

# STRATEGIES FOR ENSURING FOOD SECURITY IN NIGERIA: A MID-AND-POST COVID- 19 APPROACH

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## 1.A INTRODUCTION – Agriculture

- A transformed agricultural sector is an important key to any developing economy's drive for economic development and inclusive economic growth.
- It ensures food security, promotes industrialization, provides jobs, stimulates strong resilience to external vulnerabilities and fosters shared prosperity.
- Hardly can a country industrialize without first modernizing its agricultural sector;

- It is a key driver of non-farm economic development.
- Each dollar of additional value added in agriculture generates another 30 – 80 cents in second – round income gains elsewhere in the economy.
- Growth in the agricultural sector will be at least 2 to 4 times (11 times in SSA) more effective in poverty reduction than in any other sector.

- Several countries that have achieved high-income status started with agriculture. China's rapid growth in GDP per capita from \$155 to \$8,123 between 1978 and 2016, was due to agricultural transformation.
- Brazil and Vietnam, at the least, doubled the value of their agriculture sector within 20 years of starting their transformation;
- Ethiopia and Rwanda reduced poverty by 33% since 2000, with an agricultural GDP growth of near 10% per year being the main driver.

## 1.B Food Security

- Hunger is the leading cause of death in the world. This is in the face of abundant resources on the planet. Access however remains a challenge (Global Goals Summit, 2019).
- It is becoming harder to confront hunger problems and to attain SDG Goal 2 of Zero-hunger (targeted to end hunger, achieve food security, improve nutrition and promote sustainable agriculture).

- This became apparent during the shutdowns and restrictions that resulted from the pandemic when a relatively high proportion of people in African countries were rather willing to go out to fend a living than obey restriction orders and “die of hunger”.
- The COVID-19 pandemic experience came to the fore during some pressing socio- environmental challenges (poverty, climate change, conflict, unstable market, poor markets linkage, lack of infrastructure, etc.). Hence, increasing the level of vulnerability.
- According to the 2020 report by Food Security Information Network, Global Network against Food Crises, the pandemic may well devastate livelihoods and food security, especially in fragile contexts and particularly for the most vulnerable people working in the informal agricultural and nonagricultural sectors (FSIN, GRFC 2020).
- Africa accounts for 54% of the global total number of people in food crisis or worse.

- Nigeria accounts for 40.65% (5.0 million) of the people estimated to be in food crisis in West Africa, having more than the total number of hungry people from countries that rank next – Cameroon (1.4 million), the Niger (1.4 million) and Burkina Faso (1.2 million) ( FSIN, GRFC 2020).
- The Hunger and Commitment Index for Africa (HANCI-AFRICA) has put Nigeria in 37<sup>th</sup> place out of 45 countries based on its political commitment to tackle hunger and under nutrition.
- South Africa, Malawi and Madagascar occupied the top three positions. Nigeria's low ranking stems from the fact that the country spends low on its agriculture and health sectors.
- Nigeria is conspicuously missing in the list of Africa's top 10 most advanced food-secure countries. According to The Africa Country Benchmark Report (ACBR, 2017) Tunisia, Morocco and Algeria as the most food-secure countries in Africa.



## 1.C Reasons For High Level Food Security

- **Democracies** (pro-people governance – governments are more attentive to the needs of their populations);
- **Peaceful coexistence** (Absence of armed conflict – focused national spending and efforts on food security),
- **Historic trade routes with foreign markets** (export-driven trading economies (perennial food exporters – assured availability of food even when local crops are affected by natural disaster.
- **and none is geographically landlocked**
- **All above lead to More Prosperous Economies, Allowing Citizens to Purchase More and Better Quality Food.**

- The Global Peace Index (GPI-2019) which measures peacefulness across three domains: safety and security, ongoing conflict, and militarisation has placed Nigeria (148 out of 163) among the 5 least peaceful countries in Sub-Saharan Africa; including Democratic Republic of Congo (155), Central African Republic (157), Somalia (158) and South Sudan (161).

## 2. AGRICULTURE IN NIGERIA

### A. Physical Attributes

- 91 million hectares total Available land – Over 84 million hectares is arable.
- Only about 40% is cultivated;
- 267.7 billion m<sup>3</sup> of surface water and 57.9 billion m<sup>3</sup> of underground water.
- Reasonably abundant rainfall of between 300 mm to about 4000 mm per annum
- Irrigable land area is approx. 3.14 million ha, (only about 220,000 ha (7%) is utilized).
- over 960km of shoreline and 120,000 sq. km. of rivers and lakes.

## B. Production Actualizations/Potentials

- Largest rice producing country in West Africa.
- Grow about 50% of grain crops produced in West Africa
- 3rd largest millet producing country in the world (after India and China)
- World largest producer of cassava (21% global production) (However, Thailand and Vietnam dominate the global export market - 51.8% in 2018).
- World's largest producer of yams
- 2<sup>nd</sup> world largest producer of sweet potatoes
- 4<sup>th</sup> world largest producer of groundnut and cocoa

## C. Economic Actualizations/Potentials

- Largest employer of labor in the country, providing jobs for more than one – third (36.4%) of the labour force, the highest over the past 28 years (1991 – 2019).
- 52% of men in the labour force working in agriculture
- 35% of women in the labour force working in agriculture.
- 57% of all households are involved in agriculture
- 60% male headed households – and 44% female – headed households. (OXFAM, 2020).
- 78% – rural households; 25% – urban households
- The Agro-sector has been growing steadily over the last three years at an average of 2.6%.

- As at Q1 2020, the sector accounted for about 22% of Nigeria's GDP compared to oil and gas (9.5%), manufacturing (9.7%), financial services (3.9%), and trade (16.1%).
- Contribution to GDP average (24.8%) over the five years from 2015 to 2019.
- The agricultural GDP is contributed by Crops (85%), Livestock (10%), Fisheries (4%) and Forestry (1%).
- **2016 Recession** – Agric is the only sector that showed resilience with a growth of about 4.11% in 2016 following the oil price crash that sunk Nigeria into recession. (The oil sector shrank by 13.65% in the same year).
- The value of imported agricultural goods increased by 12.02% in Q1 2020 compared to Q4 2019 and 10.62% more than Q1 2019.

- The value of Agricultural goods exports grew 85.36% in Q1,2020 compared to Q4,2019
- Major crops produced; cassava, sesame, rice, cocoa, palm oil, ginger, groundnut, tomatoes, sorghum, millet, and wheat.
- Major agricultural imports; wheat, sugar, fish and milk
- Main agricultural exports; Sesame seeds, cashew nuts, fermented cocoa beans, ginger, frozen shrimps and cotton. (Sesame, cashew nuts and cocoa accounts for more than half of the nations agricultural exports)

## The Top Agro Exports (first half of 2019):

- Sesamum seeds – (N60.6 billion)
- Sesame oil and its fraction – (N928.1 million).
- Fermented cocoa beans – (N31 billion).
- Raw cocoa beans – (N17.15 billion)
- Natural cocoa butter – (N2.26 billion)
- Cashew nuts – (N8 billion)
- Ginger – (N2.26 billion)
- Agro-food items – (N1.8 billion).

However, the share of agriculture in Nigeria's total export earnings remains small compared to crude oil exports. In 2019, agriculture (less than 2% of total exports) Crude oil (76.5%).



## D. Reasons for Slow Agro-Growth

- i. Nigeria's agricultural sector is primarily focused on meeting domestic demand and is less export oriented. Food production cannot keep-up with population expansion resulting in increase in importation, even with increased productivity.
- ii. Approximately 92% of activities in farming are informal, with little or no documentation.
- iii. There is a preponderance of smallholder farmers, cultivating low-yield staple food crops on small plots with minimal use of agricultural inputs, and heavily rainwater-dependent, (Production subjected to the vagaries of the weather).
- iv. Tax uptake from Agriculture is very low, owing partly to its informal nature
- v. Fiscal planning is relatively difficult.

## Low Level of Technology Use

- vi. Engine powered technology (3%), Hand tools application (90%) and Animal drawn technology (7%)
- vii. Low Level of value addition and crop processing of agricultural commodities.
- viii. Post-harvest losses average 30-40 percent of total production.

### 3. INFRACTIONS AND INEQUITIES ON THE AGRICULTURAL SECTOR.

- Nigeria's agricultural sector has been described as one of the most underfunded in the world.

A. Nigeria's budgetary allocations to agricultural sector have not exceeded 2 per cent.

This is contrary to the Comprehensive Africa Agriculture Development Programme's (CAADP) Maputo Declaration's of 10% agricultural expenditure target in any year.

# Budgetary Allocation

Year	Total Budget (N' Billion/Trillion) (a)	Agriculture Allocation (N' Billion) (b)	As % of Total budget $b/a*100$	As 10% of Total (N' Billion) (d) (a/10)	Variance from 10% Benchmark (N' Billion)
2014	4.69	66.64	1.41	469.52	402.87
2015	4.49	40.65	0.90	449.33	408.68
2016	6.06	75.81	1.25	606.07	530.26
2017	7.44	135.55	1.89	744.12	608.57
2018	9.12	203.01	1.41	912.03	709.02
2019	8.92	107.22	1.20	891.70	784.48
Funding Gap arising from the variance:					N3.44 trillion

Source: OXFAM (2020)

**B. Neglected agricultural research system:** Nigeria's agricultural research system, the largest in sub-Saharan Africa, has stagnated. It is plagued by inadequate funding, poor research infrastructure and unskilled workers and has become largely disconnected from the priorities of Nigerian farmers.

i. Public Agricultural research and development (R&D) spending plans

2010-2015 Nigeria spent approx. 1.5 percent of the budget on agricultural research activities [cf.]

Uganda (12.6%); Benin (17.0%); Côte d'Ivoire (20.0%)

## C. Global Innovation Index

2018 – Nigeria ranked 11<sup>th</sup> out of 22 Countries (South Africa, Mauritius and Kenya – best places for innovation in Africa)

2019: Nigeria ranked 27<sup>th</sup> out of 29<sup>th</sup> in lower middle income group – OVERALL RANK – 117 – 125.

SSA 15<sup>TH</sup> of 25.

## D. Global Competitiveness Index (GCI)

2017-2018 – Nigeria ranked 125<sup>th</sup> out of 137 countries.

- 2019 – Nigeria ranked 116<sup>th</sup> out of 141 countries

## E. Ease of Doing Business

2019 – 131<sup>st</sup> out of 146 countries

## F. Lending to the Agricultural Sector

2016 (3.26 %) and 2017 (3.36%)

(cf. Kenya -6%; Brazil, 18%).

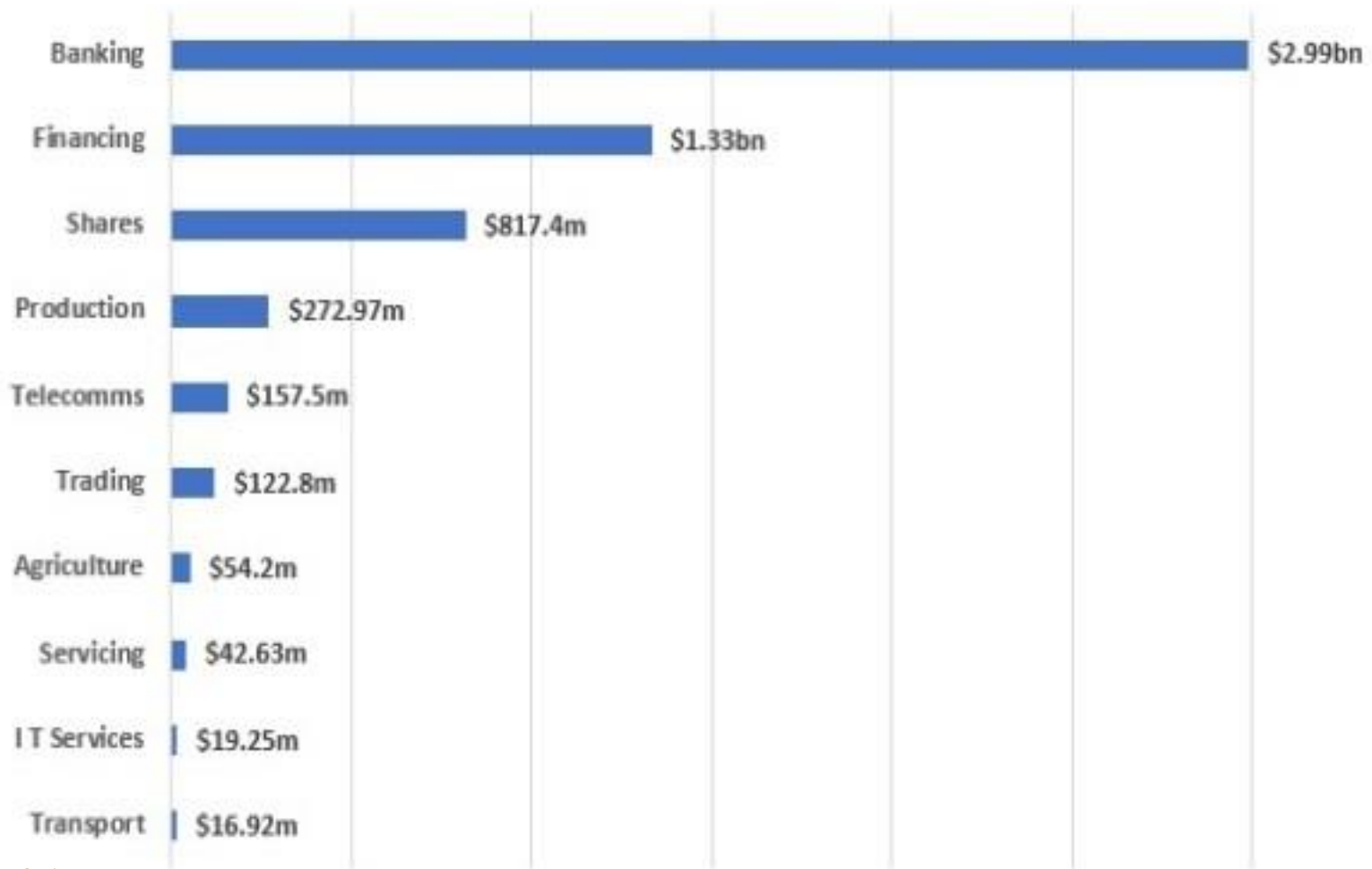
G. Foreign Direct Investment (FDI) in the agric sector have grown consistently at an annual average of 82percent within the last six years,

- 2018 (\$290million)
- 2019 - hits \$490million (N176.4bn) , 69 % higher than 2018
- Q1 of 2020 - Total Capital Importation (inflows) \$5.85 billion
- Banking sector - 51.08% (\$2.99bn) largest portion
- Agriculture sector - 0.93% (\$54.2.m) 7<sup>th</sup> largest portion (out of 10 sectors)



# With Regard to Nigeria

Capital inflows by sectors in Q1 2020



## H. Factors of Production

- Improved seeds, fertilizer and agricultural machinery (3 most important) but barely feature in most of Nigeria's farming operations.
- Effective coordination is important.

## i. Improved Seeds

- Less than 1% (8, 000 tonnes) of improved seed inputs made available
- Estimated requirement - 1, 000, 000 tonnes per annum.
- Less than a third of African farmers use improved inputs.
- **Sad Commentary:** In all regions but Africa, crop yields have remained a step ahead of population growth.

## ii. Fertilizer Use in Nigeria

Increased by 63% in 2017 rising from 959,364 metric tonnes in 2016 to 1,564,816 mt.

- Fertilizer Use Proportion: 2010 (7kg/ha)
- 2015 (8.3 kg/ha)
- 2019 (13 kg/ha)
- African Average (8kg/ha)
- Global Average (99kg/ha)
- FAO Recommendation for SSA 200 kg/ha

### iii. Mechanized Agriculture

- No. of Serviceable tractors in Nigeria (approx. 45,000 units).
- Nigeria - One of the least mechanized farming countries globally,
- Tractor density - 0.27hp/ha, far below FAO recommended 1.5hp/ha.
- Ranked 132<sup>nd</sup> out of 188 countries surveyed on agricultural mechanization
- Requires about 750,000 tractors to be at par with global average.
- Five (5) functional tractors are available for 100ha of arable land in sampled states; Current Survey Ozumba et al (2020)

## 1. Agricultural Re – Investment (Insurance)

Very low (Only 1% farmers can easily access insurance)

Out of 20 million commercial farmers in Nigeria, only 700,000 (3.5%) have accessed agricultural insurance as at 2014, implying over 19 million farmers are still unserved (OXFAM-2017).

- Low budgetary allocation and release to the Nigerian Agricultural Insurance Commission (NAIC).
- 2014, N250million allocated – only N100million was released;
- 2015, N148million was budgeted – N16million was released;
- 2016, N108million was budgeted – N71million was released;
- 2017, N917million was budgeted – N454million was released;

- Women Farmers: Between 2014-2018, of the N1.1billion expended for agricultural insurance only 3.24 % (N37. 1m) was accessed by them.

## J. Infractions/Inequities on the Socio-economic Fabric of the Economy

- i. A clear paradox is that of reported increase in domestic food production and increasing hunger and malnutrition in the country.
- Lots of Reported food production increases (CBN, 2016)

- March 2017 - about 7.1 million people in Nigeria were facing acute food insecurity and in need of urgent life saving and livelihood protection (FAO, 2017).
- Nigeria accounts for 40.65% (5.0 million) of the people estimated to be in food crisis in West Africa.



## ii. Food Inflation

- Despite the continuous increase in Nigeria's food prices, global commodity prices have been declining (the 5th year in a row in 2016)
- NBS shows that the composite food index rose by 15.48% in July 2020 compared to 15.18% in June 2020. This represents 0.34% increase compared to June figures.
- The Brookings Institution has rated Nigeria as the nation with the highest number of extremely poor people in the world.
- In May 2018, 87 million people lived in extreme poverty
- Number of Nigerians in extreme poverty increases by 6 people every minute

### iii. Inflation Rate

- Rose by 12.82% (year-on-year) in July, compared to 12.56% recorded in June 2020.
- Highest rate recorded in 27 months since March 2018 when headline inflation was 13.34%.
- Nigeria ranked a very lowly 6<sup>th</sup> on Hanke's Misery Index 2017, behind Egypt, and with an index score of 52.1.
- On the prosperity Index, the Legatum Prosperity Index ranked Nigeria 128<sup>th</sup> out of 149 countries.
- Nigeria has the highest poverty rate in all OPEC countries.

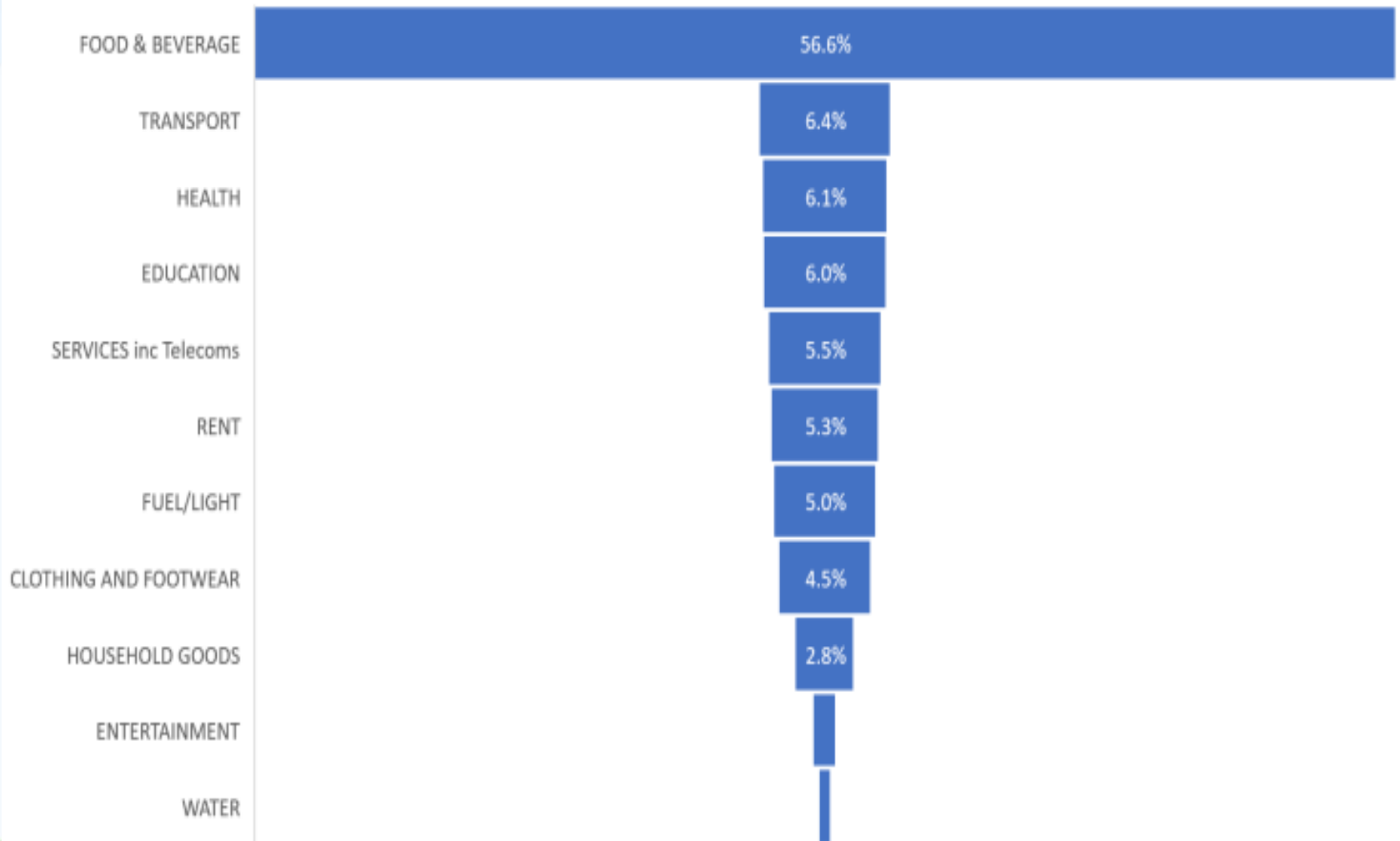
- In May 2018, 87 million people lived in extreme poverty

Nigerians spend over half (56.65%) of household income on food (the highest of all the 10 nations, world-wide that spend more than 40% of their income on food).

- USA citizens spend at least 6.4% household budget on food.
- Nigerians incurred **N40.20 trillion** as household consumption expenditure in 2019. (NBS, 2020) Food items (22.7 Trillion, - 56.65% of Nigeria's consumption expenditure
- In 2009 (the last time the report was published,) Nigerians spent **N21.62 trillion** on consumption expenditure.

# Consumption Expenditure (Nigeria, 2019)

Chart Title



Oxfam (2017) views poverty in Nigeria as outrageous because it thrives in the context of expanded economy, where benefits are reaped by a minority.

Oxfam (2017) avers that lifting all poor Nigerians living below the poverty line of USD1.90 for one year will cost about USD 24 billion, the amount of which is lower than the total overall wealth owned by the 5 richest Nigerians (USD 29.9 billion).

## K. Youth

- There is a seeming disconnect between the agricultural sector and its contribution to Nigeria's survival and ultimate sustenance.
- Agriculture is widely regarded as having an undisputable capacity for employment opportunities - this is however not reflected in the ever expanding labour market.
- The unemployment rate was 18.8% in the third quarter of 2017.
- 27.1% in the second quarter of 2020 (21.7 million Nigerians remain unemployed) while 55.7% is the combined figure for both the unemployed and underemployed (28.6%)

- Unemployment rate among young people (15-34 years) was 34.9%, up from 29.7%, while the rate of underemployment for the same age group rose to 28.2% from 25.7% in Q3, 2018. These rates were the highest when compared to other age groupings.
- Nigeria's youth are hardest hit by unemployment with over 13.9 million people aged between 15 and 34 years unemployed.
- Graduates and post graduates combined made up about 2.9 million of the total Nigerians that are unemployed.

## L. Climate Change

- Nigeria's low rating is exacerbated by Climate Change hazard and Lack of Water (especially in Lake Chad region) with 24 percent of its population at risk.
- Climate change could decrease Nigeria's economic productivity by up to 11 percent by 2020, and up to 30 percent by 2050. Agricultural productivity is projected to decline by 10 to 25 percent by 2080, and by 50 percent in some northern regions of the country.
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- 2018 - Nigeria was ranked as the world's 4th most vulnerable country to climate change.
- Declining productivity of livestock, with adverse consequences on livelihoods
- Increase in food imports (up to 40 percent for rice long term)



- A long-term decline in GDP of up to 4.5%.
- Funding needed to mitigate climate change is estimated by the country's environment ministry at \$10 billion per year through 2030
- But as of May 2017, Nigeria has leveraged \$63 million of multilateral funds for climate change projects (Overseas Development Institute, 2015). This is broadly equal to that of Rwanda, whose population is roughly 7 per cent of Nigeria's, and is just over a tenth of the funding approved for South Africa.
- Nigeria's population size is about equal to the combined populations of the six countries receiving the largest share of multilateral climate adaptation funding — Niger, Tanzania, Mozambique, Zambia, Mali, and Uganda. Yet these countries have received a combined 47 times the amount of finance for adaptation as the population of Nigeria
- Nigeria has not benefitted from multilateral climate funding because it has not established enough institutional frameworks to access this funding.

## M. **Agricultural Extension Services**

It is commonplace to hear government officials and indeed all those related to agriculture extolling the virtues and indispensability of extension in the agricultural innovation value chain, but at the end it all ends up to paying lip service as extension provisions are usually the first to be relegated even when provided at all (NUC, 2018).

However, the success of the Asian green revolution has been anchored on the elaborate extension service that was at the centre of farmers' mobilization in the utilization of inputs, especially farm mechanization, and other innovations and appropriate technologies.

- According to experts, there exists a wide extension agent-to-farm ratio in Nigeria where it is estimated that there is one (1) extension agent to 2,500 to 10,000 farm families depending on the state in the country. This is against FAO recommended ratio of 1:800
- Low government funding for extension services has led to the unavailability of input materials needed to support farmers such as 4WD vehicles, farmer's skills acquisition centres, demonstration centres, demonstration kits and low morale exhibited by the extension workers.

- There is need to revisit the ADP extension system, which sustained the Fadama I, II, and III projects and the great successes recorded in boosting agricultural productivity when it lasted.
- The Federal government on May 3, 2020 inaugurated the Technical Committee on the Revitalization of Extension Services Workers, stating that agricultural development in Nigeria requires an integrated approach to revive extension advisory services. It is expected that the Programme would stimulate technology adoption and embed Good Agricultural Practice (GAP) towards improving food requirements and industrial expectations. It is expected that the Committee will also bring up modalities to assist the Ministry in developing a workable framework and actionable Programme for the training of 75,000 extension workers in collaboration with States' Agricultural Development Projects (ADPs).

## 4. EFFECT OF COVID-19 PANDEMIC ON FOOD SECURITY

### A. Acute Hunger:

- About 265 million people (up from 135 million people) could be plunged into acute hunger by the end of 2020.

In March 2020, Nigeria was listed among 44 countries globally that require external food assistance.

- Majority Nigerians are unable to procure food items from local market due to very low incomes, high food prices and bottlenecks in the distribution of agric products within the country.

## B. Degraded Farming Season and Possible Effect on Food Availability from Q3 2020.

- Current farming season was disrupted due to lockdown and restriction on Inter-state movement.
- Situation compounded by ban on importation of major food products and depletion of Strategic Grains Reserve
- Local agro industrial firms may face shortages of key inputs or shortage of raw materials for production
- The challenges arising therefore may become manifest from Q3 2020.
- **Hike in food prices**

Panic buying due to lockdown cost a rise in the prices of basic food stuffs and essential household items, causing inflation to rise; inflation has risen five times this year.

### C. Disruption in Food Distribution and Supply Chain

- Inability to distribute food is one of the reasons for food insecurity and the high cost of food in Nigeria.
- Arising from distortion caused by pandemic, the distribution of food across the country could deteriorate in the coming months.
- At the core of the food distribution system are storage facilities especially for perishable foods about 70% of fresh agric produce get spoiled on the road).

- The infrastructure needed to Preserve and Store and store agricultural products in Nigeria is grossly inadequate.
- About 75 government warehouses, 33 silo complexes and 10 conditioning centres scattered around Nigeria

#### D. Depletion of the Strategic Reserves of food.

- 70, 000 metric tonnes (MT) of food, mostly grains from the six silo complexes of the National Food and Strategic Reserve were released to cushion the impact of lockdown on the poor and vulnerable.



## E. Decline in Export Earnings from Agribusiness

- Driven by combination of declining price and dampened demand by import partners.
- Logistic constraints at the port are another challenge. Currently, all terminals in Lagos are between 90-95% full of uncleared cargo – many of which are carrying non – essential goods.
- Slowdown in the implementation of government's agribusiness funding interventions

## 5. GOVERNMENT ACTIONS TO CUSHION EFFECT OF PANDEMIC

- Apart from Anchor Borrowers Programme and Agricultural Credit Guarantee Scheme,
- The CBN introduced **N50 billion** Targeted Credit Facility (TCF) as a stimulus package for firms; Approved the disbursement of **N75 billion** loan guarantee scheme under NIRSAL;
- Reduced its interest rate for all its previous intervention funding such as the ABP and ACGS from 9% to 5% per annual;
- Recently the FGN approved **US1.2 billion** loan facility for the FMARD to build 140 processing centres and purchase tractors and other farm machines for about 632 local government.

- Extended the moratorium on the payment of principal of its intervention funds by one year
- Granted leave for all banks to restructure their loan terms.
- Despite all-COVID-19 has slowed down the rate of investment.
- Disruption of Agricultural Promotion Policy (APP) targets for self-sufficiency in certain food items
- Decline in disposable Income

## B. Recommendations for Improvement

- Reduction of fertilizer price from N5,500 to N5,000. Government should explore other palliatives like free farm inputs, hire of implements at highly subsidies prices and free extension services to farmers.
- Increase in budgetary allocations to agriculture
- Increase in the Capacity of Existing Strategic Food Reserves

## Recommendations for Improvement Silos Capacity

<b>Region</b>	<b>Operational Capacity</b>	<b>Non-Operational Capacity</b>	<b>Total Capacity</b>
<b>North Central</b>	136,000	150,000	286,000
<b>North East</b>	25,000	200,000	225,000
<b>North West</b>	25,000	275,000	300,000
<b>South West</b>	50,000	150,000	200,000
<b>South South</b>	50,000	125,000	175,000
<b>South East</b>	-	150,000	150,000
<b>Total</b>	<b>286,000</b>	<b>1,050,000</b>	<b>1,336,000</b>

# Recommendations for Improvement

## Utilise Moribund Silos

- Food prices in 2009 cost Nigeria to increase its grains reserves from 13 to about 33 silos complexes with the total capacity of 1,336,000.
- Six of these silos are managed by the government. In 2018 FGN entered into a concessionary agreement with 13 companies to lease out 20 silos - still unutilized.

## 6. VARIOUS ATTEMPTS TO REVITALIZE THE AGRICULTURAL SECTOR

- Agricultural policies, programmes and projects featured in the various development plans until mid-1980s when planning was abandoned and SAP introduced.
- The first post-independence agricultural policy document was crafted during this period and launched in 1988. However, it could not be reviewed 10 years after its implementation as envisioned before the inception of civilian administration in 1999.
- By 2001 a new policy was prepared (FRN, 2001) and implemented during the period of strategic planning exemplified by NEEDS I and II (2001-2007).
- The Seven-Point Agenda (2007-2010) that witnessed the preparation of the Food Security Strategy Document in 2009 which started to emphasize the need for a value chain approach to agricultural development.

- These strategic planning periods also featured the formulation of sub-sector-specific policies such as the Land Resources Policy,
- National Agricultural Mechanization Policy,
- National Cooperative Development Policy,
- National Seed Policy,
- National Policy on Integrated Rural Development.



# Programmes and Projects Implemented Between 2001 and 2009

- Special Programme for Food Security (**SPFS**);
- Fadama II Programme; **Fertilizer Revolving Fund (FRF)**;
- **Presidential Initiatives** on Cassava, Rice, Vegetable Oil, Tree Crops and Livestock;
- Restructuring and recapitalization of the Nigerian Agricultural, Cooperative and Rural Development Bank (**NACRDB**);
- Formation of **Three agricultural development and marketing companies** (the Tree Crops Development and Marketing Company, the Livestock Development and Marketing Company and the Arable Crops Development and Marketing Company);
- The Central Bank of Nigeria (CBN);
- The Trust Fund Model (**TFM**);
- **Increase of Silo storage capacity** from 600,000 MT to One Million MT with the completion of 4 additional silo complexes.

Despite these achievements, challenges remain:

- low productivity;
- Under investment by the private sector;
- Land ownership and tenure rigidities;
- Weak research-extension linkage;
- Poor infrastructure;
- Restricted access to credit;
- Ageing farming population;
- Low returns on investments;
- Persistent rural-urban population drift;
- Unsustainable development paradigm due to short planning horizons.

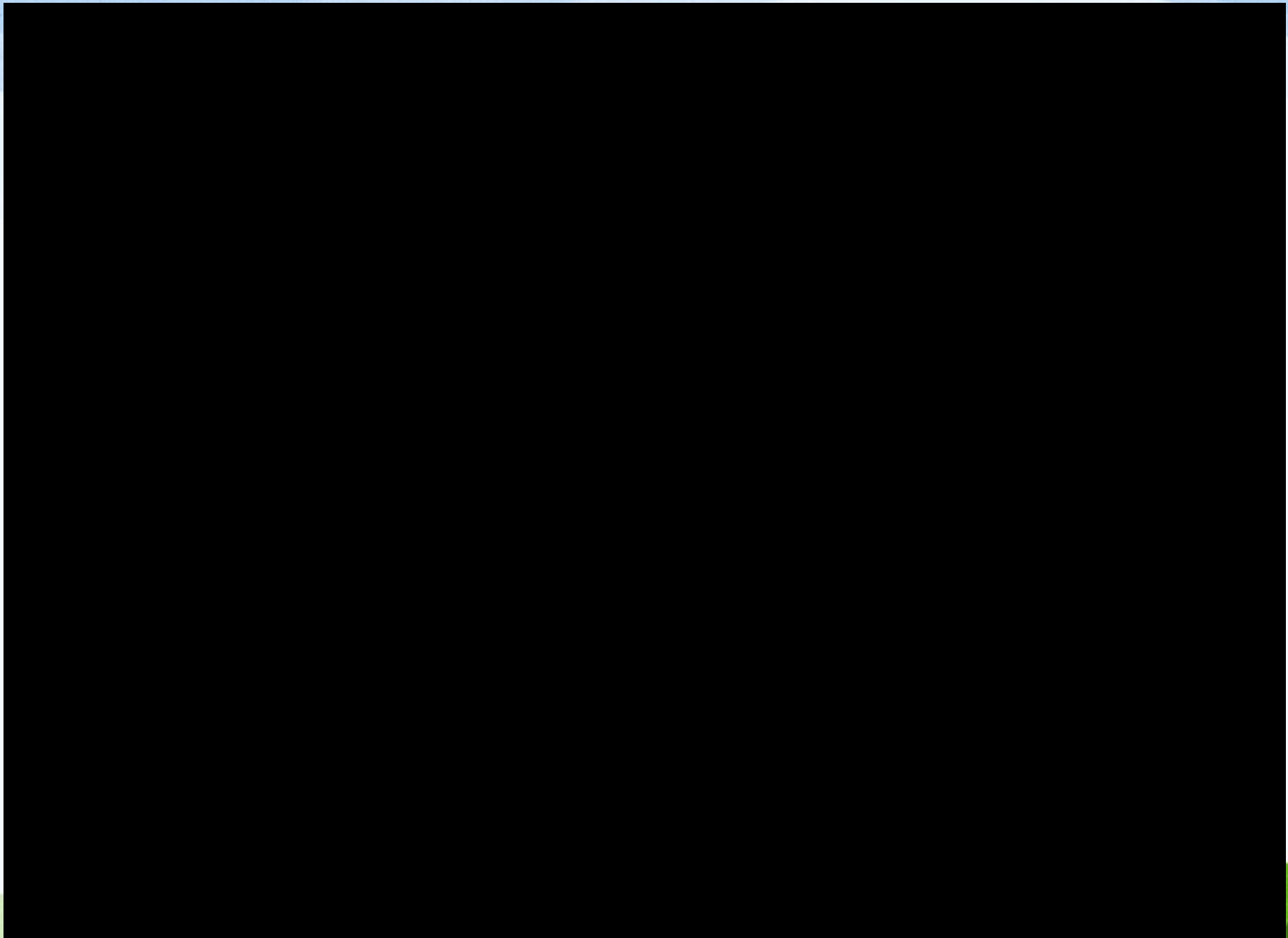
- These and other challenges were addressed in the **Nigerian Vision 20: 2020 (NV20: 2020)** which was prepared in 2009 (launched in 2010).
- The first implementation plan (2010-2013)
- Second Implementation Plan (2014-2017)
- Third Implementation Plan (2018-2020)
- The agricultural sector has witnessed remarkable policy changes since the launch of the vision document
- The first implementation plan (2010-2013) was ongoing when the **Agricultural Transformation Agenda (ATA)** came on stream in 2011 and lasted till 2015.
- In August 2016, the **Agriculture Promotion Policy (The Green Alternative)** was launched and it is now reshaping the direction of agricultural development in the country.

## **The overall goals and targets of the vision 2020 were:**

- To achieve a 3-fold increase in domestic agricultural productivity by 2015 and 6-fold increase by 2020
- To transform the Nigerian agricultural production system to a substantially mechanized system by 2020
- Expand dairy production and milk yield from the current less than 2000 kg to 5,000 kg per cow per lactation by 2015
- Achieve 20% farm-gate storage, 75% commercial storage and 5% strategic reserves by 2020
- To achieve a fully digital, green and biotechnology driven agriculture by the year 2020
- To derive over 50% of the nation's foreign exchange earnings through agro-industrial exports by 2020
- To reduce the present level of food import by 50% in 2015 and by 90% in 2020
- To reduce the post harvest loss of agricultural produce by an average of 50% in 2015 and 90% in 2020

## B. Recommendations for Improved Agro Development

1. Realign Fiscal and Monetary Policies to Encourage Agriculture's Access to Credit.
2. Strengthen Institutional Linkage to Promote Agricultural Export
3. Emphasis must be given to the export of high value-added products
4. Revitalization of the Agricultural Extension Service
5. Strengthen institutional framework for data collection on social protection, women empowerment and other key areas
6. Establish budget line for nutrition in the relevant MDAs
7. Improve high level political buy-in of the Maputo and <sup>61</sup>Malabo declarations



## 7. AGRICULTURE AND MANUFACTURING

- For any economy to drive to maturity and industrial revolution, structural transformation must occur. Structural transformation accompanies development, they are interrelated.
- Structural adjustment touches on how an economy transits from agriculture to industry and from industry to service. The initial stage of any economy is the agricultural phase, then gradually moves to industry and then to service.
- So it may be difficult to transit to industry if the agricultural stage is not well managed. Any country that desires development must experience each phase duly before any transformation can be achieved.
- It is confirmed that growth in agriculture is more effective in reducing poverty than growth in other sectors.

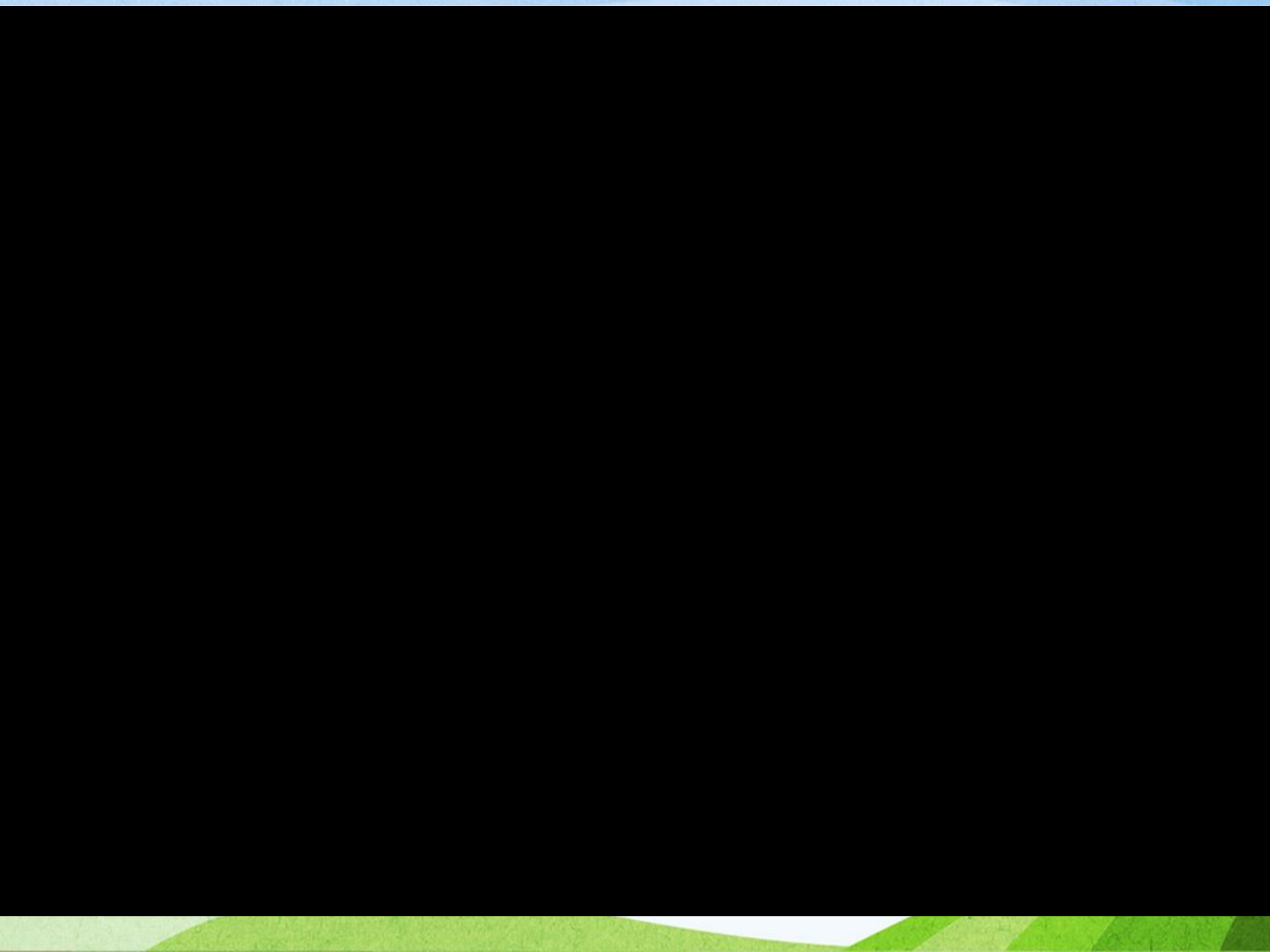
- But beyond a basic, subsistence level of development, industrialization determines agricultural efficiency and expansion, and even the development of high-value services.
- For any country to experience industrial revolution, labour in the agricultural sector must be moved to the agricultural sector; however, the sector's productivity must not decline as a result of the labour migration.
- The productivity level of agriculture can be maintained through technology, re-training of labour, investing in factors of production and investing in agriculture researches.
- The matters arising in Nigeria's Industrial revolution are that the country has not explored its comparative advantage.
- Agricultural producers have to move beyond the raw material stage and become more involved in value added activities.



- Countries grow wealthy and prosperous through the structural transformation of their economies – by moving capital, labour and technology from lower to higher-productivity sectors.
- Manufacturing is the most productive sector, the Asian experience shows; where growth-inducing structural transformation from low-productivity subsistence agriculture to high productivity manufacturing led to rapid income growth, unprecedented levels of poverty alleviation and improved livelihoods.
- For SSA- a shift has occurred from low productivity agriculture to slightly more productive employment in services, generally consisting of wholesale and retail trade in the informal sector (Bhorat et al, 2017).
- However, low-end services such as retail and trade were reported to be only two times more productive than agriculture, with the result that growth in services in Africa has contributed to no or slow growth in aggregate per capita income (Cervantes-Godoy and Dewbre, 2010)

- Manufacturing is however unique in its potential to transform productivity and induce rapid economic growth. This is more so in Africa, it has been reported that manufacturing is six times more productive than agriculture and that growth in manufacturing propels more rapid general economic productivity improvements (Cilliers, 2018).
- Rather than improving productivity, Africa's structural transformation from low-productivity agriculture to low productivity urban-based retail services has therefore been 'growth reducing'.
- This is because the share of workers employed in high-productivity sectors such as manufacturing is declining, offsetting positive 'within sector' productivity growth. The result is that the aggregate growth of output per worker is declining (Bhorat, 2017)

- The knowledge spillover from manufacturing eventually makes it profitable to invest in more productive agricultural machinery and systems.
- Growth in manufacturing thereby increases wages and productivity in the agricultural sector. Agriculture and other components of the primary sector can eventually be part of the 'high-tech' sector (given the potential for technological upgrading within the agricultural sector) when combined with IT or digital technologies.



## 8. FOURTH INDUSTRIAL REVOLUTION (4IR)/(DIGITAL REVOLUTION) AND AGRICULTURE

A. Introduction - The Fourth Industrial Revolution (4IR) is also known as the 'digital revolution',

The 4th revolution refers to a unique era of technology development marked by a fusion of digital, biological, and physical systems, in a way that will affect all sectors of life.

It talks about self-driving cars, electric cars, robotics, 3D printing, ambient computing, wearable technologies and automation; among others.

Under this technological revolution, leather will come - not from the unequal body sizes of random animals, but from the predictable calculations of genetic engineering.

# Digital Agriculture- Through the Fourth Industrial Revolution (4IR)

**Table 1: Main Characteristics of Industrial Revolutions**

Period	Transition Period	Energy Resource	Main Technical Achievement	Main Developed Industries	Transport Means
I: 1760-1900	1860-1900	Coal	Steam Engine	Textile, Steel	Train
II: 1900-1960	1940-1960	Oil Electricity	Internal Combustion Engine	Metallurgy, Auto, Machine Building	Train, Car
III: 1960-2000	1980-2000	Nuclear Energy Natural Gas	Computers, Robots	Auto, Chemistry	Car, Plane
IV: 2000-	2000-2010	Green Energies	Internet, 3D Printer, Genetic Engineering	High Tech Industries	Electric Car, Ultra-Fast Train

Source: Prisecaru, P. (2016)

## B. Key Emerging Technologies Linked to 4IR

- a) **Big data:** Voluminous machine-readable data
- b) **Big Data analytics:** Refers to techniques and technologies that allow big data to be generated, stored, accessed,
- c) **Cloud computing:** Cloud computing services are used over the internet to access software, computing power, storage capacity and the likes.

- *d) Additive manufacturing: The use of special printers to create three dimensional physical objects from 3D model data by adding layer upon layer through various means. Additive manufacturing is contrasted with subtractive manufacturing methods, which use moulds or rotating milling cutters to remove material from a solid block of materials .*
- *e) Artificial intelligence: The branch of computer science which seeks to make computers intelligent and capable of mimicking and predicting human behaviour and solving problems as well as or better than humans.*



f) **Blockchain:** A network of computers that must all approve a transaction before it can be verified and recorded. Using cryptography to keep transactions secure with reliability and anonymity.

- The record of events is shared between many parties and information once entered cannot be altered. Before blockchain, we relied on trusted institutions such as a bank to act as a middleman.

g) **Machine-to-machine:** Direct communication or data exchange between machines, or between machines and devices or components. The interconnection of more machines able to communicate is known as *Internet of Things*.

h) **The Internet of Things (IoT):** Is the Internetworking of physical devices. System of interrelated computing devices with the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction.

i) **Drones:** Unmanned flying vehicles that are controlled remotely. Depending on their design, they may be used for surveillance, survey, sports, cinematography and delivery.

j) **Robotics/ Robots:** Machines programmed by a computer and designed to execute one or more complex tasks automatically with speed and precision. Robots can be industrial robots (carry out industrial tasks); service robots (cleaning, surveillance and transportation tasks) and collaborative robots (portable and physically interact with man).

k) **Building Business around Social Platform (Network Building):** Use of social network which include e-marketing, mobile marketing, mass customization and social marketing.

Business platforms tools and techniques include; websites, online public relations, email, blogs, social networks, podcasts and wikis.

l) **Social commerce** is a subset of e-commerce that utilizes the social interaction media and technologies to assist in the marketing of goods and services

- These include; Facebook, Twitter, Youtube, Amazon, Google+, Instagram, Pinterest, LinkedIn as well as personal websites; among others.

## C. Preconditions for 4IR (Digitization) Take-off

There are three main preconditions for the take-up and take-off of 4IR technologies in Nigeria. They are **stable power supply, reliable and fast internet connectivity** (both through fibre mobile connections to the 'last mile') and **human capital**.

### i. Power Supply

- Nigeria has power supply deficits.
- About 80% of the population still does not have access to on-grid electricity, while
- Four (4) out of 5 people that do have a grid connection have to rely on expensive, petrol and diesel back-up generators to complement the electricity coming from the weak and unreliable power grid.
- Power Africa (2019) reports that 20 million Nigerian households have no access to power and places current access rate at 45%; with rural and urban estimates placed at 36% and 55% respectively.

## ii. Internet Connectivity

As regards internet connectivity, It is not possible to make the leap straight to mobile networks but rather a combination of investment in fibre broadband and 'last mile' mobile connectivity is required.

Below are a few indicators on the World Economic Forum's competitiveness index, placing Nigeria near the bottom of the rankings, as reported by ADB (2019):

- Mobile broadband subscriptions: 19.9% of the population (ranked 126th out of 140 countries);
- Fixed broadband internet subscriptions: 0.06% of the population (ranked 136th out of 140);
- Fibre internet subscriptions: 0% of the population (ranked 105th out of 140);
- Internet users: 25.7% of the population (ranked 107<sup>th</sup> out of 140).

Nevertheless, there have been some improvements. The country recently exceeded its own target of connecting 30% of the population to broadband, reaching 33% in early 2019, representing 65 million citizens. A new target of 70% has been set by the Federal Government for 2024.

### iii. Human Capital

- Perhaps, most important precondition for rapid 4IR take-up and reaping the associated rewards is a well-educated and motivated workforce with the right skills.
- Nigeria has already made significant progress in this regard but more needs to be done. According to the World Economic Forum, Nigeria is ranked 3.3 on a scale of 1-7 (121st out of 140 countries) in terms of the existence of digital skills in the population.
- In rural areas, more basic issues trump the lack of digital skills as many people are illiterate.
- The take-up of the 4IR is made more difficult by a mismatch of skills and a 'brain drain' of highly-skilled people to other countries. Where in the past many medical staff left for Europe and the US, it is now the software developers and coders that are joining start-ups around the world.

#### iv. Regulation & Government Support

A strong regulatory framework creates the legal certainty needed for investors to be confident enough in the Nigerian economy to invest in innovation. The WEF has two indicators positioning Nigeria in the lower ranks of countries with regard to its regulatory environment:

- Intellectual property protection: **3.1** on a scale of 1-7 (ranked 129th out of 140);
- E-participation index (use of online services to facilitate the provision of information by governments to citizens): **0.48** on a scale 0-1 (ranked 104th out of 140).

## D. Potentialities and Utilization of 4IR for Agricultural Development Purposes

4IR technology can combine traceability, digital finance and mobile-based information exchange and training, among many others; and also have the potential to makes farmers' lives better, by lifting yields, improving suitability and linking farms to markets (Dixie (2018)).

4IR technologies will also reduce environmental impact, by reducing use of chemicals through targeted on-leaf applications, and thereby enhance profitability of a farm enterprise.

However, it's only when these tools all work together in concert on a single farm that transformation is created.



# E. Expected Improved Outcomes From The Use of 4IR Technologies

## Expected Improved Outcomes From The Use Of 4ir Technologies

- i) IoT devices-collect data that can help farmers efficiently manage their farms, eliminate the need for manual monitoring in greenhouses, monitor the health, reproductive cycle and location of livestock, and also to monitor levels and health of water tanks and track dairy cows, through the aid of smart collars.
- ii) Big Data and AI- provide data to support farm management decisions, help in bovine facial recognition and herd behavior. AI start-ups also help to select good genetic breeds that address changing consumer demands in an accelerated and more precise manner
- iii) Blockchain devices can improve traceability, increase transparency in agricultural supply chains, and can help secure contracts and transactions, namely in land registration and agricultural insurance. It can also provide better monitoring of farmers' inventory and simplify their food value chain, resulting in greater income for the farmers.

iv) **Drone technology** - Used to monitor crop volume and vigour and track changes in plants and indicate their health. It can also be used for **precision spraying**, inspection of farm infrastructure, generation of high-resolution mapping and surveying of individual fields, crop damage assessment and insurance claim forensics. Drones are also used for **precision planting**, which will increase yield, with lower costs, faster planting speeds, and a reduced impact on the environment.

v) **Robotics** allows farmers to monitor factors, e.g., soil properties and animal movement in almost real-time circumstances. Robots are also being used to milk cows, feed chickens and harvest fruit. They may also be used for soil compaction and indoor hydroponic farming.

vi) A combination of IoT sensors, 3D aerial imagery from **drones**, and AI-powered analytics can help pesticide and fertilizer companies to use precision farming to analyze the characteristics of soil and the behavior of crops down to the square inch, which may soon significantly reduce the need for fertilizers and pesticides altogether.

vii) Mobile-commerce platforms exist that help farmers purchase supplies and raw materials. There is also a mobile app that utilizes a "missed call" technique. (The customer dials a number but disconnects before the call is picked up, which alerts the recipient that the caller wants to order or communicate but enables the caller to avoid cell-phone usage charges.)

viii) GPS packages are available that can track and map an agricultural producer's mechanized equipment, and help farmers to monitor their machines on a tablet or smartphone and direct them to where they are needed — when, for example, a storm is coming — as well as to reroute support vehicles carrying fuel, seed, and fertilizer.

ix) Drones, multispectral and satellite imagery — provide valuable information at a glance — for instance, whether a particular area or crop is unrecoverable and not worth spending further money on (e.g. fertilizer, pesticides). Satellites can be used to predict crop yields and will soon be used to look at any cultivated field and know what crop is growing there, when it was planted, what kind of soil it's growing in, how well it's growing, what the protein content is, what the yields will be, and when harvest time will be.

x) **Satellite and Unmanned Aerial Vehicle (UAV) Imagery and Transportation:** Weather modeling can be done with the aid of weather satellites to transmit weather data, predict weather patterns and warn farmers about conditions and, predict how the next season will be so as to plan for the amount of irrigation that will be needed.

UAVs can also be used in precision farming, for close-up visual inspections, or to detect the height of trees or crop canopy. They can also be used for index-based insurance, to transport small goods to places that are not easily reachable and in case of an emergency, a drone can be used to transport emergency equipment to a remote location and provide fast action.

xi). **Global Navigation Satellite Systems (GNSS)** are satellite constellations that provide world-wide positioning, navigation, and timing information. They can be used for increased accuracy in farm management and agricultural planning, to ensure efficiency. It can also be used to determine the exact location where pesticide, fertilizer or irrigation needs to be applied.

## F. Current Use of 4IR Technologies for Agricultural Development in Nigeria

- There are only a few companies leading the use of six prominent digital technologies (drones, blockchain, 3D printing, AI, big data analytics and IoT) in agriculture in Nigeria (ADB/ KOAFEC, 2019).
- Drones are hardly utilized because of legal barriers by the military, blockchain use is still at an exploratory stage, but it is the most frequently searched technology,
- There is limited scope for 3D- printing due to the low level of mechanization in the country;. It may be obvious that take-up of these technologies in Nigeria is still fairly low; their potential for modernizing the sector is as summarized by ADB (2019).

## Current Level of 4IR Utilization for Agricultural Purposes

<i>Technologies</i>	<i>Current Level of Use</i>	<i>Potentials for Application</i>
<i>Artificial Intelligence</i>	<i>Nascent/some examples</i>	<i>Good potential/numerous examples</i>
<i>Big Data Analytics</i>	<i>Nascent/some examples</i>	<i>Good potential/numerous examples</i>
<i>Blockchain</i>	<i>Nascent/some examples</i>	<i>Nascent/some examples</i>
<i>Drones</i>	<i>Nascent/some examples</i>	<i>Good potential/numerous examples</i>
<i>3D Printing</i>	<i>not many/few examples</i>	<i>Not many/few examples</i>
<i>IoT</i>	<i>Nascent/some examples</i>	<i>Good potential/numerous examples</i>

## G. Specific Current Use Cases and Potentialities for Development

Privately-ran Agritech start-ups are the main proponents and sponsors of 4IR use in Nigerian agriculture.

They seek to solve the logistics of food waste in the country and how to get produce from the farm to the end consumer in the most efficient and effective manner.

Some also create solutions for farmers to access credit to grow crops, connecting urban citizens with some disposable income with rural farmers who need the cash injection to expand their production.

ADB (2019) details a set of use cases of start-ups working on applying 4IR technologies to disrupt and modernize the agricultural sector in Nigeria.



a. MTN, Nigeria has an IoT-based Animal Identification Management System. The chips provide real-time information on the location of animals to the farmer, and produces automatic alerts if a cow breaks out of a designated area; Plantheus is a plant diagnostic application that requires no internet access to run diagnostics on the condition of (cocoa) plants, which is available in local languages.

b. Zenvus seeks to improve decision-making for farmers by providing insights into crop status based on data collected from sensors and IoT. The data is stored in the cloud and can be accessed by the farmers regardless of their location. This allows farmers to use fertilizers and irrigation more precisely, for increased farm efficiency;

c. Binkabi is a Blockchain-enabled agriculture trading platform developed in cooperation with Sterling Bank which will allow farmers to deposit their crops in a warehouse as opposed to the current situation in which they are often forced to sell it right away after harvest. The crops are used as assets to borrow money. XendBit is a Blockchain start-up in collaboration with the Nigeria Stock Exchange. The platform will allow for alternative funding and crowd funding of infrastructure and equipment for farms, and should reduce the counterparty risks when it comes to payments

d. Vetsark analyses Big Data to protect crops and livestock from pests and disease and works as a mobile platform for veterinarians, crop extension officers and farmers.

e. **Orbital Solutions** uses Big Data and drone technology and AI to provide small scale farmers with technology driven advisory services. They monitor crop health, predict yield, combat pests, use local language to provide weather information prediction and advisory services, and teach young people in local communities how to use ICT and Smartphone to collect and interpret data to support smallholder farmers.

f. **Track Your Build**- uses drones, satellites, cloud computing and data analytics to collect vegetation data in order to predict yields and maximize field productivity whilst reducing environmental impact.

g. **Hello Tractor**- uses AI and IoT solutions to track tractors and monitor their condition.

h. **Farmcrowdy** - connects investors and smallholder farmers on a crowd funding platform.

## H. Challenges Militating Against 4IR Use in Agriculture

Lack of quantity and quality of agricultural products in Nigeria. Digital solutions can provide answers to these issues, for instance, by using drones to monitor crop health.

Digital solutions require the necessary infrastructure: access to electricity, access to the internet, access to hardware (e.g. mobile phones, drones or other devices) and users who have sufficient knowledge as to how to use the applications that they are provided with.

Since literacy is an issue in Nigeria, especially in rural areas, digital solutions for agriculture need to take this into account.

Moreover, due to the different climate zones (ranging from tropical rain forest to the desert); advice for farmers needs to be adapted to these circumstances.

There are also sedentary and nomadic people in Nigeria and several languages are spoken, which highlight the need for custom-made solutions adapted to the cultural diversity of the country. Otherwise, there could be a risk of deepening inequality between those who are computer literate and those who are not.

These challenges notwithstanding, there are considerable rewards to be reaped from using the 4IR in agriculture in Nigeria, which should drive its take-up. The consequence of combining drones, IoT and AI would be more productive farms that increase food security and hence well-being, using fewer resources as inputs, which has a positive impact on the environment.

However, increased use of technology may also reduce the need for manual labour and hence the number of jobs in agriculture. This may not be a negative development, however, as it would mean that Nigeria's workforce would resemble more that of more advanced economies, with fewer people working in agriculture and more in industries and services and working in urban environments.

## 1. Strategies to Overcome Agro-Digitization Adoption Challenges.

a). The African Union (supported by the World Bank) is reported to have taken the first steps. Ghanem (2020) discloses that the African Union (supported by the World Bank) is pursuing a **Digital Moonshot Initiative** targeted at digitally transforming the rate of internet use to catch up and even surpass the rest of the world in a decade or less. This has five key elements, as stated below.

- The first element is investing in digital infrastructure to improve access and quality, which includes investing in connectivity (e.g., high speed internet, internet exchange points), the Internet of Things (e.g., mobile devices, computers) and data repositories (e.g., data centers, clouds). These upgrades will require some public investments, but most investment will need to come from the private sector, hence the need for legal and regulatory reforms to encourage private investment.
- The second element is investing in a digitally savvy workforce to build robust digital economies and competitive markets.

- **Third** is investment in digital platforms that offer products and services through digital channels.
- **Fourth** is the development of digital financial services to enhance financial inclusion; this requires reforms of monetary and financial regulations and supervision systems to allow mobile phone operators to provide financial services.
- The **fifth** element is to create an ecosystem to encourage digital entrepreneurship and innovation.

**Other requisite important elements include;**

The need to put in place policies and institutions that encourage the private sector to invest; and to ensure that the needs of the digital economy do not distract from work to deal with other equally important needs, especially investment in human capital, energy, and transport.

b). Other strategies to ameliorate constraints deterring adoption of 4IR technologies are listed below, to include:

i) **Fixing the labor-skills mismatch** - through Investments in education and skills re-training programs. The focus here is the development of appropriate skills to identify and use technologies by updating existing curricula and developing new vocational education programs.

ii) **Develop policies that create conducive environment** for the development and adoption of new technologies, and ensure that wealth generated by new technologies is not accumulated by only some.

Invest in and promote the development of technologies that address the needs of low-income and vulnerable groups, including women

iii) **Enhancing agile governance** for secure, effective management of the 4IR and integration into global value chains.

iv) **Enactment of a comprehensive legal framework and institutional capacity** to address cybercrime.



## Nigeria must improve on its global e-Readiness Index status –

- Improved access to broadband and developing technical skills and technology hubs.
- Policies should address frameworks for increased digitalization and investment, including better and more affordable access to internet and other information and communications technologies (ICT) and ICT infrastructure and participation in global value chains.
- Necessary to facilitate collaboration that will lead to innovation through local content development.
- v) **Public – private collaboration** should contribute to investments in education and complementary skills through revising and reorienting the curriculum around science, technology, engineering and mathematics and providing better technical and vocational education and training.
- In the process, it will build a nation whose citizens can aspire to be the best in world and join a future that will be led by educated humans, supported by intelligent machines.

vi) **Universities** would play a crucial role. They would carry over the fruits of pure science to applied science and they would also provide laboratories and workspaces with the aim of developing entrepreneurial skills and fostering the demand for new products, services and applications. Their role in the digital cyber space cannot be overemphasized.

vii). The lack of adequate investments in research and development is an important obstacle. Nigeria must develop innovative financial instruments and public-private partnerships to fund human capital development, including a focus on industrial research and innovation hubs that bridge the gap between higher education institutions and the private sector to ensure the transition of 4IR products from the laboratory to the market.

viii). **Nigeria should Strengthen the capacity of the Private Sector** to improve the potential for innovation in the private sector.

The belief is that the private sector creates technologies that serve the needs of customers efficiently and effectively.

The role for governments would therefore be to de-emphasize focus on technologies in which investments can be made more appropriately by companies, while supporting a broad range of technological applications in different industries.

# CONCLUSION

It may be concluded that technology and advancements in science drive transformation around the world.

They create ripple effects on societies, institutions, and economies.

They will transform the ways in which we live, work, and interact with one another.

Understanding these new technologies and their disruption potential is critical for all nations and especially developing countries.

Every period of upheaval has winners and losers, and the technologies and systems involved in this latest revolution means that individuals and groups could win – or lose.

There have been positive strides in ensuring smallholders become involved in digital agriculture.

An estimated 33 million people – about 13 percent of all sub-Saharan African smallholders and pastoralists—are already registered for services such as weather updates and market linkages.

Ethiopia's "80-28" hotline—a farmer advisory service – has about 4 million users, and because of its free service and local language delivery, has the highest subscription on the continent.

On the other hand, Kenya leads the way in digitization in Africa, mainly, because of its Collaborations between agriculture and telecommunication.

One additional strategy is to blur the boundaries between different sectors. Digitization is not just an agricultural nor manufacturing issue, or a technological one. It involves many parts of the economy. Hence, digitization must be situated within a broader development and poverty reduction agenda

For instance, education is critical to farmers' ability to use and benefit from digital technologies. It is also crucial to place smallholders' front and center when designing policies and specific digital products meant to help them. In this way, digital transformation will reflect the users' needs.

It is a desideratum to move the digital sector forward. Experts assert that it would be a tragedy for Nigeria to miss the 4IR, because this presents a huge opportunity for Nigeria and other African countries to leapfrog into the global technology ecosystem

THANK YOU

