rural areas by the creation of "Rural Towns" fitted to serve between 5,000 and 20,000 farmers. This should stem the flow of uncontrolled rural-urban migration especially of able-bodied young educated people.

(ii) The preparation of land use and resource maps with a view to determining the sizes of farmed and unused lands.

This will reveal precise knowledge of our soils and thus permit the recommendation of appropriate fertilizers at adequate levels to farmers throughout Nigeria.

To achieve a successful agricultural revolution, there has to be a close collaboration among the Federal, State and Local Governments. The Federal Government will henceforth have to commit about 10 per cent of its annual budget to agriculture, water resources and rural development for the next 10-15 years. Above all, young Nigerians must be attracted back to the farms since we cannot continue to depend mainly on an ageing population of farmers to produce food for a rapidly expanding Nigerian population.

Conclusion

I am of the opinion that the Federal Government should be commended for the new agricultural initiatives which are impacting positively on agricultural production and have consequently helped substantially to reduce the food gap. Happily, most State Governments have keyed into the initiatives, and without doubt, with this synergy; Nigeria would soon solve its food crisis problem and become self-sufficient in our basic food grains (excluding wheat), root and tubers for which we have comparative advantage. We must therefore establish agriculture as the bedrock of our economic expansion and development.

References

Agboola, S.D. (1983). Effective Post-harvest loss prevention as a major contributory factor to Nigeria's self-reliance in food. Paper delivered at the 8th meeting of the "Technical Sub-Committee of the Green Revolution National Committee", Ibadan, February 16-18, 1983.

Akande, M.A. (2014). *History of Cocoa in Nigeria. CRIN at 50: Book in Commemoration of the 50th Anniversary Ceremony of the Cocoa Research Institute of Nigeria* (CRIN) (1964-2014).

Are, L.A. and Jacob. VJ. (1970). Rehabilitation of cocoa with chupons from coppiced tress. *COCOA,* Turrialba, Costa Rica, Vol. VX, No. 1, pp. 1- 4.

Are, L.A. (1971). Some aspects of food storage and transportation in Nigeria. *Bulletin of Rural Economics and Sociology,* University of Ibadan, Nigeria, Vol. 6, No. 1, pp. 95-113.

Are, Lekan (1984). Amazing Grace. Paper read at the 1984 Annual Congress of the Nigerian Society, Nigerian Institute of International Affairs, Lagos, May 10, 1984.

Are, Lekan, Adeniji, M.O. and Fatokun, Jide (1988) Food crisis — Whither Nigeria? *The Punch,* October 1, 1980.

Aribisala, T.S.B. (1979). National self-sufficiency in food production through integrated rural development. Keynote Address to the 15th Annual Conference of the Agricultural Society of Nigeria, Owerri, Nigeria, 1979.

Elemo, Gloria (2018). DG FIIRO in the interview: FIIRO has made significant contributions to Job Creation. *The Nation,* March 26, 2018.

Martins, Bankole (1983). The socio-economic implication of the International Drinking Water Supply and Sanitation Decade in Nigeria. Keynote address delivered at the 2nd National Workshop on the IDWSSD Owerri, February 20-25, 1983.

Oluwasanmi, H.A. (1981). Nigerian Agricultural Policy for the 1980s. Pa presented for World Food Day Celebrations, National Arts Theatre, October 1981.

Olusi, Janet Omolara (2018). *Development Pathways, Zombie Economic Policies and Possible Alternatives for Nigeria.* Inaugural Lecture Series 313, Obafemi Awolowo University Ile-Ife, Nigeria, February 13, 2018.

ShobaKonsult (1982). Perception Study of Ofiki and Mokoloki Agriculti Projects. Report submitted to OORBDA, Abeokuta.

Nigerian Tribune: Cassava production to hit 2m tonne this year — NC January 9, 2018.

Nigerian Tribune: Women farmers decry low agric. budget in Kwara, June 25, 2018.

Sunday Vanguard: The Ogun rice revolution. December 24, 2017.

The Guardian: Rice: How local re-packaging undermines self-sufficiency. February 11, 2018.

The Nation: Rising transportation costs hurt farmers, food processors. February 16, 2018.

The Nation: Yam exporters to ship another consignment to UK, US. February 16, 2018.

The Punch Opinion: Nigeria's plethora of food-borne hazards. January 2018.

The Punch: Non-oil exporters earned N2.34bn in 2017 — Report. March 2018.

Vanguard: Emefiele reiterates CBN's commitment to development of agriculture. March 19, 2018.