Covenant University Journal of Politics & International Affairs, Vol.9 No. 1, Special September, 2021

ISSN: p. 2354-3558 e. 2354-3493 DOI: xxxxxxxxxxxxxxx

Open Access Journal Available Online

Innovation and Sustainable Food Security in Nigeria

Augustine Nduka Eneanya
Department of Political Science
University of Lagos, Akoka, Yaba, Lagos
austineneanya_2010@yahoo.com

Received: 20.04.2020 Accepted: 25.07.21
Date of Publication: September, 2021

Abstract: The objective of paper is to investigate how innovation and technology can boost agriculture productivity increases and sustain food security in Nigeria. Exploratory qualitative research technique was adopted. This technique gave insight and understanding on how innovation and technology can be enablers in behavioural change in food production and its sustainability. Data were collected from key-informant interviews made up of five agricultural experts. Data from secondary sources were collected from previous empirical studies in journal articles, textbooks, internet, government published reports and newspapers. Data were analyzed using content-analysis and secondary data analysis methods within the constructed conceptual system framework to answer research questions. Results revealed that traditional agricultural practices and research outcomes based on government subsidies have not yielded adequate food productivity increases that promoted food security. The paper concluded that innovation using science and technology would promote food security in Nigeria. The study suggested that agriculturists should adopt organic and bio-engineering technology in combination with research-based climate smart agriculture to promote productivity increases and sustainable food security in Nigeria.

Keywords: Food security, innovation, technology, agricultural productivity and sustainability

Introduction

Globally, food security is a major concern of governments, international organizations and entire people of the world. This growing concern about food insecurity and fear of it meeting the future need motivated the world Food Summit, organized by Food and Agriculture Organization (FAO) in Rome in 2008 to address the issue of food insecurity. The Rome Declaration on World Food Security "established target for reduction of under – nourished children by 2015. In 2008, delegates from 181, countries also reaffirmed this pledge" (Tietenberg & Lewis, 2010, p. 225). Besides, the United Nations World Food Programme issued warning that an estimated 265 million people could face acute food insecurity by the end of 2020. In addition, 135 million food producers could lose incomes and remittances (due to large losses on perishable and nutrition food) (World Bank, 2020).

As COVID-19 pandemic unfolded, there were disruptions in domestic food production, processing, distributions, marketing and supply chains, which have led to massive unemployment, poverty, hunger and inequality. Loss of incomes and remittances have been witnessed among poor rural and urban farmers, creating food security risks in Nigeria

When the Sustainable Development Goals (SDGs) were unveiled in 2015, the drive to end hunger and eradicate poverty became number two goals among the 17 SDG targets. In fact, the achievement of SDG goals by the year 2030 has become doubtful as a result of emergence of COVID-19. With COVID-19 life changed fundamentally as global and national economics tumbled. Crude oil prices crashed and it became difficult to invest in agriculture or compete at international market to sustain productivity in agriculture and sustain food security in Nigeria.

In Nigeria context, there were pre-existing challenges in productivity in agriculture and food security because of locust invasion, flood disaster, deforestation, desertification, population growth and Boko Haram insurgency in the North Eastern area of Nigeria. According to UN, Report (2018), Nigeria is leading top 11 extremely poor countries by about 87 million people. With this report, Nigeria's possibility of attaining United Nations Sustainable Development Goals (SDGs) by 2030 to end extreme poverty and hunger by 2030 may be unattainable.

The food insecurity challenges have become more alarming as a result of the emergence of COVID-19 pandemic. As COVID-19 pandemic unfolded, there were disruptions in domestic food production, processing, distribution, marketing and supply chains, which led to massive unemployment, poverty, hunger and inequality. Loss of incomes and remittances have been witnessed among poor rural and urban farmers, creating food security risks in Nigeria.

These challenges are also not unconnected with nature, such as; climate change, urban sprawl, environmental degradation, loss in diversity and deforestation, among others. All these disrupt the efficient functioning of the food systems. It is believed by scientific agricultural experts that technological innovations would boost agricultural gains and sustain food security in Nigeria (UN, 2020). Hence, the justification for this investigation.

The purpose of this paper, therefore, was to

interrogate how innovation using science and technology can promote sustainable food security in Nigeria. Specific objectives included:

(i) To find out food security gaps arising from demand and supply of agricultural crops production sustaining food security in Nigeria
(ii) To find out how research, science, innovation and technology enhanced productivity in agriculture and sustainable food security in Nigeria
(iii) To find out food security policy options for promoting agricultural productivity increases and sustaining food security in Nigeria

RESEARCH QUESTION

In the light of these objectives, the following research questions would guide the paper

(i) What are the food security gaps arising from demand and supply of agricultural crops production that sustained food security in Nigeria?
(ii) To what extent have research, science, innovation and technology enhanced productivity in agriculture and sustainable food security in Nigeria?
(iii) What are the food security policy options for promoting productivity in agriculture increases and sustainable food security in Nigeria?

For answers to these research questions, the paper was structured into three parts. Part one examined the introduction, objectives of the study, research questions, literature review and methodology. Section two interpreted evidences to answer the research questions. Section three discussed the findings, concluded the study and suggested the way forward for sustainable food security using innovative technology.

CONCEPTUAL CLARIFICATIONS

Basic concepts relevant for this study need to be clarified. They include: food security, innovation, food system and sustainability.

Food Security

The concept of food security refers to having at all times an adequate level of food and food productions to meet increasing consumption demand in order to mitigate the demand and supply of output and price (Idrisa et al, 2008). Ladele & Ayoola, cited by Adegbola et al. 2011), argued that food security is a function of food production level. That is, high level of food production is equals to food security. As noted by Adebayo (2010), there are four dimensions to food security, namely: "first, availability of sufficient amounts of food which is a function of food production; second, stability of supply over time which depends on the ability to preserve/store produced food and supplement available food through imports if necessary; third, access to the available food which depends on income levels and its distribution; and fourth, food utilization which encompasses procurement ingestion and digestion all of which are dependent on nutritional quality, education and health" (p.135). These four dimensions capture food security system in Nigeria. The absence of food security in these dimensions is food insecurity which means lack of access to enough food that can either be chronic or temporary (NAP, 2020).

Concept of Innovation

Innovation in this context, involves the "generation of new ideas about a process or phenomenon or the development of new ways

of doing things" (Olaopa, 2009, p.10). This definition connotes process of change that enables food producers to adapt to modifications in their environmental circumstances be they natural, cultural, socio-political, economic technology from time to time. Adopting innovation in food production, enables through research, science and technology facilitates sustainable food security. Moreover, innovation also involve doing old things in new ways and betters. As noted by Adair, "innovation is not dependent solely upon products and services, organizations and institutions, as they also undergo change intended to improve them. In this case, change is not a quantum leap forward but a series of steps-some small; some large – in a desired direction" (Adair, 2007, p.5)

From this definition, innovation primarily concerns bringing new ideas or changes in food production in order to confront food insecurity in Nigeria. The introduction of new technology to promote agricultural productivity increases and sustain food security has become a new paradigm shift thinking by many agriculturists. .This can be achieved by collaborating with private sectors and other stakeholders not only to introduce innovation and technology but address it with nature challenges such as: combat climate change, deforestation, soil erosion, floods, environmental degradation through climate smart (Tietenberg & Lewis, 2010).

Concept of Food System

The concept of food system refers to food production, processing, marketing, distribution and supply chains (FAO, 2020). Agricultural experts believe that more resilient food systems in these areas would provide return on investment on research, innovation and technology needed to promote food security in Nigeria.

Concept of Sustainability

The concept of sustainability means valuing the environment as they utilize resources with current and future needs of the people in mind. Miller & Spoolman (2008) defines sustainability as the "ability of the earth's various natural systems and human cultural systems and economies to survive and adapt to changing environmental conditions indefinitely" (p.7). In this study, sustainability means utilizing the environmental resources with current and future needs in mind.

CONCEPTUAL AND ANALYTICAL FRAMEWORK

The key concepts- innovation, food systems, food security and sustainability were integrated into a system-based framework for the analysis of the study. Political System model as displayed in Figure 1(See appendix). The political system is "a group of inter-related structures and processes that functions authoritatively to allocate values for a society. Forces generated in the environment that affect the political system are viewed as inputs. Outputs of the political system are authoritative value allocation of the system and these allocations constitute public policy" (Dye, 1996, P.35). The framework in Figure 1 (See Appendix) is made of input, conversion, outputs and outcomes. In this study, inputs consist of biophysical environmental issues such as land, water and Air. The inputs also include political, economic, demographic and socio-cultural issues, such as environmental issues like climate change, deforestation, degradation of ecosystem, air and water pollution and food security issues. The food systems have actors, who are involved in food production, processing, marketing,

distribution and others in supply chains. These actors' activities in food systems (conversion process) are guided and regulated by agricultural policies and programmes that bother on science, research and technology-laws and regulations legitimized by the legislature. The policies and programmes are implemented by the executives and bureaucracy through institutional actions during implementation (output). The impacts of government's policies and programmes on agricultural value chains have necessitated using science, research and innovative technology to promote sustainable food security.

This framework is significant for the study because it assists administrators, agriculturists, stakeholders and policy makers to focus on how innovation and technology can improve productivity in agriculture and sustain food security in Nigeria. Moreover, "as policy environments are full of complexities, usually involving diverse range of players coming from different perspectives and spawning a host of unexpected events" (Dye, 1996, p.35). An integrated systematic approach as constructed for the framework of analysis to this study can be of significant benefit to the government in addressing the policy options suggested for using innovation and technology to promote agricultural productivity increases and sustain food security in Nigeria (Edwards, 2004).

METHODS

The study adopted exploratory-based qualitative research design. Data were collected from key informants interviewed among agricultural experts and previous empirical studies from journal articles, textbooks, internet, and newspapers. Data collected from the key informants were entered in the field notes. Field notes were transcribed, content-analyzed, edited, sorted, and categorized into themes, namely: innovation, technology and sustainable food security. Content-analysis technique was adopted to elicit key concepts from secondary data collected which were pattern-matched into the identified themes. Thematic and secondary data analysis methods were adopted to analyze and interpret evidences collected from themes and secondary sources, using the constructed conceptual framework to answer research questions. These methods of analysis were justified because they gave insight and understanding context in the use of research, science, innovation and technology in order to enhance productivity in agriculture and sustainable food security in Nigeria. These methods are in consonance with previous studies using content-analysis, thematic and secondary data analysis methods for analyzing, interpreting and answering research questions in qualitative research (Yegidis & Weinbach, 2002; McNabb, 2009, p. 146).

LIMITATION

This study was investigated using exploratory qualitative research design in a system-based conceptual framework. There is need to replicate this study using quantitative research with the same framework to determine the pattern of relationship between the impact of innovative technology on sustainable food security in Nigeria. Future research direction should address this limitation of the study.

FINDINGS

RQ1: What are the food security gaps arising from demand and supply of agricultural crops production that

sustained food security in Nigeria?

Food system and food security have faced different challenges in Nigeria. These challenges include: Boko Haram insurgency, banditry, kidnapping, Fulani-herdsmen and farmers conflict, making logistics and distribution difficult. Nigeria was also facing cases of extreme weather events such as floods, droughts and pest, like locusts plague – impacting food production. Poor Nigerians and vulnerable groups, were already chronically food insure before the COVID-19 pandemic, leading to poor food scarcity. Food security occurs if "production fails to keep pace with increases in demand brought about by population growth" (Tietenberg & Lewis, 2010, p.228). Food purchases being price responsive abound. Demand for food will continue to rise and price stimulates supply response. The supply can be "increased either by expanding the amount of land under cultivation; by increasing the yields on the land already under cultivation or by some combination of the two" (Tietenberg & Lewis, 2010, p.228). The primary input for growing food is land and land is ultimately fixed in supply. Hence, rising demands would not lead to greater output of food, leading to demand and supply gaps in Nigeria's food security system, as displayed in Table 1 (see appendix).

From Table 1(see appendix), it is empirically inferred that supply gaps in food production is approximately 84.14 million tons of agricultural crops in Nigeria between 2016 and 2020. This is a clear indication of agriculture crops shortages, which would result in food insecurity in Nigeria. Table 1 shows clearly the demand and supply gaps of agriculture crops in Nigeria. The intervention of federal and state governments to boost food security in Nigeria is, therefore, inevitable.

RQ.2: To what extent have research, science, innovation and technology enhanced productivity increases and sustainable food security in Nigeria?

Research, science, innovation and technology are inter-related when developing ideas or improved knowledge for agricultural productivity increases. The "increases in crop productivity are stimulated by improvement in machinery, increasing utilization of commercial fertilizer, pesticides, and herbicides, developments in plant and animal breeding, expanding use of irrigation water and adjustments in location of crop production" (Tietenberg & Lewis, 2010, p.229). Technological progress provides "the main source of support for optimism about continued productivity increases.

Technology is a distinctive body of knowledge with its own operating principles and norms for design activity" (Suneja, 2002, p.75). Three technological techniques have received significant attention:

(i) " DNA, which permits genes from one species to be recombined with those of another";
(ii) "tissue culture, which allows whole plants to be grown from single cells"; and
(iii) "cell fusion, which involves uniting the cells of species that would not normally cross in order to create new types of plants different from "parent" cells". Several "applications for these genetic engineering techniques include the following:-

- "making food crops more resistant to diseases and insect pests";

- "creating hardy new crop plants capable of surviving in marginal soils";
- "giving staple food crops such as corn, wheat, and rice the ability to make their own nitrogen – rich fertilizers by using solar energy to make ammonia from nitrogen in the air";
- "increasing crop yields by improving the way plants use the sun's energy during photosynthesis" (Tietenberg & Lewis, 2010, p. 229)

Biotechnology offers "hope of improving the nutritional benefits of many foods. It benefits the consumers through enhanced nutritive qualities that include more and higher-quality protein, lower levels of saturated fats, increased vitamins and minerals, and many others. Moreover, bio-engineering can "reduce the level of natural toxins (such as in cassava and kidney beans, and eliminate certain allergies from foods like peanuts, wheat and milk" (Johnson, 2007, p.426). Many of these products are being developed primarily or even exclusively for subsistence farmers and consumers in poor countries, including Nigeria.

Smart agriculture was suggested as another technological innovation to promote sustainable food security in Nigeria.. It entails increasing productivity in agriculture and incomes sustainably, adapting and building resilience climate change and removing greenhouse gases emissions (FAO, 2020).

At the COP 21 summit, Nigeria presented its pre-existing position on climate smart agriculture. Smart agriculture has not been implemented in Nigeria because of certain challenges. They include:

- "Limited awareness of climate issues, and therefore key changes required to protect agriculture;"
- "Poor management of land, water, soil nutrients and genetic resources";
- "Inconsistency of the governance regimes, policies, legislations and financial mechanism with the requirements for climate friendly agricultural practices";
- "Inefficient and unsustainable management of agriculture and natural resources, for example, soil, water, and so on;"
- "Lack of awareness of soil management practices";
- "Limited availability of drought resistant variety of crops";
- "Lack of research into climate smart agriculture":
- "Lack of cooperation and synergy among the key MDAs and other stakeholders";
- "Absence of comprehensive soil map for Nigeria";
- "lack of awareness on climate change and its effects on agricultural practices";
- "lack of access to alternative energy use';
- "poor infrastructure to support climate smart agriculture" (UN Report, 2018)

However, the growing bio-technology industry has given more promise of productive crops, using synthetic fertilizer and pesticide combined with genetically modified organisms (GMO) would assist in boosting agricultural growth, banish poverty, hunger and inequality. To hold food prices

down to affordable levels and sustainably increase food supply, a mix of organic and non-organic techniques, such as synthetic nitrogen containing fertilizers and pesticides, known as organic farm is required. Proponents of organic farm claims that they preserve the health of the soil and provides healthier food for the people (Easton, 2009).

However, genetically modified foods have sparked considerable controversy. Since the "social and economic costs and benefits of GMOs are multifaceted and uncertain, it remains to be seen whether consumers will support or reject this new technology" (Tietenberg & Lewis 2010, p.241).

Though, Nigeria has agricultural institutions conducting research for increased productivity in agriculture through genetically modified foods, their results were never made available to farmers or commercialized for the benefits of end users. Besides, conducting agricultural research has become climate smart and poor funding has been challenge to leverage digital innovations to lower cost in agricultural value chains. All these are findings emerging in the use of research, science, innovation and technology to boost increases in the productivity in agriculture and sustainable food security in Nigeria.

DISCUSSION OF FINDINGS

Food security is a major concern of government, nongovernment and inter-government organizations. More than 820 million people were already classified as food insecure (UN, 2020). The consequences of this projection is poverty, hunger, inequality and malnutrition.

In Nigeria, farmers grow good for consumption. There are challenges in the course of food production, such as cases of rainfalls resulting in flash floods due to climate change, locust or pests invasion, desertification, deforestation, banditry, Boko Haram insurgency and kidnapping that make farmers to access farmland difficult. When these challenges are combined with COVID-19 pandemic, they become pathetic issues in terms of food insecurity, poverty, hunger and malnutrition.

To improve productivity in agriculture and sustain food security, innovative technology instead peasant production of staple foods has been advocated by agricultural experts. Studies argue that "organic agriculture can produce quantities of food required by six billion people of the world, provide healthier food and hold prices down to affordable levels" (Easton, 2009, p. 271; Tietenberg & Lewis, 2010, p. 241).

In addition, future changes in the productivity increases in agriculture can also involve changes in agricultural practices. A transition to alternative techniques of agriculture appears to be underway. While the growth of the organic foods industry provides one example, new technology in the form of genetically modified organisms (GMOs) is another. Organic agriculture is believed to produce food in large quantities. To hold food prices down to affordable levels and sustainably increase food supply, a mix of Organic, and non-organic techniques, such as synthetic nitrogen containing fertilizers and pesticides, known as organic farm is required.

Proponents of organic farm claims that they preserve the health of the soil and provides

healthier food for the people (Easton, 2009). Though, genetically modified foods have sparked considerable controversy since the "economic and social costs and benefits of GMOs are multi-faceted and uncertain, it remains to be seen whether consumers will support or reject this new technology" (Tietenberg & Lewis, 2010, p. 241).

A comprehensive and coordinated effort by the federal, state and local government should leverage and collaborate to implement food security policies mutually agreed by stakeholders. Research, science, innovation and technology are required as enablers to promote agricultural productivity increases and sustain food security in Nigeria. Unfortunately, Research Institutes and Organizations have not be able to support agriculture productivity increases with implementable research outcomes that could be made available to rural and urban farmers (UN, 2020). Research, science, innovation and technology are inter-related in developing ideas or improved knowledge for agricultural productivity increases. Crop productivity can be promoted by the "improvement in machinery, increasing utilization of commercial fertilizer, pesticides, and herbicides, developments in plant and animal breeding; expanding use of irrigation water, and adjustments in location of crop production" (Tietenberg & Lewis, 2010, p.229).

CONCLUSION AND RECOMMENDATION

The paper concludes that there are opportunities for agricultural productivity increases in Nigeria to rise in the future if supported with research, science, innovation and technology. With proactive innovative technology and balancing it with climate smart agriculture, productivity increases and sustainable food security can be achieved. Another conclusion is that research into climate smart agriculture would build resilience and sustainably increases in agricultural development food security.

In addition, future changes in the productivity increases in agriculture requires changes in agricultural production practices. While the "growth of the organic foods industry provides one example, new technology in the form of genetically modified organisms (GMOs) is another. Organic agriculture is believed to produce food in large quantities" (Tietenberg & Lewis, 2010, p.229). To hold food prices down to affordable levels and sustainably increase food supply, a mix of organic and non-organic techniques, such as synthetic nitrogen containing fertilizers and pesticides, known as organic farm is required. Proponents of organic farm claims that they preserve the health of the soil and provides healthier food for the people (Easton, 2009).
The study concluded that good agricultural policies can help drive positive behavioural change and increase the choice between organic and genetically modified foods.

SUGGESTION FOR FUTURE RESEARCH

This study, therefore, suggests that future research direction should focus on how genetically- modified foods can promote agriculture productivity increases and sustain food security in Nigeria.

RECOMMENDATIONS (POLICY IMPLICATIONS)

Agricultural subsidies have helped to create a dependence on purchased inputs. Similarly, guaranteed prices of cash crops, marketing

loans based on crop prices and import restrictions to protect foreign competition have also not promoted food production and security. This study, therefore, recommends the following policy options for productivity in agriculture and sustainable food security in Nigeria:

(1) Sustainable Food Security Policy

Nigerian government establish measures to strengthen local food production and supply and in turn moderate the cost of food. Strategic food reserve should be introduced to stabilize food prices in period of scarcity. Moreover, farmers should be encouraged to use agro-chemicals to avert pest and diseases. In addition, government should encourage the use of fertilizer through soil mapping to boost soil fertility. Finally, government should establish processing and storage facilities for better storage of agricultural products.

(2) Conduct research on Climate Smart Agriculture

Lands are not "titled, effectively limiting their capacity to be treated as collateral for financial transactions" (Ogbeh, 2016, p.26). Government should amend current Land use Act to encourage access to land. There should be access to market information in non-markets and innovations through access to information and knowledge

Moreover, Smart agriculture policy should be established to achieve sustainable agricultural productivity and food security under climate change. Nigeria has not been able to implement climate-smart agricultural research outcome. Nigeria agricultural research has to contend with the need to become climate smart to be able to promote agriculture productivity and sustain food security in Nigeria.

(3) Collaboration between federal, state and local government on agricultural policies

Though the three levels of government – Federal and State have authority over agriculture, collaboration on implementation of agricultural policies has been problematic on desirable results. There has been apathy in states on agricultural programmes driven by federal government due to jurisdictional issues. To ensure full utilization of potentials of agricultural policies, federal, state and local governments should focus on greater collaboration, implementing policies jointly approved at the National Council on Agriculture. Mechanism that would promote dialogue and remove areas of conflict should be established by the three levels of governments.

(4) Food infrastructure programme

Food infrastructure in rural communities need infrastructure programme that would support food production, security and rural development**.** Government should promote economic activities in rural communities, develop rural infrastructure, and improve the enabling environment for food infrastructure programmes' investment and opportunities.

(5) Income growth and inclusiveness

Limited access to finance by poor rural communities affect food production. Poverty is rooted in social and economic problems of the larger society. Strategies to contain are to build human capital to promote inclusive growth, which would lead to more sustainable poverty reduction. Another is to extend federal aids or grant agricultural loans to farmers.

(6) Research and innovation

Finally, agricultural research and extension services should be properly funded. Moreover, research outputs should be made available to farmers. In addition, government should expand research community's capacity to leverage digital innovations to lower costs of agricultural production activities.

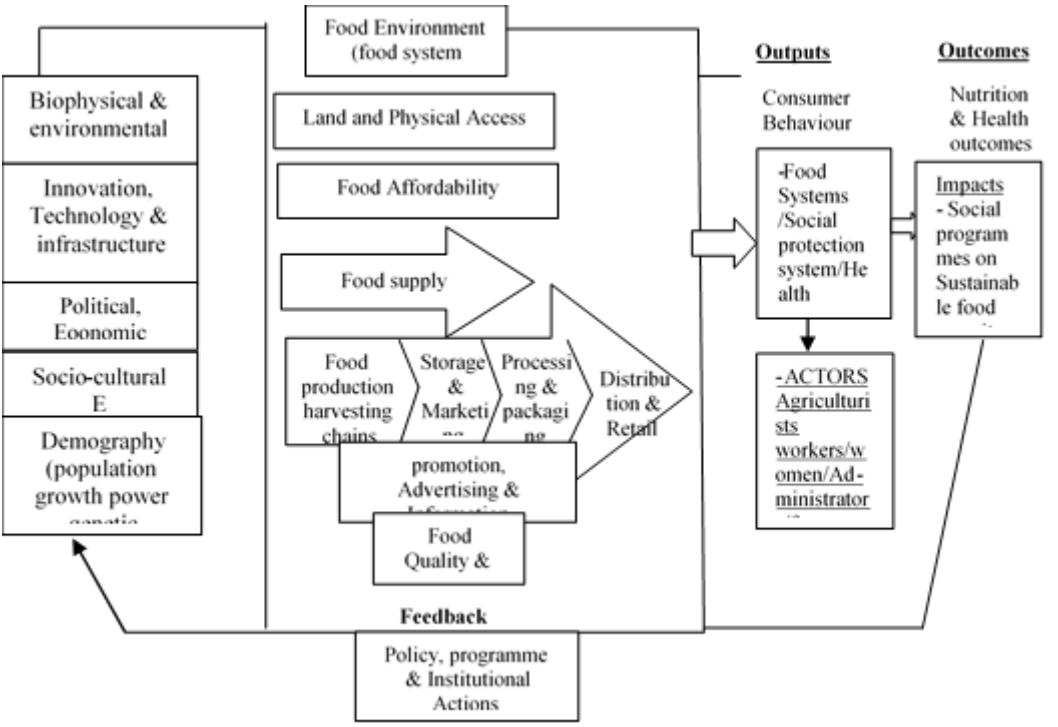

Fig 1: Constructed system-based conceptual framework capturing Innovation and technology impact on Sustainable Food Security System in Nigeria

Table 1: "**Gaps in Nigeria Demand and Supply Across Key Agriculture Crops and Activities" (2016-2020 Estimates) :**

"**Crop"**	**"Demand (tons)"**	**"Supply (tons)"**	**"Supply gaps (tons)"**	**"Observation "**
"Rice"	"6.3 million"	"2.3 million"	"4 million"	"Insufficient supply chain integration remain issues"
"Wheat"	'4.7 million'	"0.06 million"	"4.64 million"	"Driven by demand for various types of wheat (White, hard, durum), etc for bread, biscuits and semovita"
'Maize/corn'	"7.5 million"	"7.0 million"	"0.5 million"	"Limited imports required but can shift due to feed demand"
"Soya Beans"	"0.75 million"	"0.6 million"	"0.15 million"	"Animal feed and protein cost alt. driving demand"
"Chickens"	"200 million birds"	"140 million"	"60 million"	"Gap filled by illegal imports that enter market at lower price point than domestic producers; gap also a moving target based on fast food/QSR demand"
"Fish"	"2.7 million"	"0.8 million"	"1.9 million"	"Fall off in ocean catch and weakness in aquaculture yields due to cost of fish feed a constraint on growth"
"Milk/Diary"	"2.0 million"	"0.6 million"	"1.4 million"	"Driven by insufficient milking cows and low yields (~15-25) liters/day versus norm of 35 – 40 liters NZ/US)"
"Tomato"	"2.2 million"	"0.8 million"	"1.4 million"	"Actual production is 1.5 million tons but 0.7M ton is lost post-harvest"
"Yams"	"39 million"	"37 million"	"2 million"	"Limited gap today but volumes expected to rise in planning period"
"Oil Palm"	"8.0 million"	"4.5 million"	"3.5 million"	"Refers to fresh fruit bunch (FFB) from which oil is extracted at a 10%-15% efficiency rate"
"Cocoa"	"3.6 million"	"0.25 million"	"3.35 million"	"Demand is global demand which will rise to 4.5M by 2020"
"Cotton"	"0.7 million"	"0.2milion"	"0.5 million"	"Demand is for seed cotton and could rise to 1.0 – 1.5million tons subject to textile sector revival"
"Sorghum"	"7.0 million"	"6.2 million"	"0.8 million"	"Demand will rise further as use in feed grows in 2016-2020. Import of malt extracts and glucose syrup is currently used to manage gap, hence a commercial threat for Nigerian farmers"

Source: Adapted from National Agriculture Policy Report 2016-2020: Abuja: Federal Ministry of Agriculture & Rural Development: June 21, 2016

REFERENCES

Adair, J. (2007). Leadership for Innovation: How to organize Team Creativity and Harvest Ideas. London: Kogan Page Ltd

Adebayo, A.A. (2010). "Food Security Status in Nigeria: Pre and Post-Economic/Deregulation Review". *International Journal of Economic Development Research and Investment,* 1 (1): 135-150.

Adegbola, J.A., Bamishaiye, E.I. & Daura, A.M. (2011). "Food Security in Nigeria: Government's Intervention and the place of effective storage". *Asia Journal of Agriculture and Rural Development,* 1(2):56-63.

Dye, T.R. (1996). *Policy Analysis: What Government Do, Why they do it and what Differences it makes.* Alabama: University of Alabama Press.

Easton, T.A. (2009). *Environmental Issues*. New York: Mcgraw-Hill Inc.

Edwards, M. (2004). Social Science Research and Public Policy: Narrowing the divide. *Policy paper No. 2*

Food and Agriculture Organization (FAO) (2020). "Female face Farming". *Online: Available at: http;;//wwwfao.org/gender/resources/infographics/the-female-face-of-farming/en/*

----------(2019). "The State of the World". Biodiversity for Food and Agriculturer

Idrisa, Y.L.; Gwary, M. & Shehu, H. (2008). Analysis of food security status among farming households: Jere Local Government of Bornu State. *Nigerian Journal of Tropical Agriculture, Food, Environment and Extension*, 7 (3): 199-200.

Johnson, J. (2007). *Global Issues, local arguments: Readings for writing*. New York: Pearson Longman.

Miller, G.T. & Spoolman, S. (2008). *Environmental Science: Problems, Concepts, and Solutions*, 12th edition. USA: Thomson & Brooks/Cole.

National Agricultural Policy, (NAP) (2020). *Agricultural Policy*. Abuja: Federal Ministry of Agriculture and Rural Development.

Ogbeh, A. (June 21, 2016). *National Agric Policy 2016-2020 Report.* Abuja: Federal Ministry of Agriculture & Rural Development.

Olaopa, T. (2009). Innovation and Best practices in Public Sector Reform: Ideas, Strategies and Conditions. Ibadan: University Press Plc

Suneja, V. (Ed.) (2002). *Policy Issue for Business*. London: SAGE Publications Ltd.

Tietenberg, T. Lewis, L. (2009). *Environmental Economics & Policy,* 6th edition. New York: Addison-Wesley.

United Nation's Policy Brief (2020). The Impact of COVID-19 on Food Seecurity and Nutrition. Available at: https://www.businessdayonline.com

United Nations (UN) (2020). Policy Brief: The Impact of COVID-19 on Food Security and Nutrition. Available at: https://www.un.org/development/desa/dpad/publication/world-economic-situation-and-prospects-as-of-mid-2020/

World *Bank Report* 2016.

WorldBank (July 2020). Food Security and COVID-19. Available at https://www.worldbank.org/en/topic/agriculture/brief/food-security/accessed on July, 7, 2020

Yegidis, B.L. & Weinbach, R.W. (2002). *Research Methods for Social Workers*, 4th edition. London: Allyn & Bacon.