



The Nexus of Agriculture and Technology as a Panacea for Food Insecurity in Nigeria

Alexander Chijioke Ukpabia

Department of Economics, Faculty of Management and Social Sciences. Michael and Cecilia Ibru University, Agbarha-Otor, Ughelli, Delta State, Nigeria.

Email address:

ukpabiaalexanderchijioke@gmail.com

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ABSTRACT

Agriculture and technology are very important for the growth and development of the food industry in Nigeria. The agricultural sector in conjunction with technology plays tangible roles in the improvement of the availability and affordability of food and also in the achievement of food security in Nigeria. Increased crop production, and government policies can address challenges and maximize the prospects of the food industry in Nigeria. The objective of this study is to investigate the role of agriculture and technology in ensuring food security in Nigeria. The Nigerian government has adopted various agricultural programmes, policies and strategies in order to ensure food security. These include: The Green Revolution, Operation Feed the Nation (OFN), Structural Adjustment Programme (SAP), among others. These laudable programmes and policies notwithstanding, the country is still experiencing food insecurity due to the following factors: gender inequality, policy inconsistencies, negligence of the role of technology, among others. The paper concluded by stating categorically that agricultural programmes and policies, coupled with improvements in science and technology, must have their targets at the peasant farmers and their rural communities and environments for the objective of food security to be achieved. Based on the findings of the study, the following recommendations were made: Firstly, there should be commercialization of agriculture, manufacturing and services to encourage infrastructural development. Secondly, there is need for the Nigerian government to set strong targets for the achievement of the United Nations Sustainable Development Goals (SDGs) by 2030, among others.

1. INTRODUCTION

Nigeria is one of the largest countries in Sub-Saharan Africa with massive economic opportunities. She occupies an estimated land mass of about 923,769 km² and 80% of her land

mass is fertile for agricultural cultivation. With the abundance of minerals and other natural resources, the economy of Nigeria is one of the biggest in the district, with a very wide and changing market [1]. If these resources can be reasonably tapped, they can feed the nationals and the excesses can be exported to other nations for financial gains and benefits.

However, Nigeria is passing through continuous food crises leading to malnutrition, undernutrition and the likes [2]. More so, the food intake requirements of many Nigerians have decreased greatly to the extent that it is lower than the international standard. Furthermore, there existed past efforts aimed at boosting food supply through fat agricultural production. But these efforts have not been fruitful. The schemes only helped in alienating the peasant farmers who are the majority of food producers in Nigeria.

By increasing food production and maintaining quality, Nigeria can solve the problems of malnutrition and undernutrition. With this, export opportunities can be increased and the overall level of economic development increased. The structure and characteristics of agriculture in Nigeria are mainly traditional. Traditional, here, is used to explain the characteristic farming type in nations where agriculture is the main employer, even though it may not be the largest sector with regards to its contribution to Gross National Product [3]. Peasant agriculture is known for its small family production unit typified by small size in output and resources alike. Here, land and few purchased inputs are the main production factors and the farm workforce consists mainly of family labour.

The agricultural sector in Nigeria is characterized by tangible and insignificant economic and social diversity. Tangible in terms of employment but insignificant in terms of production for market and meager in terms of employment. On the contrary, in developed countries that are saddled with the social and

economic unification process between agriculture and other sectors of the economy, farming is a good business while farmers are profit-making businessmen, who are technically informed, commercially oriented and can boast of marketing, financial, advisory and institutional research both public and private.

Before the colonial rule in Nigeria, agriculture was the main occupation of the people. The Federal Republic of Nigeria included Agricultural Science as a compulsory subject into the Senior Secondary School curriculum. Agriculture's contribution to the national economy was enormous though short-lived. It gave way to petroleum as the government shifted attention to the oil sector from agriculture. There is an urgent need for a return to agriculture. The decline in agriculture notwithstanding, it still remains the prevalent sector of the Nigerian economy. The needed food security for Nigeria and her citizens cannot be assured by our dependence on oil.

According to the Federal Republic of Nigeria [1], the economy of Nigeria is currently the biggest in Africa with over \$400 billion nominal GDP. This notwithstanding, Nigeria is still being confronted with myriads of challenges comprising of high poverty levels, a tripling population and complete trust in oil exportation. These make the economy vulnerable to changing world oil prices.

Food Security is defined as a state of affairs in which everyone at all times possess material, social and economic admittance to enough, hygienic and nutritious food that contains the desired diets and food preferences for an agile and healthy life [4]. The above definition is the real meaning of food security but the achievement of it in any part of the world is uneasy. In Nigeria, it is far from being achieved because of the height of poverty and hunger in the country. In Africa, food security policies were mainly about increasing the production, distribution and marketing of cereals and other starchy foods [5].

The COVID-19 world pandemic is one of the most serious issues that have been compared with food security challenges [6]. Faced with these challenges, increased agricultural production and food security is not within a reach. The achievement of food security made the government to begin agricultural policies and programmes that can boost agricultural production. These programmes include among others:

1. The Green Revolution Programme.
2. Back-to-Land Programme.
3. Operation Feed the Nation (OFN) – 1976
4. Directorate of Food, Roads and Rural Infrastructures (DFRRI)
5. National Accelerated Food Production Programme (NAFPP) – 1973
6. Farm settlement Schemes
7. Agricultural Development Projects (ADP) - 1974
8. National Agricultural and Land Development Authority (NALDA)
9. Nigeria Agricultural and Credit Banks (NACB) – 1973
10. River Basin Development Authority (RBDA) – 1973
11. Community Board (CB) – 1977
12. Land Use Degree
13. Structural Adjustment Programme (SAP) – 1986

These policies and programmes were either speedily introduced without timely planning or were poorly practiced, thus, leading to the failure of the achievements of the objectives and aims. In addition to the reasons for the failure of the schemes is the total neglect of the farmers. This is because no agricultural production policy or programme can survive unless the policy makers become aware that farmers need inputs (factors of production) to boost production. More so, the role of science and technology in ensuring food security should be acknowledged and appreciated.

The thrust of this paper, therefore, is that

adequate food production and food security, via agriculture and technology, can be used to wipe hunger from the face of Nigerians both at home and in the diaspora.

2. LITERATURE REVIEW

2.1. *The Concept of Food Security*

Food security has been defined by the Food and Agricultural Organization [4]. as a situation in which everyone and at all times possess physical, social and economic advance to enough, healthy and nutritious food that is commensurate with their dietary needs and food requirements for an active and healthy life. However, food security touches more than the health of human beings and their welfare. In addition, it oils economic and political stability. This is because in countries where political stability and wars exist, there is bound to be food insecurity. Nonetheless, there are three major aspects of food security. They include: food adequacy, food access and food availability. Food security is generally known as nutrition security, food accessibility, food utilization, food safety, food insecurity, etc. [7]. On the other hand, food insecurity is a situation when individuals lack lasting physical or economic access to measurable safe, nutritious and socially recognizable food for a productive and healthy life. However, food insecurity can be temporary or seasonal. According to the Food Security Nutrition Report (2022) made public by the Food and Agriculture Organization of United Nations [8]. and other UN agencies, about 45 million children below five years of age are regarded as wasted due to severe malnutrition and also, continuous malnutrition causes weakness in children and makes them vulnerable to common childhood diseases like malaria, measles, diarrhea, inspiratory infections, among others.

To solidify the functioning of the market and its access for African rural dwellers, [9]. suggested

the following measures:

- Good roads and market infrastructure,
- Good transportation system,
- Good processing and storage facilities, and
- Access to modern production technologies, information and credit, among others.

While about 11% of the global population are sequentially malnourished, 13% of the inhabitants of developing countries are suffering from undernourishment [10]. More so, majority of these people are residents in developing countries. Africa is endowed with rich agricultural biodiversity. About 33% of the world population suffers from micronutrient malnutrition due to lean or inadequate intake of vitamins and minerals to have a healthy living [11]. Here, approximately 14 per cent of the inhabitants cannot meet their dietary energy needs.

Undernutrition is still in vogue among rural dwellers in Africa. These individuals suffer from inadequate calorie intakes and low dietary variety leading to many micronutrient inadequacies with harsh negative health repercussion. Most rural dwellers in Africa only operate at the subsistent level as they manufacture a certain part of the food they eat themselves [9]. However, while the rest of the world has made tangible efforts to eradicate poverty, Africa and Nigeria in particular is lagging behind. Future forecast shows that there is bound to be greater poverty unless drastic measures are taken.

Food as a great necessity for human survival and existence is always a timely issue and has been identified as one of the most known topics in the last decades [12]. Most of the challenges correlating with malnutrition and undernutrition in food security are found in most African countries, Southeast Asia and West Asia [13]. To ensure food security is now an issue of great importance to nations with varying degrees of economic development, the agricultural subsector plays an important role in increasing food availability [14].

Due to greater food demand and decreased crop productivity, inflated food prices coupled with income inequalities may adversely affect accessibility to food and its being available for poor homes. Crises, conflicts, climate change, natural disasters and population explosion are seen to be the real causes of hunger and malnutrition [15]. UN organizations predict steady population growth and by the year 2050, this figure is believed to range from 8.3 billion to 10.9 billion people. This increased population, according to experts, will demand a rise in food supply by at least 50% or 75% [15]. According to Food and Agricultural Organization of the United Nations, [10]. the global population exceeded 7.6 billion people in 2018. It is expected to reach 9.2 billion by 2050 with an anticipated food demand of 59% - 102% [16]. Following the above, it becomes important to raise the quantity of agricultural production by 75% in order to make food available for the world population by 2050.

Due to the call to nip malnutrition in all its forms in the bud, the Nigeria Agricultural Sector Food Security and Nutrition Strategy 2016-2025 was founded and the strategy highlights eight priority areas:

- Increasing food value chains,
 - Diversifying the production of food with women as its target,
 - Improving the safety of food along value chains,
 - Resilience and social coverage nets for liable groups,
 - Encouraging research on nutrition and information systems,
 - Increasing organizational capacity and human resources,
 - Communication, advocacy, behavioural modification and nutrition education, and
 - Assessment and monitoring,
- [17].

2.2. Science and Technology and Food Security

In Africa in general and Nigeria in particular, a degeneration in technology has continued to lower outputs from given inputs. Native methods which include, crop rotation, bush burning and fallowing and other indigenous farming practices are no more relevant in the current efforts aimed at boosting food production in developing countries including Nigeria.

On African soil, many plant species are underused and they have large abilities to reduce hunger, fight poverty, climate change and agricultural growth. There is need to enlarge Africa's food basket by encouraging the growth of underused plants through research and development (R & D) in order to reduce the current fading away of these plants [18]. But in the case of low-income developing nations, the existing or available technology and knowledge will pose some hindrances to the needed food production in the nearest future [19]. Some persons have argued that government's involvement to raise food production through the channels of technical and economic aid to the small-scale farmers for land rehabilitation programmes is not a wrong allocation of resources [20]. Rather, this is a necessity since this type of assistance by the government cannot be left in the hands of the invisible forces of demand and supply in the present situation when viewed from the macroeconomic perspective [21]. Therefore, there is a great need or an urgency for the government to continue the intervention.

In addition to the above, lack of resolve to the issue of the security of genetically altered foods made possible through agricultural biotechnology has posed some threats to the achievement of food security in Nigeria. Recently, biotechnology stands for a scientific advancement in agriculture with long lasting potentials in raising the level of food production in an environmentally lasting manner [22].

The agricultural sector plays tangible roles in the improvement of the availability and affordability of food and achieving food security. Meanwhile, while there is general consensus on the raised world demand for food to be hoped for in the coming years, there is no certainty concerning world's agriculture's capacity to fill this demand through an increase in the supply of food [23].

Conclusively, there still exist some obstacles to the full advantage of scientific information in biotechnology in agriculture. First, there is paucity of funds for investment in the project. Secondly, there is dire need for the upgrading of the quality and effectiveness of extension services needed to raise the knowledge of the peasant farmers of the endowments of biotechnology. Third, the media (especially mass media) has the task of teaching rural farmers in their native dialect on the associated problems on the use and abuse of agrochemicals. Lastly, superstition scares the people away on the consumption of genetically altered foods working against the safety of these foods. The fact still remains that without the help of agricultural biotechnology, positive results in food security will continue to slip away from Nigerians.

2.3 Causes of Food Insecurity in Nigeria

Food insecurity arises due to the consequences of insufficient consumption of nutritious food, bearing in mind the physiological employment of food by the body as being within the domain name of health and nutrition [24]. Addressing food insecurity causes in Nigeria is a very hard task as most Nigerians breed dislike for locally produced food and choose imported food over home-grown foods. Reference [25] identified the following factors as the causes of food insecurity in Nigeria:

2.3.1 Gender Inequality

This is a major root cause of poverty and

hunger in Nigeria. When people are not capable of participating in labour-formal, informal or agricultural, food security can be main concern for them. The United Nations estimated that over 60 per cent of the world's serious hungry people are women and girls. Out of this, 98% of them ate residents in developing countries. Facts abound that when women have income, the income is spent on food and children's needs. Also, women play tangible roles in land use, production, distribution, processing, marketing, accessing, buying and selling and the availability of food.

Therefore, ensuring global food security will entail bringing to the barest minimum gender inequality and acknowledging the role of women to agriculture. Anytime women status is improved upon, there is bound to be a rise in agricultural productivity leading to a reduction in poverty and in increase in nutrition [3].

2.3.2 Policy Incongruity and Corruption

Food production and distribution has always been hampered by continuous policy changes and poor performance of agencies saddled with the implementation of food and agricultural programmes. When a new government takes over power, the previous agricultural programmes and policies are sidelined and replaced by new ones, who are not better than the old ones. This is aimed at creating opportunities for graft [2].

2.3.3 Hunger and Poverty

Hunger and poverty discourage people from working assiduously to raise the level of food production. Food and agricultural productivity are both labour and capital intensive. Regrettably, the poor peasant farmers produce in large quantities the food needs in Nigeria. Owing to their poverty level, they find it hard to learn, work and take good care of themselves and members of their families [3].

2.3.4 Conflicts and Crises

It has been observed that religious and ethnic conflicts have destructive effects on economic activities especially food production in areas that they exist. For example, farmers in Benue State of Nigeria have deserted their farmlands and communities due to religious and ethnic conflicts. This has led to a significant reduction in the quantity and quality of foods that are produced in this region which until now has been known as 'The Food Basket of the Nigeria Nation [3].

2.3.5 Natural disasters

Natural catastrophe is another impediment to food security in Nigeria. Steady climate changes cause shortage of rainfall and drought in Nigeria especially in the northern Nigeria. More so, too much rainfall and flood in the South and middle belt regions of the country also contribute their quota in low food production in Nigeria [15].

2.3.6 Non-availability of Processing and Storage Facilities

In Nigeria, there is non-availability of processing and storage facilities. This causes scarcity of agricultural foods and products during off-season.

2.4 Solutions to Food Insecurity in Nigeria

In order to reduce to the barest minimum, the effects of food insecurity in Nigeria and on Nigerians, researchers and other stakeholders have argued that there should be proactive actions on the side of the leaders with a view to saving Nigerians from starvation as we are experiencing currently. To achieve this, this paper suggests these few things among other numerous ways of ameliorating the impact of food insecurity.

2.4.1 Provision of Infrastructures

Social amenities like electricity, pipe-borne water, motorable roads, etc. should be made available to the rural inhabitants to cut rural-urban

migration. This action will ensure adequacy of labour for agricultural activities in rural areas, thus, increasing food productivities that will guarantee food security and providing employment opportunities to the growing population [26].

2.4.2 Population Restraint

Because there is poverty in Nigeria, population is not checked as the birth control measures are still unpopular especially in the rural areas. This leads to population explosion resulting further to undue competition for inadequate food. The government and other organizations (both International and local should rise up and assist in educating the people on birth control measures in order to control inflation and guarantee food security [26].

2.4.3 Workable Policy Framework

Government should adhere strictly to feasible agricultural policies that will be subjected to regular review by experts. After this, the successive governments will be able to chase after food security with desired energy [27].

2.4.4 Provision of Storage and Processing Facilities through science and technology

In Nigeria, during harvest time, we always have abundance of agricultural products and after a while, scarcity resurfaces. The government and other relevant agencies should ensure that there is adequate provision of processing and storage facilities through science and technology for the products of agriculture so that we can have all-year-round food security. This will also boost the income levels of farmers [26].

2.4.5 Removal of Trade Barriers

Barriers to trade impede economic growth and development. There should be free movement of goods and services across national and international boundaries to minimize food

insecurity not only in Nigeria but in other African countries [27].

3. CONCLUSION

This paper diagnosed the food security stance in Nigeria using agriculture and technology. The role of science and technology in ensuring the availability of food should not be downplayed. Food security problems must be tackled the same way security threats are tackled, thereby charging Nigeria and Nigerians to devise strategies to ameliorate the negative effects and consequences of food insecurity. If the challenges are attacked with all enthusiasm and the needed eagerness by putting into action the recommendations of the various programmes and policy makers, then, Nigeria will be self-sufficient in food security.

More so, since food is an invaluable and indispensable commodity, all hands must be on deck to ensure its steady supply for sustained economic growth and development and human survival. Here in Nigeria, it is the peasant farmers who produce most of the food need and these peasant farmers are scattered all over the rural communities. Therefore, agricultural programmes and policies must have their targets at these peasant farmers and their rural communities and environments for the objective of food security to be achieved effectively and efficiently.

4. RECOMMENDATIONS

Nigeria can attain food security if all Nigerians anytime have both physical and economic admittance to adequate, safe and nutritious food to obtain their dietary needs and food choices for a working and healthy life [28] in [26]. Based on the findings and causes of food security in Nigeria, this study recommends as follows:

1. There should be commercialization of agriculture, manufacturing and services. There is need for measures to be put in place to

encourage infrastructural development and ensure a business-friendly environment.

2. There is need for the Nigerian government to set strong targets for the achievement of the United Nations Sustainable Development Goals (SDGs) by 2030.
3. The government of Nigeria should strive and implement programmes and policies that will aim at diversifying the economy, lowering her dependence on oil and encouraging sustainable growth.
4. Since the rise in productivity of agricultural products in developed countries like United States and the EU will not ensure the provision of food to African population, there is need to consider the UN humanitarian programmes [15].
5. The Nigerian government should acknowledge that combating malnutrition is 'sine qua non' to economic and social development. Therefore, nutrition-sensitive interventions in areas like agriculture, social protection and education are needed to curb food crises and malnutrition.
6. Gender inequality should be discouraged and women's role in agriculture should be appreciated and encouraged to ensure global food security.
7. There should be continuity in governance as this will ensure that new governments taking over power from previous governments will implement the programmes and policies of the previous governments. This will discourage opportunities for corruption.

conflict of interest.

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