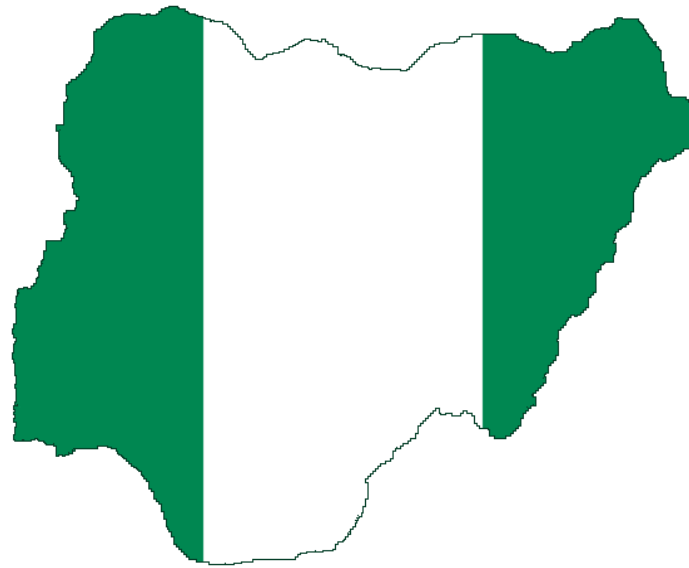


## NIGERIA

# Potentials and Possibilities for German Collaboration in Agriculture



## CONTRIBUTORS TO THE COUNTRY DOSSIER NIGERIA

ARCN: Dayo Phillips

FARA: Yemi Akinbamiyo, Fatunbi Oluwole Abiodun

ZEF: Heike Baumüller, Joachim von Braun, Annapia Debarry, Katharina Gallant, Tigabu Degu Getahun, Christine Husmann, Hannah Jaenicke, Oliver K. Kirui, Ehsan Eyshi Rezaei, Yasmin Smith, Justice Akpene Tambo, Detlef Virchow, Katharina Zinn

This report is work in progress and continuously being updated. Any feedback and suggestions for further improvement are welcome and can be sent to [pari@uni-bonn.de](mailto:pari@uni-bonn.de).

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## **1 General background information of the agricultural and food sectors**

Nigeria, a country in the West African sub-region of Africa, is bordered in the West by Benin Republic, Chad and Cameroon in the East and Niger Republic in the North. On the South lies the Gulf of Guinea in the Atlantic Ocean. Nigeria covers 923,768 km<sup>2</sup> with a population of 182.2 million people (estimate 2015) and a population density of 189.9 per km<sup>2</sup>. With an estimated nominal GDP of US\$ 522 billion (est. 2015), Nigeria presently has the largest economy in Africa. Nigeria's external earning is driven mainly by its oil sector, with the country ranking as the sixth largest exporting country, globally.

Agriculture employs about two-thirds of the total labor force, contributes about 22% of the GDP and provides 88% of non-oil earnings. More than 90% of the agricultural output is accounted for by small scale farmers with less than 2 ha under cropping. It is estimated that about 81% of the total land area has potential for agricultural activities with about 33 million ha under cultivation. Similarly, of the estimated 2 million ha irrigable land area, only about 220,000 ha (11%) is utilized.

In recent years, several attempts have been made by the Federal Government of Nigeria to reform Nigeria's agricultural sector. The most recent has been the Agricultural Transformation Agenda (ATA) Programme from 2011. The vision in the transformation strategy is to achieve a hunger free Nigeria through an agricultural sector that drives income growth, accelerates achievement of food and nutritional security, generates employment and transforms the country into a leading player in global food markets to grow wealth for millions of farmers. The strategy was to change the approach to fertilizer, seed and other inputs distribution, with greater emphasis on value chain development, national processing capacity development and private sector involvement. Consequently, some modest achievements have been made in the last four years with major increase in food production and reduction in the country's annual food import bills on rice, wheat and other major agricultural crops.

The potential for German collaboration in contributing to agricultural growth and development ranges from improved research capacity development in the areas of technology generation and improved seeds production, collaborations in innovation platform development/expansion, commodity value chain development and extension services.

### **1.1 Pan-African policies and strategies**

Nigeria was the 12<sup>th</sup> African country to sign the Comprehensive Africa Agriculture Development Programme (CAADP) compact in 2009, but implementation of the compact only started after the reconstitution of the Federal cabinet in 2011. CAADP represents the commitments of Presidents of African countries to commit at least 10% of their budget to agriculture and increase the agricultural sector at an annual growth rate of 6%. Nigeria did not meet the CAADP target of 10% national budget allocation to agriculture between 2003 and 2013, but has passed the annual 6% target in recent years.

Nigeria joined the New Alliance for Food Security and Nutrition in 2013 with the commitment to achieve sustained inclusive, agriculture-led growth in the country.

Nigeria is also part of the Grow Africa Partnership, with the goal of increasing private sector investment in agriculture, and accelerating the execution and impact of investment

commitments. The Grow Africa Partnership comprises over 200 companies and governments in 12 countries. These companies have made formal commitments with the government in the respective country to invest in agriculture. In 2013-2014, US\$ 611 million investments were made and 22,672 jobs were created in Nigeria by international and national companies within the Grow Africa Partnership and New Alliance for Food Security and Nutrition (New Alliance, 2014).

## **1.2 National (and regional) policies and strategies**

Several policies, programs and projects have been formulated and implemented during the last four decades in attempts to ensure that the Nigerian agricultural sector awakes to its traditional roles of providing food, export earnings, industrial raw materials and employment for the country. A brief review of some of the current agricultural policies, programmes and projects is presented below.

**Agricultural Development Projects (ADPs) (1974 to date):** The ADPs were initially funded by the World Bank, starting with pilot establishments at Gombe, Funtua and Gusau. ADPs were set up to provide extension services, technical input support and rural infrastructure services. The ADP concept was a response to the fall in agricultural production and hence, a concern to sustain domestic food supplies. The ADPs are presently implemented in all 36 States and the Federal Capital Territory.

The project changed the extension methods from the training and demonstration system to the training and visit (T&V) system. The T&V system was slow, resulting in a top-down rather than responsive recommendations to farmers and continued technical emphasis without attention to socioeconomics. Under the project, programmes for multiplication of improved seeds generally fell short of goals. However, the decline in oil prices that started in 1982 and the lack of will on the part of state governments to sustain the ADPs at the initial levels of funding gradually led to the decline in the agricultural extension delivery nationwide. Supplies of fertilizers were erratic largely due to centralized government control of international procurement and a very heavy subsidy programme. At project closure, most of the ADPs had a weak and uncertain funding structure and were providing poorer services than expected of the scheme. Efforts are being doubled in recent times to make the ADPs more effective, through increased commitment to funding as well as capacity and infrastructural development.

**River Basin Development Authority (RBDAs) (1977 to date):** The major instrument of the Water Resources and Irrigation Policy was the establishment of 11 RBDAs in 1977 to develop available water bodies in the country for agriculture, fishing and other purposes. RBDAs were the main instruments for the government's intervention in direct agricultural production through large scale mechanized farming. RBDAs had the mandate for land preparation, development of irrigation facilities and construction of dams, boreholes and roads. RBDAs were also involved in distribution of farming and fishing inputs. Some of the challenges that faced the RBDAs include political interference and managerial problems resulting from socioeconomic differences which permeated the nation's sociopolitical, economic and cultural institutions. Moreover, the RBDAs were highly capital intensive, with very little to showcase in terms of the total area irrigated nationally. The failure of the RBDAs to deliver large areas of irrigated lands led eventually to the conception and implementation of the World Bank funded National Fadama Development Projects (NFDPs).

**National Fadama Development Projects (NFDPs):** The NFDPs have been implemented in Phases I, II and III from 1992 to 2013. Nigeria has large areas of “Fadama” land which has only partially been developed. The Fadama I and II projects successfully refined approaches for improved utilization of these lands. Fadama II implemented an innovative local development planning (LDP) tool and built on the success of the community-driven development mechanisms. Fadama III supported the financing and implementation of five main components designed to transfer financial and technical resources to the beneficiary.

**Agricultural Transformation Agenda (ATA) (2011-date):** In 2011, the Federal Government of Nigeria launched an ambitious agricultural reform for the development of its agriculture sector. The agricultural policy in Nigeria was aligned with the Agricultural Transformation Agenda (ATA), which evolved from the National Economic Transformation Agenda. The ATA strives to increase agricultural productivity and value addition in agriculture in order to reduce food prices and Nigeria's reliance on food imports. The vision of the ATA is a food secure and prosperous Nigeria. The main aspects of ATA include value chain development, growth enhancement scheme for the provision of subsidized inputs, special crop processing zones, incentive-based risk-sharing system for agricultural lending, and private sector involvement.

Some of the strategies adopted to achieve the ambitious agricultural transformational goals in the country include:

- Import substitution of agricultural development initiatives to attain self-sufficiency in food production, reduce the cost of food, etc.;
- Export-oriented agricultural sector to broaden the resource base of the economy and foreign direct investments in areas where Nigeria has a comparative economic advantage in the production of various agricultural value chains;
- Grow the value-added agro-processing sector to leverage on direct foreign investment and economies of scale derived from an export-oriented agricultural sector to provide affordable raw materials and stimulate investment;
- Intra- and inter-sectoral linkages to integrate agriculture into a higher value-added manufacturing scheme with emphasis on agro and agro-allied industry through the provision of industrial machinery and materials and build a solid financial base in the country.

**The Nigeria Incentive-Based Risk-Sharing System for Agricultural Lending (NIRSAL):** This is a new innovative mechanism targeted at de-risking lending to the agricultural sector. The goal of NIRSAL, which was developed by the Alliance for Green Revolution in Africa (AGRA) on request of the Central Bank of Nigeria (CBN) is to trigger an agricultural industrialization process through increased production and processing of the greater part of what is produced to boost economic earnings across the value chain. NIRSAL is an approach that tackles both the agricultural value chains and the agricultural financing value chain.

**Growth Enhancement Support Scheme (GESS):** This scheme represents a policy and pragmatic shift within the existing Fertilizer Market Stabilization Program and it puts the resource constrained farmer at its center through the provision of series of incentives to encourage the critical actors in the fertilizer value chain to work together to improve productivity, household food security and income of the farmer. GESS targets five million farmers in each year for four years that will directly receive GESS on their mobile phone, totaling 20 million farmers at the end of four years. GESS provides support directly to farmers to enable them to procure agricultural inputs at affordable prices, at the right time

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and place. GESS increases productivity of farmers across the length and breadth of the country through increased use of fertilizer i.e., 50 kg/ha from 13 kg/ha. Also, there is a change in the role of Government from direct procurement and distribution of fertilizer to a facilitator of procurement, regulator of fertilizer quality and catalyst of active private sector participation in the fertilizer value chain. State Governments are also collaborating with the Federal Government under the GESS.

**Staple Crops Processing Zones** are about improving investment frameworks for agriculture in Nigeria. This idea focuses on attracting private sector agribusinesses to set up processing plants in zones of high food production and process commodities into food products. The government intends to put in place appropriate fiscal, investment and infrastructure policies for the staple crop processing zones. These include:

- Tax breaks on import of agricultural processing equipment;
- Tax holidays for food processors that are located in these zones;
- Supportive infrastructure, especially complementary investment by the government in roads, logistics, storage facilities and power;
- Infrastructure focus on power, irrigation, flood control, roads, rail, air etc.;
- Linking farmers in clusters to food manufacturing plants;
- Developing an Agricultural Investment Code, in partnership with Ministry of Finance and Ministry of Trade and Investment and CBN.

**Marketing Corporations:** Under the Agricultural Transformation Agenda, the government plans to strengthen the markets for agricultural commodities through the establishment of commodity marketing corporations around each of the commodities. The Federal Government intends to support the development of private sector driven-marketing organizations to grow the agricultural sector. These marketing institutions would be owned by agricultural value-chains and run as private sector led, but government enabled institutions to empower farmers and the value chain actors to generate value. These new institutions, which would be called marketing corporations, will coordinate production and export of target commodities. They will also attract investment into the sector from Research and Development to infrastructure and processing. They will also stimulate the development of tailored financial services to grow the sector.

### **1.3 Data on Food and Nutrition Security in the Country and AIC-Region**

The following section includes information about important socio-economic indicators, production and trade data and data on consumption and nutrition status.



**Table 1: Selected national economic and health-related data for Nigeria**

<b>Indicator</b>	<b>Data</b>	<b>Year</b>
Population, total	178,516,904	2014
Population growth (annual %)	2.8	2014
Rural population (% of total population)	53	2014
GDP per capita, PPP (constant 2011 international \$)	5,607	2014
GNI per capita, PPP (constant 2011 international \$)	5,166	2013
Poverty headcount ratio at \$2 a day (PPP) (% of population)	82	2010
Poverty headcount ratio at \$1.25 a day (PPP) (% of population)	62	2010
Poverty headcount ratio at national poverty lines (% of population)	46	2010
Rural poverty headcount ratio at national poverty lines (% of rural pop.)	53	2010
Agricultural land (% of land area)	79	2012
Agricultural irrigated land (% of total agricultural land)	no data	
Agriculture value added per worker (constant 2005 US\$)	4,760	2014
Agriculture, value added (% of GDP)	20	2014
Access to electricity, rural (% of rural population)	34	2014
Employees, agriculture, female (% of female employment)	39	2004
Employees, agriculture, male (% of male employment)	49	2004
Employment in agriculture (% of total employment)	45	2004
Literacy rate, adult total (% of people ages 15 and above)	51	2008
Ratio of female to male secondary enrollment (%)	89	2010
Mortality rate, under-5 (per 1,000 live births)	117	2013
Malnutrition prevalence, weight for age (% of children under 5)	31	2013
Malnutrition prevalence, height for age (% of children under 5)	36	2013
Maternal mortality ratio (modeled estimate, per 100,000 live births)	560	2013

Source: World Bank, <http://data.worldbank.org/country>

*Program of Accompanying Research for Agricultural Innovation (PARI)*

**Table 2: Gross Domestic Product at 1990 Constant Basic Prices (million Naira)**

	Agriculture	Crop Production	Livestock	Forestry	Fishery	Total GDP	Agric as % total GDP
1995	96,220.6	80,702.8	10,051.3	2,421.9	3,044.6	281,407.4	34.2
1996	100,216.2	83,761.5	10,342.8	2,434	3,677.9	293,755.4	34.1
1997	104,514	87,363.2	10,601.4	2,455.9	4,093.5	302,022.5	34.6
1998	108,814.1	90,770.4	10,887.6	2,485.4	4,670.7	310,890.1	35.0
1999	114,570.8	95,526.8	11,192.5	2,517.7	5,333.8	312,183.5	36.7
2000	117,945.1	98,392.56	11,449.9	2,555.5	5,547.2	329,178.7	35.8
2001	122,522.3	102,131.5	11,793.4	2,606.6	5,990.8	356,994.3	34.3
2002	190,133.4	168,777.9	12,360.6	2,624.8	6,370.1	433,203.5	43.9
2003	203,409.9	181,238.1	12,879	2,664.3	6,628.6	477,533	42.6
2004	216,208.5	192,452.2	13,716.1	2,837.4	7,202.7	527,576	41.0
2005	231,463.6	206,178.4	14,643.9	3,005.4	7,636	561,931.4	41.2
2006	248,599	221,622.3	15,654.7	3,186.2	8,135.8	595,821.6	41.7
2007	266,477.2	237,685.7	16,739.4	3,381.3	8,670.9	634,251.1	42.0
2008	283,175.4	252,469.7	17,877.6	3,587.6	9,240.5	672,202.6	42.1
2009	299,996.9	267,362.8	19,039.1	3,797.5	9,797.5	716,949.7	41.8
2010	317,282	282,605	20,264.4	4,016.8	10,395.4	776,332.2	40.9
2011	335,180	298,414	21,506.9	4,244.6	11,014.2	834,000.8	40.2
2012	348,491	309,644	22,699.3	44,86.7	11,661.1	888,893	39.2
2013	365,277	324,256	23,983.4	4,729.9	12,308.6		

Source: World Bank, <http://data.worldbank.org/country>

**Table 3: Agricultural Total Factor Productivity (TFP) index Nigeria, 1995-2011**

Index (1992=100)			Index (1961=100)		
Year	Est1	Est2	Year	Est1	Est2
1995	113	111	1995	118	96
1996	116	113	1996	122	98
1997	121	116	1997	127	100
1998	120	114	1998	126	98
1999	124	115	1999	130	99
2000	125	115	2000	131	99
2001	129	117	2001	135	101
2002	134	118	2002	140	102
2003	137	118	2003	144	101
2004	140	117	2004	147	101
2005	141	116	2005	148	100
2006	142	115	2006	148	99
2007	141	113	2007	148	98
2008	135	108	2008	142	93
2009	144	114	2009	151	98
2010	139	107	2010	146	92
2011	136	101	2011	142	87

Source: <http://www.ers.usda.gov/dataFiles/Internationalproductivity/AgTFPindividualcountries.xlsx>

Note: For each base year (1961 and 1992), two annual estimates of the Agricultural TFP were published on Nigeria by the data source.

Table 4: Annual growth rate of Agricultural TFP (Nigeria) 1995-2011

Year	Est1%	Est2%
1995	0.038527	0.028587
1996	0.031232	0.01941
1997	0.039133	0.025637
1998	-0.00544	-0.02085
1999	0.028249	0.013903
2000	0.01282	-0.00176
2001	0.03061	0.012189
2002	0.036175	0.012713
2003	0.022765	-0.0048
2004	0.023742	-0.00176
2005	0.007576	-0.01256
2006	0.001308	-0.01128
2007	-0.00424	-0.01112
2008	-0.04145	-0.04583
2009	0.065504	0.052782
2010	-0.03857	-0.06338
2011	-0.02289	-0.05436

Source: <http://www.ers.usda.gov/dataFiles/Internationalproductivity/AgTFPindividualcountries.xlsx>

Note: Two annual estimates of the Agricultural TFP growth rates were published on Nigeria by the data source.

Table 5: Public agricultural expenditure and Public Expenditure, Nigeria 1995 – 2010

Year	Public Agriculture Expenditure (PAE) Billion LCU	Total Expenditure Billion LCU	Share of Public Agriculture Expenditure (PAE) in Total Expenditure, %
1995	6.2	172.2	3.6
1996	5.5	172.5	3.2
1997	8.3	776.3	1.1
1998	11.8	363.5	3.2
1999	66.2	586.7	11.3
2000	12.1	765.6	1.6
2001	64.9	1,018.0	6.4
2002	47.1	1,018.2	4.6
2003	42.1	1,226.0	3.4
2004	80.9	1,426.3	5.7
2005	117.8	1,930.6	6.1
2006	127.6	1,847.2	6.9
2007	129.2	2,473.1	5.2
2008	130.8	2,880.2	4.5
2009	166.5	3,117.0	5.3
2010	220.8	3,845.8	5.7

ReSAKSS (Regional Strategic Analysis and Knowledge Support System). 2013. CAADP M&E Indicators:

Agriculture expenditure share in total expenditure. ReSAKSS, IFPRI, Washington, DC

(<http://www.resakss.org>); data accessed from ReSAKSS Africawide Node on September 8, 2015.

## 1.4 Data on most relevant crops and value chains

The most relevant crops in Nigeria include maize, rice, sorghum and millet, tubers (mainly cassava, yams and taro), legumes (including cow peas and peanuts), bananas and plantains, cocoa and oil palm. Production and consumption data are provided below.

### 1.4.1 Production

Table 6: Top 10 crops produced by area, volume and value

Area harvested (ha)		Production volume (tons)		Production value*	
Top 10	% of Total	Top 10	% of Total	Top 10	% of Total
Maize	12.2	Cassava	31.0	Yams	27.2
Sorghum	11.3	Yams	21.9	Cassava	12.5
Cassava	10.6	Maize	5.8	Oil, palm fruit	12.3
Yams	9.0	Oil, palm fruit	5.0	Maize	5.8
Cow peas, dry	7.7	Vegetables, fresh	3.8	Sorghum	3.5
Oil, palm fruit	7.0	Sorghum	3.8	Rice, paddy	3.4
Millet	6.1	Rice, paddy	3.0	Cow peas, dry	3.1
Rice, paddy	5.7	Fruit, citrus	2.4	Plantains	2.7
Groundnuts	5.5	Sweet potatoes	2.1	Groundnuts	2.2
Cocoa, beans	2.7	Taro (cocoyam)	2.1	Oil, palm	2.0
Rank 26: Potatoes	0.6	Rank 20: Potatoes	0.7	Rank 20: Potatoes	1.0

\* Gross Production Value (constant 2004-2006 mil. US\$). Source: average 2011-2013, FAOStat, accessed 9 July '15

Table 7: Average National yields of Maize, Sorghum, Rice and Cassava, Nigeria, Kg/ha

National data					FAO data				
Year	maize	sorghum	cassava	rice	Year	maize	sorghum	cassava	rice
1994	1,545	1,056	11,126	1,313	1994	1,272	1,080	10,592.7	1,416
1995	1,588	1,101	11,319	2,102	1995	1,266.6	1,148	10,667.1	1,625.8
1996	1,491	1,146	11,730	1,948	1996	1,326.1	1,144.2	10,664.6	1,749.8
1997	1,649	1,161	11,984	1,924	1997	1,251	1,107.5	11,881.8	1,595.7
1998	1,701	1,250	11,736	1,919	1998	1,320	1,132.8	10,746	1,602.3
1999	5,025	1,185	11,874	1,787	1999	1,599.8	1,126.1	9,599.8	1,495.7
2000	4,445	1,147	11,689	1,864	2000	1,300.1	1,120	9,700	1,499.8
2001	4,357	1,146	11,932	1,855	2001	1,399.9	1,100	9,601.198	1,300
2002	4,424.3	1,156	12,091	1,854	2002	1,489.9	1,100	9,901.335	1,340
2003	4,483.4	1,144	12,213	1,872	2003	1,499.9	1,155.9	10,402.29	1,410
2004	5,000.7	1,141	12,061	1,879	2004	1,600.2	1,220	11,001.13	1,419.9
2005	6,203.1	1,149	12,317	1,948	2005	1,659.8	1,260	10,990.22	1,430.2
2006	6,767.3	1,182	12,571	1,975	2006	1,818.2	1,350	12,000.26	1,483.3
2007	7,073.4	1,143	12,772	1,975	2007	1,704.9	1,159.5	11,202.58	1,299.9
2008	7,970.3	1,154	13,121	2,039	2008	1,957.1	1,223.3	11,800.42	1,754.4
2009	8,645.5	1,268	13,640	2,179	2009	2,196.1	1,114.5	11,767.94	1,930.6
2010					2010	1,850.2	1,439.7	12,215.51	1,838.6
2011					2011	1,527.9	1,410.1	14,022.53	1,770.6
2012					2012	1,809.6	1,254.5	14,025.97	1,800
2013					2013	2,000	1,218.2		1,807.7

## 1.4.2 Consumption and Nutrition Status

Table 8: Food supply by tons, kg per capita and kcal per capita

Food supply quantity (tons)		Food supply quantity (kg/capita/yr)		Food supply (kcal/capita/day)	
Top 10	% of Total	Top 10	kg	Top 10	kcal
Cassava and products	16	Cassava and products	123	Roots & Tuber Dry Equiv	609
Yams	13	Yams	100	Rice (Milled Equivalent)	291
Roots & Tuber Dry Equiv	9	Roots & Tuber Dry Equiv	66	Rice (Paddy Equivalent)	291
Beverages, Fermented	7	Beverages, Fermented	51	Yams	274
Vegetables, Other	6	Vegetables, Other	47	Maize and products	274
Rice (Paddy Equivalent)	6	Rice (Paddy Equivalent)	43	Cassava and products	270
Sorghum and products	4	Sorghum and products	32	Sorghum and products	259
Maize and products	4	Maize and products	31	Millet and products	186
Rice (Milled Equivalent)	4	Rice (Milled Equivalent)	29	Wheat and products	154
Millet and products	3	Millet and products	23	Palm Oil	131

Source: average 2011-2013, FAOStat, accessed 22 July 2015

## 1.4.3 Trade

Table 9: Nigeria's imports

Import volume (tons)		Import value (US\$)	
Top 10	Share of Total	Top 10	Share of Total
Wheat	42.8	Wheat	21.0
Rice – total (Rice milled equivalent)	22.5	Rice – total (Rice milled equivalent)	17.6
Sugar Raw Centrifugal	10.2	Oil, palm	16.3
Oil, palm	8.9	Sugar Raw Centrifugal	7.0
Sugar refined	4.0	Milk, whole dried	5.1
Tomatoes, paste	1.3	Food preparations, flour, malt extract	4.0
Malt	1.2	Food prep nes	3.8
Food preparations, flour, malt extract	0.8	Sugar refined	3.5
Milk, whole dried	0.8	Tomatoes, paste	2.4
Glucose and dextrose	0.8	Milk, skimmed dried	1.7
Flour, maize	0.1	Flour, maize	0.1

Data: average 2010-2012, FAOStat, accessed 31 Oct 2015

Note: AIC value chains marked in red; nes refers to Not elsewhere specified.

**Table 10: Nigeria's exports**

Export volume (tons)		Export value (US\$)	
Top 10	Share of Total	Top 10	Share of Total
Cocoa, beans	28.7	Cocoa, beans	42.6
Sesame seed	17.0	Rubber natural dry	12.9
Bran, wheat	14.6	Cashew nuts, with shell	11.4
Cake, palm kernel	9.3	Sesame seed	10.4
Rubber natural dry	7.0	Cocoa, butter	3.6
Cashew nuts, with shell	6.2	Cotton lint	3.0
Cotton lint	3.0	Cigarettes	2.7
Oil, palm	1.9	Cocoa, powder & cake	2.4
Cocoa, butter	1.7	Rubber, natural	1.7
Cocoa, powder & cake	1.3	Crude materials	1.4
Potato	0.1	Potato	0.0
Rice – total (Rice milled equivalent)	0.012	Rice – total (Rice milled equivalent)	0.001

Data: average 2010-2012, FaoStat, accessed 31 Oct 2015

Note: AIC value chains marked in red.

Wheat and rice are the most important import goods in Nigeria. Cocoa and sesame seed are the most important export goods. The export of cocoa accounts for more than 40% of the export value, but only for less than 30% of the export volume. Maize, cassava and potato can be neglected.

## **1.5 National (and Regional) Innovation System**

### **1.5.1 Research system and organizations**

Nigeria has the highest agricultural research capacity and spending levels in sub-Saharan Africa, but its investment in agricultural research as a share of agricultural GDP has always been quite low (e.g. 0.33% in 2011). The focus of agricultural research is heavily concentrated in the crops and livestock subsectors. The private-sector activity in agricultural research is negligible.

About 144 national agencies conduct agricultural research in Nigeria, including 22 government agencies and 122 higher education agencies (specialized universities, colleges, faculties, and departments). There are 15 national agricultural research institutes, which are coordinated by the Agricultural Research Council of Nigeria (ARCN). The research institutes within the ARCN are primarily involved in research for technology development, the universities of agriculture and the faculties of agriculture are involved in training manpower required by the sector and, to a lesser degree, technology generation and dissemination.

Nigeria also has 13 Federal colleges of agriculture which focus their attention on the training of intermediate level manpower in agriculture and rural development.

#### **1.5.1.1 International**

A number of international agricultural research centers having offices or programs in Nigeria. The International Institute of Tropical Agriculture (IITA), a member of the CGIAR, with the mission of increasing agricultural production, food security, and income in the tropics,

especially in Africa, is headquartered in Ibadan, Nigeria. It conducts research on key tropical crops, such as banana/plantain, cassava, cocoa, coffee, cowpea, maize, soybean, and yam, under the following thematic areas: biotechnology and genetic improvement, natural resource management, plant production and plant health, and social science and agribusiness. Other CGIAR centers conducting research activities in Nigeria include AfricaRice, International Livestock Research Institute (ILRI), International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), World Agroforestry Centre (ICRAF), and International Food Policy Research Institute (IFPRI).

### **1.5.1.2 National**

The 15 national agricultural research institutes are commodity based. They are:

- National Root Crops Research Institute (NRCRI);
- National Horticultural Research Institute (NIHORT);
- Cocoa Research Institute of Nigeria (CRIN);
- Nigerian Institute for Oil-Palm Research (NIFOR);
- Rubber Research Institute of Nigeria (RRIN);
- Nigerian Institute for Oceanography & Marine Research (NIOMR);
- Lake Chad Research Institute (LCRI);
- National Veterinary Research Institute (NVRI);
- National Institute for Fresh-Water Fisheries Research (NIFFR);
- Nigerian Stored Products Research Institute (NSPRI);
- National Cereal Research Institute (NCRI);
- Institute for Agricultural Research & Training (IAR&T);
- National Animal Production Research Institute (NAPRI);
- National Agricultural Extension & Research Liaison Services (NAERLS);
- Institute for Agricultural Research (IAR).

### **1.5.2 Innovation Platforms**

Innovation platforms are very common in Nigeria. Many projects are currently using the platforms to promote agricultural innovations. Examples are provided below:

- Since 2013, The West Africa Agricultural Productivity Programme (WAAPP) has sponsored the formation of Value Chain Innovation Platforms (VCIPs) in Nigeria in 7 priority commodity subsectors, namely, Aquaculture, Cassava, Maize, Mango, Rice, Sorghum, and Yam. WAAPP is using innovation platforms to disseminate improved technologies in Nigeria. The number of beneficiaries in 2014 was 588,585. The goal of the innovation platforms is to assist farmers' groups and other stakeholders to attain increased productivity, income, and economic opportunities of farming systems. Some of the impacts of platforms include, for instance, the cassava and yam platforms have trained about 38,639 of its members on various aspect of cassava/yam cultivation, processing and food standards. It has also facilitated interactions and collaborations among different platform actors and research agencies.
- The Research Into Use (RIU) programme funded by the UK's Department for International Development (DFID) implemented three innovation platforms in Nigeria between 2006 to 2011. These are cowpea and soybean innovation platform, cassava flour value chain innovation platform and aquaculture innovation platform. The

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platforms enabled farmers to get access to improved seeds and related inputs, improved post-harvest storage methods and skills, and face-to-face meetings with policy makers. An evaluation conducted by the Agricultural Research Council of Nigeria (ARCN), found a strong sense of ownership amongst the platform members, good evidence of partnership working with mainstream development and research agencies, and progress in terms of wide adoption of improved farm inputs (planting materials) and skills and knowledge transfer. Currently, two of these innovation platforms (cassava flour value chain innovation platform and aquaculture innovation platform) are either being strongly supported by or incorporated into national or state-level processes and priorities.

- The International Institute of Tropical Agriculture (IITA) is increasingly using innovation platforms as a scaling-out mechanisms for newly developed and existing agricultural technologies and to strengthen multi-stakeholder collaboration in its research programs and projects, such as the Humidtropics program, The Africa Research in Sustainable Intensification for the Next Generation (Africa RISING) program, and Support to Agricultural Research for Development of Strategic Crops in Africa (SARD-SC) program.
- The Sub Saharan Africa Challenge Program (SSA-CP), which was coordinated by FARA, used Innovation Platforms (IPs) as its operational frame to engage stakeholders in a network configuration to undertake multidisciplinary and participatory research. Eight IPs were established in northern Nigeria in the Kano–Katsina–Maradi (KKM) project learning site (see Table 11). These are: maize-legume, rice, vegetable, livestock, two maize-legume-livestock platforms, and two sorghum-legume-livestock platforms. A number of robust studies have been conducted to assess the impact of the SSA-CP innovation platforms. These studies have shown that IPs have positive impact on marketed crop outcomes. They also robustly promote the adoption of crop management innovations, and impact positively on the lives of the beneficiaries by about US\$1822 per annum or US\$4.99 per day per participant (Adekunle *et al.*, 2014; Pamuk *et al.*, 2014).



Table 11: FARA Innovation Platforms

Name of Platform	Location of Platform	Commodities of the platform
NGS Rice IP	Dandume Local Government, Kaduna state	Rice
NGS Maize- Legume IP	Ikara Local Government Area (Villages:Kargo, Bakula, Barangwaje, Jafallan and Rafin Tabo)	Maize, soy bean, cowpea
NGS Vegetable IP	Kudan Local Government Area, Kaduna state	tomato, sweet pepper, onion etc.
NGS Livestock IP	Kubau Local Government Area	Ruminant fattening
SS Maize-legume-Livestock IP	Bunkure LGA, 10 communities, Kano	Improved maize, sorghum and legume production systems, Improved seed systems, soil fertility and parasitic weed management, improved livestock nutrition, improved market and improved support from government
Sorghum-legume-Livestock	Shanono LGA, 10 communities	Improved sorghum, maize and legume production systems, Improved seed systems, soil fertility and parasitic weed management, improved livestock nutrition, improved market and improved support from government
SS Maize-Legume-Livestock	Musawa LGA, 11 communities, Katsina state	Improved maize, sorghum and legume production systems, Improved seed systems, soil fertility and parasitic weed management, improved livestock nutrition, improved market and improved support from government
SS Sorghum-Legume-livestock	Safana LGA, 10 communities, Katsina state	Improved maize and legume production systems, Improved seed systems, soil fertility and parasitic weed management, improved livestock nutrition, improved market and improved support from government

### 1.5.3 Extension System and Organizations

The Agricultural Development Programme (ADP), initiated with funding from the World Bank in the 1980s, remains the main source of extension and advisory services in Nigeria. Extension activities implemented by the ADPs include establishing demonstration farms, identifying lead farmers, providing lead farmers with information about improved farming practices, facilitating access to improved technology and inputs and helping lead farmers teach other farmers. The quantity and quality of the extension workers are low. It is estimated that depending on the State, there is one extension agent to approximately 2,500 - 10,000 farm families (Obiora and Emodi, 2013). Several extension systems and programmes have been introduced in the country. These include: Unified Agricultural Extension System (UAES), Nationally Coordinated Research Programme (NCRP), Farming System Research And Extension (FSRE), Training and Visit System (T&V), Research Extension Farmer Input Linkage System (REFILS), Commodity-Based Extension, Farmer Field Schools (FFS), etc. In addition

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there are numerous non-government organizations (NGOs) and private sector players, notably, the British-American Tobacco (BAT), the ECWA Rural Development Project in the North, the Shell and the Mobil outreach programs in the Niger Delta areas, the Leventis Foundation, the Sasakawa Global 2000 and the USAID-Markets.

The Research-Extension-Farmer-Inputs Linkage System (REFILS) is a research and extension management tool and a platform to bring together all the stakeholders (researchers, extension workers, farmers, the private sector and government) in technology development, adaptation, dissemination, adoption and utilization processes. The development and operation of REFILS reached its peak during the World Bank-assisted National Agricultural Research Project (NARP) support to the National Agricultural Research and Extension System (NARS) in Nigeria (1995-2000). Similar to the ADPs experience, the termination of the NARP support marked the downward turn of REFILS and its virtual collapse today. Consequently, the REFILS has remained weak, uncoordinated, poorly funded and ineffective.

### **1.5.4 Private R&D activities**

In the Agricultural Transformation Agenda (ATA), the government of Nigeria recognizes the essential role of the private sector in achieving agricultural growth and prosperity through investment in production, marketing and processing. Private companies, dealers, and civil society organizations are involved in the implementation of ATA. There is increased private sector participation in the fertilizer and seed value chains in Nigeria. Through the Grow Africa Partnership, a number of private companies are investing in the agricultural sector of Nigeria. Among the companies are: Free Range Farms Ltd., Okomu Oil Palm Company Plc, Syngenta International AG, The Coca-Cola Company, Global Shea Alliance, Maslaha Seeds Limited, etc.

### **1.6 Key challenges, emerging needs and potentials in the agricultural sector**

Major challenges hindering the development of agriculture in Nigeria include:

- Underfunding of research;
- Lack of access to credit;
- Poor extension services;
- Low adoption of best practices and improved technologies;
- Threats from diseases, pests and climate;
- Poor post-harvest management;
- Lack of local storage and processing;
- Lack of market linkages and poor road network;
- Civil unrest, i.e., *Boko Haram*.

Based on the general approach (see Africa-wide study Chapter 4) and in pursuit of efficiency and effectiveness, investment by Germany into the agricultural and food sector are suggested in those African countries, which:

- Show actual progress in sustainable agricultural productivity driven by related innovations, as indicated by comprehensive productivity measurement and innovation actions on the ground;
- Have a track record of political commitment to foster sustainable agricultural growth, as indicated by performance under CAADP, and

- Prioritize actions for hunger and malnutrition reduction and show progress, but where agricultural and rural development and nutrition interventions are likely to make a significant difference, as indicated by public policy and civil society actions.

**Table 12: Country level Performance Indicators**

Indicator	index	Performance (%)
1. Number of Years with more than 6% agricultural growth (2005 to 2014)	4	40
2. Percentage point change in TFP index between 2001 and 2008	11	60
3. Number of years with more than 10% government expenditure (2005 to 2014)	0	0
4. Average share of agricultural GDP spent on R&D (2005 to 2011) in %	0.3	33
5. Steps in CAADP completed	5	63
6. Percentage point improvement in undernourishment between 2001 and 2011	2.7	30
7. Global hunger index (2014)	14.7	30
<b>Total score (weighted)</b>		<b>37</b>

Source: Own computation based on World Bank (2015), FAO (2015), ASTI database and von Grebmer *et al.* (2014)

Note: the % performance (rounded) is defined as follows for the respective indexes: 1. % out of 10 years; 2. classes: if <1, or negative= 0; 1 – 7= 30, 8-15= 60, > 15= 100; 3. % out of 10 years; 4. % of the AU target value of 1% spent on R&D; 5. % of the desired 8 steps; 6. classes: if < 2 = 0; if 3-5= 30; if 6-10=60, if>10=100; 7. classes: if < 12= 0; 12-16= 60; 17-20= 60; > 20= 100.

Total score (weighted) performance and need to invest: (sum of (1.+2.)/2 (expected growth performance); + sum of (3.+4.+5.)/3 (expected government commitment); + sum of (6.+7.)/2 (performance in food and nutrition security and need)) divided by 3.

Based on this approach, investment into the agricultural and food sector of NIGERIA has only 37% success rate and cannot expect to have significant effects on food and nutrition improvement in the country.

Results of assessment (Table 12):

Expected agricultural growth performance:

- Nigeria has increased its agricultural growth to more than the annual 6% agricultural growth targeted by CAADP in only four years between 2005 and 2014 ([www.resakss.org](http://www.resakss.org)).
- Total factor productivity in Nigeria, however, has improved by 11% between 2001 and 2008 (Fuglie and Rada, 2011).

Government commitment:

- Nigeria has a track record of political commitment to foster sustainable agricultural growth by being active in the CAADP process and has completed five of the eight steps in the CAADP process ([www.resakss.org](http://www.resakss.org)).
- However, the Nigerian government has not shown much commitment to invest in the agricultural sector. In no single year, the government has invested more than 10% of the total government expenditures (CAADP target) in agriculture between 2005 and 2014 ([www.resakss.org](http://www.resakss.org)).
- In addition, Nigeria spends only 0.3% of its agricultural GDP on agricultural research and development, which is much lower than the Sub-Saharan Africa average ([www.asti.cgiar.org](http://www.asti.cgiar.org)) and the AU target value of 1% spent on R&D. This indicates that Nigeria's investment on agricultural innovation is not yet sufficient.

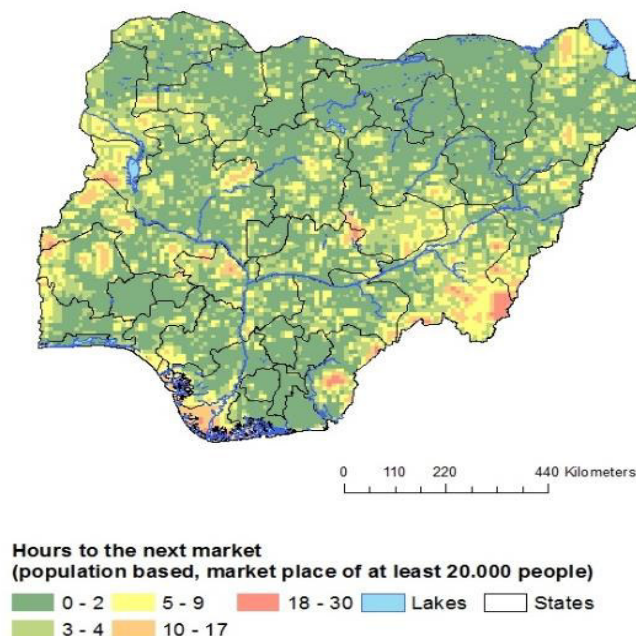
Food and nutrition security progress and need:

- Nigeria is hardly prioritizing actions for hunger and malnutrition reduction and shows a less than 3% reduction of undernourishment between 2001 and 2011 (FAO, 2014).
- In addition, Nigeria has a GHI score value of 14.7 reflecting a serious level of hunger (von Grebmer *et al.*, 2014)<sup>1</sup>. This makes the investment into the agricultural and food sector in Nigeria very urgent to fight the high numbers of food insecure people.

The economic, political, and social/nutrition framework in Nigeria does not seem to suggest accelerated investment into the agricultural and food sector of the country. Hence, it is questionable whether Germany's envisaged investment in Nigeria is worthy.

Nonetheless, there are a number of potentials in Nigeria's agricultural sector. The large area of uncultivated land coupled with the natural fertility of its soil is one of the key potentials. Nigeria has about 84 million hectares of arable land, but less than 40% of this land is cultivated. The country also has a large potential for the expansion of both small- and large-scale irrigation investments in Africa (You *et al.*, 2011). In addition, there is abundant labour, the population of about 170 million people provides a large domestic market, and there are many improved technologies available.

**Figure 1: Distance to markets**



Data sources: Hours to next market - HarvestChoice, 2015;

Administrative areas: <http://www.gadm.org/>, accessed 20.9.2015

Inland water bodies: <http://www.diva-gis.org/gData> (water bodies), accessed 20.9.2015

Transport intensive products should be promoted in areas that are well connected to markets, whereas the remote areas should focus on low volume and livestock value chain segments.

<sup>1</sup> GHI score Values less than 5.0 reflect low hunger, values from 5.0 to 9.9 reflect "moderate" hunger, values from 10.0 to 19.9 indicate a "serious" level of hunger, values from 20.0 to 29.9 are "alarming," and values of 30.0 or greater are "extremely alarming"(von Grebmer *et al.*,2014).

## 2 Most relevant value chains in Nigeria

Among the most promising agricultural value chains in Nigeria are cassava, cotton, fisheries, maize, fruits, palm oil, poultry, rice, cowpea, soybean, and tomato value chains. Through the Agricultural Transformation Agenda, commodity value chains are playing an essential role in the economy of Nigeria. Table 13 below presents a summary of the achievements of the major value chains in the country (FMARD 2015).

**Table 13: Selected value chains and achievements 2011-2014**

Value chain	Key achievement
<b>Rice</b>	1,744 922 jobs created; 7 million metric tons of paddy production and thus 45 % reduction in national supply gap; Net value of over 400 billion Naira
<b>Poultry</b>	1,696 jobs created; 305,000 metric tons production of broiler meat and thus 84 % increase in production; 49% increase in the production of eggs; Net value of over 106 million Naira
<b>Oil palm</b>	1,080,000 jobs created; 2,760,000 metric tons of increase in output; Over 38.9 billion annual revenue
<b>Cocoa</b>	Establishment of a cocoa factory in Ondo state; 21,000 jobs created; 45.5 million seed output; 7.5 billion Naira annual net revenue
<b>Cassava</b>	55,934 jobs created; 5 % increase in output, over 2.6 million additional production; Over 7 billion net value
<b>Fishery and aquaculture</b>	36,723 jobs created; 21% increase in aquaculture and 39% increase in artisanal fisheries; Over 1.5 billion Naira net value
<b>Cotton</b>	129,000 jobs created; 293,000 metric tons total production of lint;
<b>Maize</b>	26,000 jobs created; About 8% increase in acreage and 50% increase in yield ; 793,000 metric tons of seed output; 78 million annual revenue
<b>Wheat</b>	300,000 jobs created; About 50% increase in acreage and 160% increase in yield; 18% reduction in supply gap
<b>Soybean</b>	23% increase in acreage and 61% increase in production; 22,000 jobs created; Over 5.6 billion Naira net revenue
<b>Sorghum</b>	Over 210000 jobs created; About 2% increase in acreage and 5% increase in production. 18% reduction in supply gap. 430000 metric tons added output; Over 55 billion Naira net revenue

Source: FMARD 2015

### 2.1 AIC-Value Chains

The value chains that were chosen for the agricultural innovation centers (AIC) include rice, maize, cassava, Irish potato.

### **2.1.1 Maize**

Nigeria is the largest maize producer in Africa. It is grown in all 36 States and the Federal Capital Territory of Nigeria, but the main producing area is the north-central zone of the country (Cadoni and Angelucci, 2013). Maize occupies the largest area of cultivated land in the Nigeria. It is one of the most frequently consumed staples in Nigeria. A significant amount of maize produced in the country is used by the industrial sector for production of flour, beer, malt drink, corn flakes, starch, animal feeds, etc.

### **2.1.2 Rice**

Nigeria is the largest rice producer in West Africa. Rice is both a food and a cash crop for farmers, contributing to smallholders revenues in the main producing areas. Rice is mainly produced in the middle belt and northern states of Benue, Kaduna, Niger and Taraba, as well as the south eastern states of Enugu, Cross River and Ebonyi. Nigeria is the second largest importer of rice in the world. To reduce dependence from imports, the government of Nigeria has set an ambitious target of achieving self-sufficiency in rice production by 2015 through the ATA and rice sector policies. The main actors in the Nigerian rice value chain are farmers, paddy traders, millers, rice traders and retailers.

### **2.1.3 Cassava**

Cassava is considered as the most widely cultivated crop in Nigeria and it is predominantly grown by smallholder farmers. Nigeria is the world's largest producer of cassava. Cassava is produced across the country, but the highest producing states are located in the south western and south eastern parts of the country. Only limited quantities are produced in the northern part of the country. The cost of production is low; hence, it is generally more affordable if compared to other staples. Most cassava consumed in Nigeria is processed through traditional methods into gari, flour, etc. It has numerous alternative uses in feed, food and agro-industry. The six main actors in the cassava value chain in Nigeria are producers, processors, industrial processors, wholesale traders/transporters, retailers, and consumers.

### **2.1.4 (Irish) Potato**

Potato is only of marginal relevance for food security in Nigeria. Irish potato hardly represents 1 % of the total annual output of all staple crops in Nigeria (Ayuba and Kitsche, 2014). Nigeria has one of the world's lowest potato yields per hectare (Ugonna *et al.*, 2013). Efficiency of production is very low. Production of potato is constrained by lack of suitable varieties, late blight disease, inappropriate storage facilities, etc. (Ayuba and Kitsche, 2014). It is cultivated by rural farmers in marginal areas of the country. More than 90% of all harvested potatoes in Nigeria come from the Jos Plateau in Plateau state. Potato consumption in Nigeria is very low. In recent years, however, consumption of potatoes on the rise, particularly in rapidly growing urban areas, and thus opens up new market opportunities for potato farmers.

## **2.2 Other relevant value chains**

*- pending further information -*

### **3 Innovations in value chains in the past 20 years**

#### **3.1 The most crucial limiting factors in Nigeria / AIC-region / in AIC value chains**

The limiting factors include:

- Limited human resource capacity;
- Slow growth of researchers with PhD degrees, and many senior researchers are approaching retirement age;
- Agricultural research agencies remain underequipped and lacking in research-related infrastructure and facilities;
- Inadequate funding of research work.

#### **3.2 The most important / beneficial innovations in the relevant value chains**

##### **3.2.1 AIC value chains**

These include:

- Drought tolerant maize varieties;
- High Quality Cassava Flour;
- Vitamin A Cassava.

##### **3.2.2 Other value chains and cross-cutting innovations**

These include:

- Aflasafe for biological control of aflatoxins;
- Purdue Improved Cowpea Storage (PICS);
- Innovation platforms;
- Electronic Wallet (e-wallet) system for fertilizer distribution.

#### **3.3 Most promising approaches for farmer and small business related VC innovations**

*- pending further information –*

### **4 Suggestions for Collaboration**

#### **4.1 Promising agricultural products and value chains**

Besides assessing the returns of investments into institutional innovations in Nigeria, analysis to choose the most promising value chains in the country is also undertaken. In compliance with the availability of data and the purpose of the study four criteria that focus on poverty and market potential are used to select the five most promising agricultural products from the long list of agricultural products the country produces and sells. The first indicator, the trade potential (revealed comparative advantage (RCA) index), is computed to identify value chains over which the country has revealed (but not potential) comparative advantage. In the present case, the RCA index compares the share of a given agricultural product in Nigeria's export basket with that of the same product in total world exports. The second indicator, yield gap, is used to assess the expected return of the envisaged Germany investment on the given AIC country value chains. A third indicator, average yield growth, is

used to examine the Potential of the product for poverty reduction. The production share of total supply is also used to assess the present integration of the poor in the market (relevance).

**Table 14: Selection of promising agricultural products /value chain**

Rank by RCA		Rank by Yield progress		Rank by yield gap		Rank by relevance of crop		
Rank	Name of agricultural product	RCA index (2011)	Name of the crop	Average annual yield growth (2005 to 2012 )	Name of staple crop (rain fed)	Relative yield gap (%)**	Name of agricultural product	Production share of supply (2011)*
1	Cashew nuts, with shell	122	Sesame seed	45	Rainfed maize	85	Millet and products	100
2	Sesame seed	39	Cow peas, dry	26	Rainfed sorghum	83	Cereals, Other	100
3	Cocoa, beans	24	Potatoes	8	Rainfed rice	66	Sweet potatoes	100
4	Ginger	14	Sugar cane	8	Irrigated rice		Yams	100
5	Vegetables, nes	7	Okra	7			Roots, Other	100
<b>GIZ selected</b>	Maize	0.00	Rice	5			Cassava	100
	Potatoes	0.01	Maize	-1			Rice	62
			Cassava	-8				

Source: \* Own computation based on FAO 2015 data, \*\* from Van Bussel et al. (2015).

Note: \*\*\* a minimum of 0.5% production (volume) share threshold is used as a screening (crop relevance) criteria.

The summary of the most five promising value chains based on Revealed Comparative Advantage (RCA) index, average yield growth and relative yield gap is reported in Table 14. The production share, RCA index, actual yield growth and relative yield gap for the GIZ-selected value chain(s) is also reported at the bottom of the table, when they are not included in the list of the first five most promising value chains.

Results of assessment (Table 14):

- The trade potential (revealed comparative advantage (RCA) index) is high for cashew nuts, sesame, cocoa beans, ginger and vegetables. This indicates that Nigeria has comparative advantage (in the export) of these commodities. The RCA value for the other GIZ selected crops, maize and potatoes, is less than 1 indicating that Nigeria has a comparative disadvantage on the export of these value chains;
- The yield performance indicating progress suggests that over the CAADP period (2005 to 2012) sesame seed, cow peas, potatoes (the GIZ selected value chain), sugarcane and okra are the five most promising value chains. The yield level of rice, one of the GIZ selected value chain, shows also a continuous modest growth (5%) on average



while the yield level of the other two GIZ selected value chains (maize and cassava) on average declined over the same period;

- Yield gaps indicate potentials from another angle, and is observed to be high for rain fed millet, rain fed rice, and rain fed maize and irrigated rice indicating the high potential return of investing on these value chains;
- In terms of relevance (production share of supply) millet, other cereals, sweet potatoes, yams, roots and the GIZ selected Cassava are leading. The total production of these products exceeds the total supply. More than three fifth of the total supply of the other GIZ selected crop, rice, is also domestically produced.

**4.2 A systematic assessment of promising partnerships for each promising innovation area**

*- pending further information -*

**4.3 Some potential partners for the German collaboration: in science and research, private sector and NGOs and governmental organizations**

*- pending further information -*

**4.4 Needed implementation research**

*- pending further information -*

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