Enhancing Food Systems in Nigeria

Scope and perspective for Dutch policy interventions

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ACRONYMS

A4NH	Agriculture for Nutrition & Health
APP	Agricultural Promotion Policy
ATA	Agricultural Transformation Agenda
CAADP	Comprehensive Africa Agriculture Development Programme
DDE	Sustainable Economic Development Department
DGIS	Directorate-General for International Cooperation
EKN	Embassy of the Kingdom of the Netherlands
FMARD	Federal Ministry of Agriculture & Rural Development
FNS	Food & Nutrition Security
FO	Farmers' Organisation
FSDS	Food System Decision Support
GESS	Growth Enhancement Support Scheme
IGG	Inclusive Green Growth Department
KIT	Royal Tropical Institute
LNV	Ministry of Agriculture, Nature and Food Quality
MACS	Multi-Annual Country Strategy
MinBuZa	Ministry of Foreign Affairs
NCFN	National Committee on Food & Nutrition
NPFN	National Policy on Food & Nutrition
RVO	Netherlands Enterprise Agency
WUR	Wageningen University & Research

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SUMMARY

The Netherlands Ministry of Foreign Affairs (MinBuZa) aspires to enhance its trade and investment programme in support of the agri-food sector of Nigeria. The Multi-Annual Country Strategy (MACS) for Nigeria identifies the following main objective: to support Nigeria in its diversification strategy from reliance on oil revenues to economic growth and job-creation based on a sustainable and inclusive agri-food sector. Six policy themes have been identified by the MinBuZa: agricultural sector transformation; agribusiness, value chain development, agri-logistics; access to finance; employment (youth and women); climate change adaptation; and food & nutrition security. The Food Systems Decision Support (FSDS) tool, jointly developed by KIT and Wageningen Economic Research, has been applied to provide a quick scan of the food system and identify leverage points to inform policy recommendations for the Dutch Government.

Nigeria is facing major challenges with high population growth, a high number of people living in extreme poverty, rapid urbanisation, and stagnating agricultural productivity. Tensions between pastoralists and sedentary farmers affect much of Nigeria's northern region. Gender inequalities are a major barrier to rural development. The central place that oil exports hold in the Nigerian economy limits diversification towards agricultural exports, which have the potential to contribute to more inclusive and sustainable economic development. Public investments in the agricultural sector are low, resulting in underdeveloped (rural) infrastructure and agricultural services. Underlying institutional drivers include weak institutions, weak links between science and practice, low quality of education, corruption, and non-transparent markets with high transaction costs and high investment risks despite the high (urban) demand for food. As Nigeria is a food-deficit country, the urban demand for cheap food is met through food imports, but there is a mutually reinforcing mismatch between supply and demand at many levels and in many dimensions. Negative feedback loops – between a weak enabling environment, lack of incentives and finance for investment and low agricultural productivity – keep the agri-food sector locked into underperformance.

It is recommended that the Netherlands focus its trade and investment strategy on a limited number of agricultural sectors, whereby the horticultural sector seems to provide most opportunities to achieve multiple policy objectives. Investments in sectors such as horticulture (vegetable and potato) and poultry have high potential – when the sector is professionalised by improving the agribusiness, value chains and agri-logistics and climate change resilience – to contribute to food and nutrition security and income generation for women and youth in the North (Kaduna and Kano), while export crops such as cocoa and palm oil can contribute to economic development and employment generation in the South. Dutch private sector and knowledge institutes can rely on their expertise in these domains to contribute with targeted investments and partnerships. The following leverage points have been identified (by policy theme):

Agricultural sector transformation
Public investments in operational enabling environment, infrastructure, and implementation of policies.

Agribusiness, value chain development, agri-logistics
Value chain strengthening and coordination for shorter value chains with less concentrated

power; and provision of data and information, and matchmaking services, through a support unit at EKN Lagos for Dutch and Nigerian private sector and NGOs.

Access to finance
Matchmaking service of private capital with other partners with agricultural know-how and social / environmental / economic impact goals; and create access to (micro-) finance for young / female entrepreneurs, in combination with business coaching / advice and match-making.

Employment
Technical and vocational training of youth and women, linked to value chains / processors and access to finance; and promotion of responsible investments (of Dutch private and public sector) creating decent jobs.

Food and nutrition security
Awareness raising and knowledge improvement on healthy diets; (public and private) investments in domestic agricultural production and processing capacities to improve the production of food and cash crops and reduce food losses.

Climate change adaptation
Sharing of data and information (and know-how) on climate change impacts and adaptation strategies for value chain actors.

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1. Scope of the assignment

The Netherlands Ministry of Foreign Affairs (MinBuZa) aspires to enhance its trade and investment programme in support of the agri-food sector of Nigeria. For this purpose, it commissioned KIT and Wageningen Economic Research to conduct a food system analysis to identify opportunities for intervention. This report presents the outputs of an assignment for the Dutch MinBuZa with the objective to support the policy process of preparing a trade and investment programming for the agri-food sector in Nigeria. Nigeria is a new focus country for both the MinBuZa and the Ministry of Agriculture, Nature and Food Quality (LNV). In 2018, a Memorandum of Understanding was signed by the Minister for Foreign Affairs and his Nigerian counterpart. The Dutch government has committed substantive efforts towards broadening the economic and political collaboration with Nigeria as part of its renewed interest in investing in West Africa.

The Multi-annual Country Strategy (MACS) for Nigeria identifies the following main objective: to support Nigeria in its diversification strategy from reliance on oil revenues to economic growth and job creation based on a sustainable and inclusive agri-food sector. The underlying vision is a sustainable transition for Nigeria's food system from one based on food imports and the depletion of natural resources to an integrated sustainable food system capable of providing sufficient healthy food to a growing (urban) population and creating jobs, and therefore, opportunities. Six policy themes have been identified by MinBuZa:

- agricultural sector transformation;
- agribusiness, value chain development, agri-logistics;
- access to finance;
- employment (youth and women);
- climate change adaptation; and
- food & nutrition security.

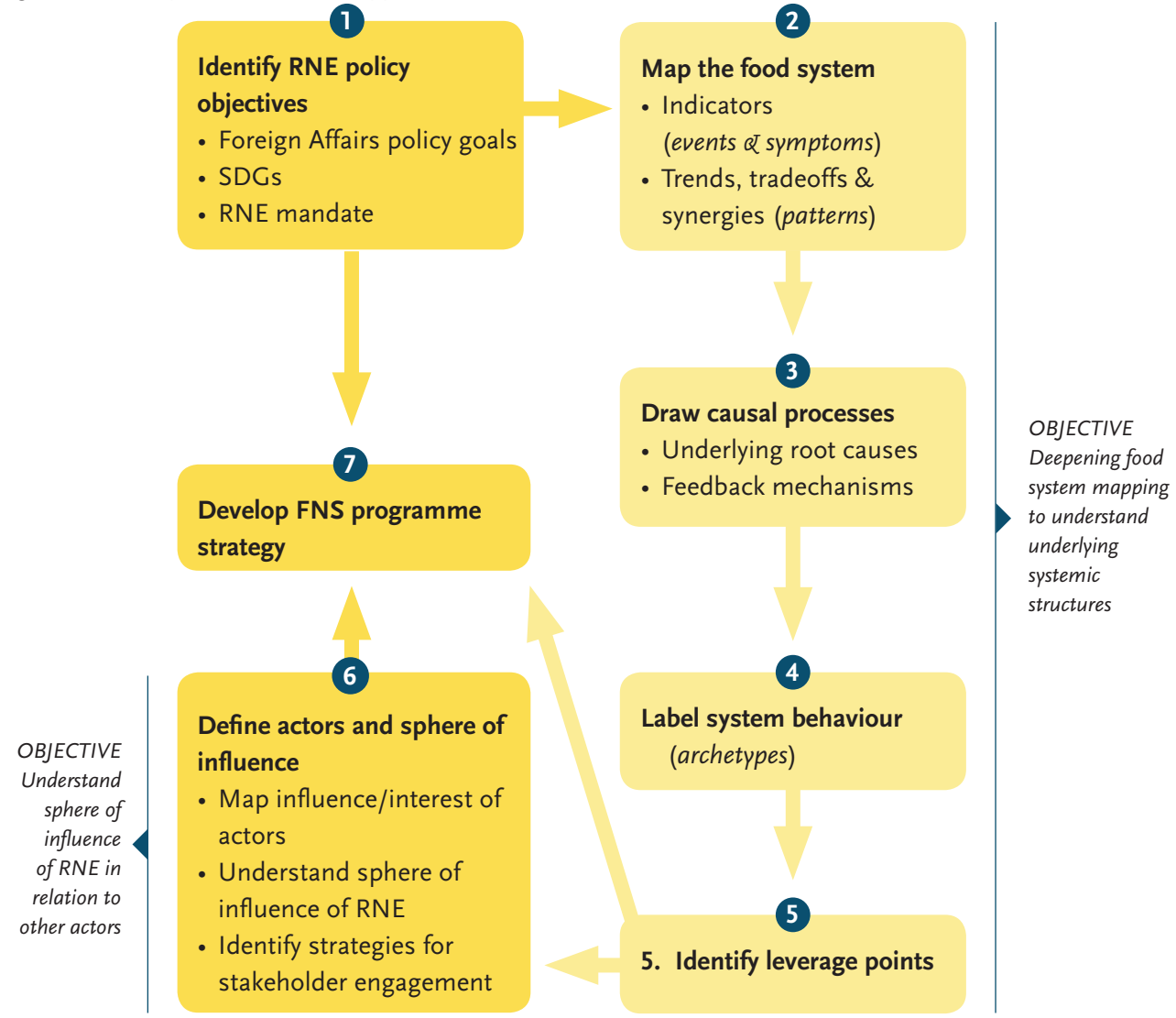
The Food Systems Decision Support (FSDS) tool, jointly developed by KIT and Wageningen Economic Research, has been applied to provide a quick scan of the food system and identify leverage points to inform policy recommendations for the Dutch Government. The FSDS tool provides a series of analytical steps to understand the dynamics of an agri-food system and identify leverage points for interventions to achieve systemic change to arrive at desired policy objectives, such as economic growth and employment, food & nutrition security (FNS), and climate change adaptation (see the Annex for the full analysis).

The FSDS tool (Figure 1) consists of seven steps:

1. Defining the policy objectives
2. Mapping the agri-food system relevant to these policy objectives
3. Identifying the causal processes underlying the agri-food system
4. Determining archetypes in system behaviour of the agri-food system
5. Identifying actionable leverage points within the agri-food system
6. Defining relevant actors and their influence and interest to address leverage points
7. Based on leverage points, policy objectives and relevant actors, provide policy recommendations

In the remainder of this report, we will describe the main findings of the application of the FSDS tool for the envisioned bilateral relationship between Nigeria and the Netherlands.

Figure 1. Food Systems Decision Support Tool



2. Exploring the Nigerian Food System

Using the food systems decision support tool developed for MinBuZa and LNV, an in-depth analysis was made of the Nigerian food system, looking at trends and developments in the components of the food system (step 2), mapping out the causal interactions between these components (step 3) and identifying archetypical behaviours of the system (step 4). In this chapter, we use the output of these analyses to provide a general overview of the dynamics in the Nigerian food system. After that, we zoom in on the relevant dynamics for each of the six FNS policy themes identified by MinBuZa for their bilateral relation with Nigeria.

Overview of dynamics in the Nigerian food system

Socio-economic trends are key drivers of the Nigerian food system. Nigeria is facing major challenges with a high population growth, a high number of people living in extreme poverty, rapid urbanisation, and stagnating agricultural productivity. Public investments in the agricultural sector are low, resulting in underdeveloped (rural) infrastructure (e.g. roads, storage facilities and processing facilities) as well as a lack of agricultural services (advisory services, access to inputs and finance). Underlying institutional drivers include weak institutions, weak links between science and practice, low quality of education, and non-transparent markets with high transaction costs and high investment risks despite the high (urban) demand for food.

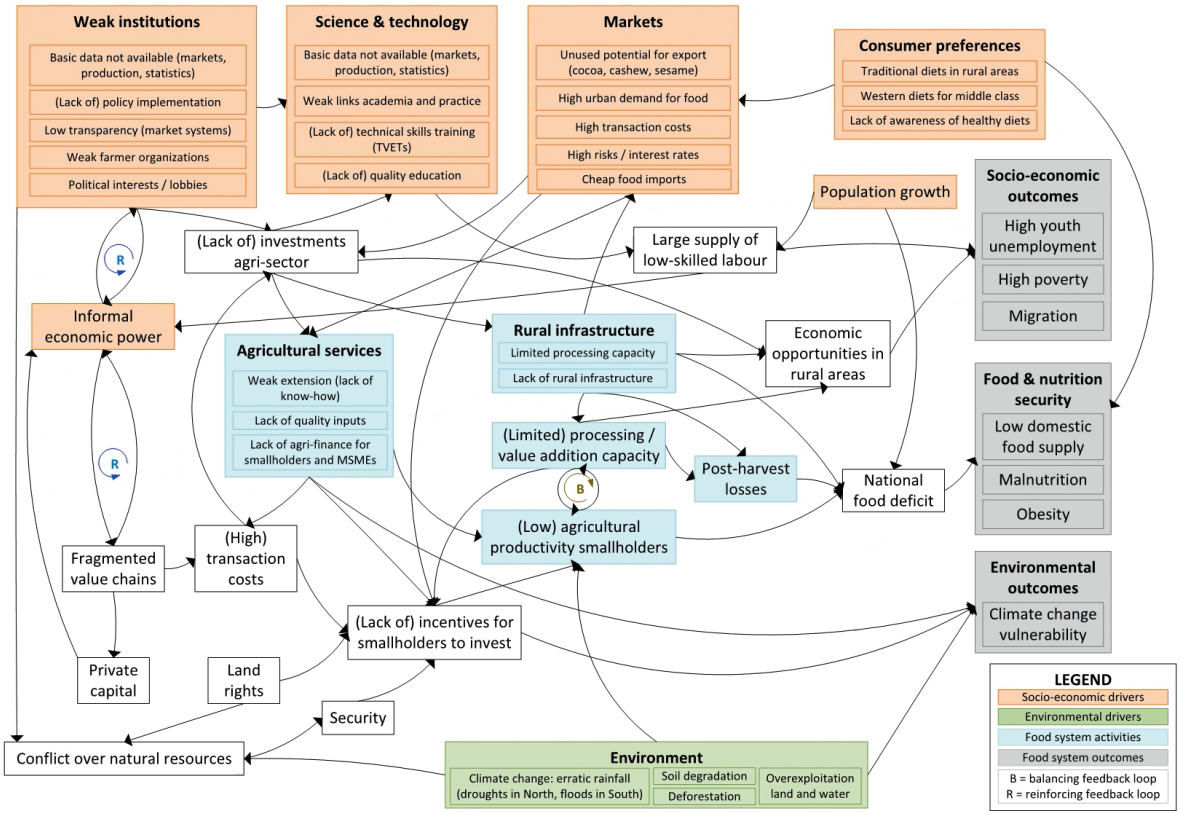
Due to the under-investment and resulting low productivity, Nigeria is a food-deficit country. The high urban demand is met through cheap food imports, which further lowers the incentives for investments in Nigerian agriculture. As such, the mismatches between supply and demand at many levels and in many dimensions seem to be mutually reinforcing each other. Environmental trends, such as soil degradation, climate change, water scarcity, deforestation and decreasing biodiversity pose further threats to the food system.

The scarcity of resources in turn is one of the drivers of the pastoral-farmer conflict in the North of Nigeria. But pastoralism (and livestock keeping) is an integral part of the food system and constitutes an important component of the agricultural economy in Nigeria. It is also closely linked to the social and cultural lives of pastoralists and of resource-poor farmers for whom animal ownership ensures varying degrees of sustainable farming, economic stability and food and nutrition security. Besides, addressing pastoralism and its related lifestyles impacts stability and security in Nigeria. Communities dependent on livestock, those who practise mixed farming on a small scale, and consumers in cities all have specific demands regarding livestock production systems and food and nutrition security.

Figure 2 depicts the main drivers and causal processes in the Nigerian agri-food system. Negative feedback loops between a weak enabling environment, lack of incentives and finance for investment and low agricultural productivity keep the agri-food sector locked into underperformance.

In the following sections of this chapter, we zoom in on different parts of the Nigerian food system, describing the main dynamics in the system for each of the six policy themes identified by the MinBuZa to guide the emerging Dutch contribution to Nigeria's agricultural transformation agenda.

Figure 2. Causal diagram NIgerian agri-food system



Main trends per policy theme

Food and nutrition security

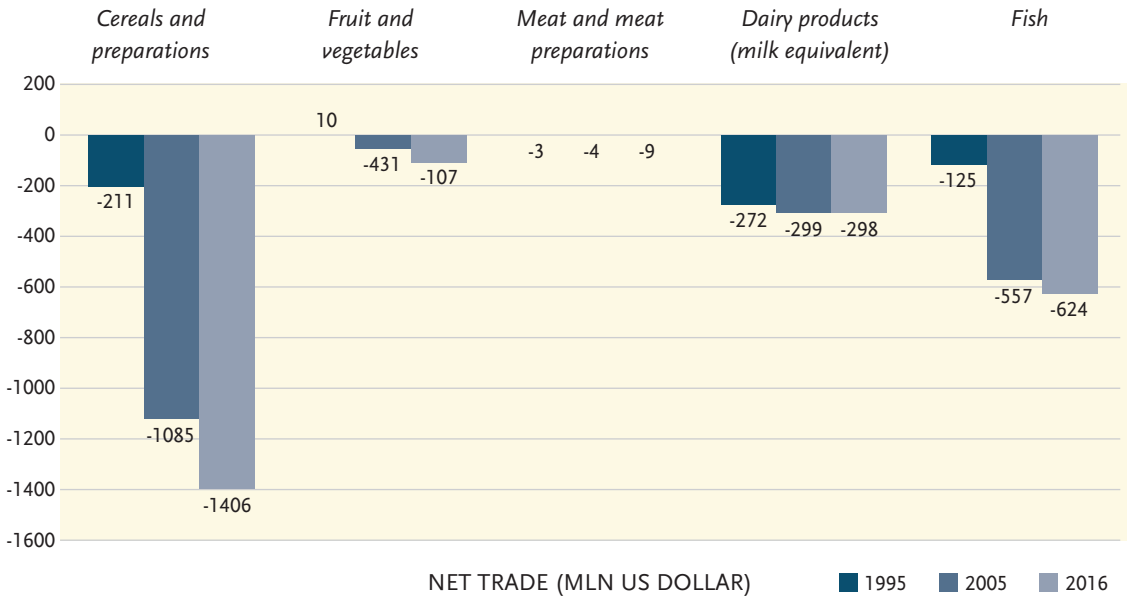
Nigeria, the most populous country in Africa, has a population growth rate of 2.6 per cent annually, which is expected to further increase in the coming years. Urbanisation has increased the share of the population living in cities from 15 per cent in 1960 to 50 per cent now (World Bank 2018). While there is a huge and growing demand for affordable food, both among the rural as well as the fast-growing urban population, agricultural productivity is low and inefficient in many parts of the country.

As the food system does not produce enough food to feed everyone, Nigeria depends on food imports to help meet the growing demand. Nigeria's food imports have more than quadrupled in the past decades, from a value of 964 million US dollars in 1995 to 4,566 million dollar in 2016 (FAO 2019), resulting in a substantial trade deficit for the agri-food sector (Figure 3). Nigeria is relatively weakly integrated into regional value chains (ECOWAS 2019): its export to the ECOWAS region, which averaged about 7 per cent of its total exports between 2001 and 2006, plummeted to 2 per cent in 2010 (Chete 2010).

The most available staple foods providing energy in Nigeria are rice (14.8%), cassava (12.9%), maize (10.6%) and yam (10.1%). Major staples providing plant proteins are cowpea (10.7%), groundnut (8.1%) and soybean (2.1%). The most available non-staple foods are meat products (14%), non-leafy vegetables (13%), leafy vegetables (9.5%), and fats and oils (8.9%).

As the gap in domestic food supply becomes larger, Nigeria becomes more dependent on cheap food imports, which works as a quick fix to the food deficit, but does not address the low agricultural productivity that keeps the deficit in place. In addition, the foreign exchange obtained through crude oil exports is declining, which lowers the GDP, and in turn, public investments in the agri-food sector. Moreover, low productivity levels affect the livelihoods of rural households, who are struggling to earn a decent wage. Among households in rural areas, 71 per cent of the population is food insecure (Matemilola & Elegbede 2017). NFCNS[1] data on nutritional status showed that at national level, 36 per cent of the children under five were stunted and 25 per cent underweight (SUN 2011). Meanwhile, obesity among adults (18+) has more than doubled from 3.4 per cent in 2000 to 7.8 per cent in 2016.

Figure 3. Trade deficit for key agricultural sectors in 1995, 2005, 2016 (FAOSTAT, 2019)



It is estimated that women produce 60 to 80 per cent of food in rural areas in Nigeria. Women also dominate the production of vegetables, poultry and small ruminants. However, lack of access to productive resources, training and farm inputs hinders women's food production and food and nutrition security. Displaced families (as a result of insecurity in the north) show a higher prevalence of malnutrition and increased gender inequality. Agricultural interventions targeting women have a direct positive impact on local agricultural production and food and nutrition security (ECOWAS/FAO 2018).

1 Nigerian Food Consumption and Nutrition Survey (NFCNS)

Agricultural sector transformation

The Government's expenditure in agriculture (as a share of total public expenditure) is small compared with many other African countries. Around 4 per cent of the total government expenditure was spent on agriculture during 2005-2015 (AGRA, 2018). This underinvestment affects all parts of the agri-food sector: institutions, science & technology, rural infrastructure (roads, processing facilities, storage), availability of data and information, agricultural services (including extension, inputs, agri-finance). Current public spending is still far below the target of 10 per cent of the national budget as stipulated by the Comprehensive Africa Agriculture Development Programme (CAADP) agreement (signed by Nigeria in 2009). Public spending of all tiers of government should increase to develop the agricultural sector (Olomola et al. 2014).

The Nigerian economy is largely driven by the informal economic sector, which is estimated to account for 65 per cent of the GDP (IMF, 2017). The supply chains within the informal sector are shaped by power imbalances between trader and farmer associations. Traditional market authorities such as so-called 'market queens' are important in organising trade, acting as trade brokers while accumulating both wealth and power within the commodity markets (Clark, 2018). Although policies for agricultural sector transformation have been created (e.g. political agenda for import substitution), weak formal institutions, corruption, and conflicting political and economic interests often prevent their implementation. These phenomena of weak formal market institutions and concentrated power among a small group of traders reinforce each other, making it difficult to bring about change through policy interventions.

The weak institutions, low tax revenue and lack of policy implementation result in low (public and private) investments in the agricultural sector. As such, the enabling environment is constraining agricultural productivity rather than enabling, characterised by poor rural infrastructure, poor access to information, services and quality inputs, low food safety standards, low processing capacity, and reportedly high post-harvest losses. As a result, the production costs, and thus domestic food prices, are high while domestic food supply remains low.

The unused potential of export crops[2] to OECD countries, such as cocoa (56%), sesame (29%) and cashew (26%), are related to this trend of underinvestment. The Netherlands in particular constitutes an important international market for these three commodities, whereby cocoa beans have by far the highest potential in monetary terms. Increasing export of cocoa (beans and butter) will directly contribute to Nigeria's aim to increase the export revenues from agricultural commodities (ITC 2019). However, and rehabilitating the cocoa farms to revive the cocoa sector in south-western Nigeria requires huge investments and long-term commitment from the Nigerian government.

Women play an important role in food and agriculture, as much in Nigeria as elsewhere. Gender inequality remains a major barrier to development in Nigeria, ranking a low 118 out

2 ITC/CBI. Nigeria country factsheet. Pers. Comm. Patrick Gouka 25/2/2019 ITC/CBI. Nigeria country factsheet. Pers. Comm. Patrick Gouka 25/2/2019 The percentage of unused potential is based on the sum of unused potential (i.e., the gap between actual and potential exports), divided by the sum of potential exports based on estimates of (EU) demand and supply of a particular commodity. A large percentage indicates that the export is significantly below its potential in the target markets (Source: www.intracen.org/country/nigeria; last accessed on 13/5/2019) ITC/CBI. Nigeria country factsheet. Pers. Comm. Patrick Gouka 25/2/2019

of 134 countries on the Gender Equality Index. Gender inequality results in misallocation of scarce resources, increased healthcare costs, lowered productivity and poor human development trends (Ajani, 2009). According to FAO and ECOWAS (2018), the neglect of issues such as gender and corruption have negatively affected agricultural and rural development. The lack of gender mainstreaming at all levels (institutional level, programme implementation, technology development) enforces gender inequalities. Despite Nigeria's encompassing gender policy, such as Gender Responsive Budgeting, lack of political will and institutional capacities to implement these policies prevent any significant impact on women's empowerment in the agricultural sector.

Agribusiness, value chain development, agri-logistics

Nigeria has a largely rain-fed agricultural sector, which constitutes an important part of the national economy. Nigeria is the continent's leading consumer of rice, one of the largest producers of rice in Africa and one of the largest rice importers. Rice generates more income for Nigerian farmers than any other cash crop in the country. Cassava is the main staple crop and predominantly grown by smallholders for home consumption and local sale. Approximately 66 per cent of total production is in the South and about 30 per cent in the north-central regions (FAO 2017).

Underinvestment in the agricultural sector has limited the development of agri-businesses and agricultural value chains in much of Nigeria. The low level of agricultural services (finance, extension, quality inputs) is an issue in most – if not all – value chains. The same is true for rural infrastructure and facilities for processing and storage, whether this is for cold chains (e.g. dairy), perishables (e.g. vegetables, cassava) or staple food products (e.g. cereals). The low agricultural productivity and limited value addition within these value chains also hamper opportunities to generate more rural incomes within the agri-food sector, adding another disincentive for investments (by producers and processors). AGRA (2018) reports that Nigeria is taxing the agricultural sector (the Nominal Rate of Assistance was estimated at 26 per cent between 2005-2016), meaning that farmers receive lower prices than would be the case without any policy interventions, and is thus creating strong disincentives for farmers.

Women are heavily involved in agricultural production (in particular food crops), but predominantly in post-harvest processing and marketing. Women dominate the buying and selling (retail, not wholesale) of agricultural products. Men involved in trading (mostly cash crops) often sell their own produce. However, women often have limited access to land, finance, inputs, technology, education and training. The extent to which women are entitled to assets such as land and capital, or are involved in decision making, varies by crop as well as region (ECOWAS/FAO 2018).

Access to finance

The current situation of low investments, limited access to agricultural services, low productivity and low rural incomes are both causes and effects of a lack of access to finance. Small-scale producers and processors lack collateral and face high interest rates when trying to access loans. Investments in the agri-food sector are considered high risk, due to lack of transparency and high transaction costs in the fragmented value chains, lack of infrastructure and facilities and high susceptibility to external environmental, economic and political factors.

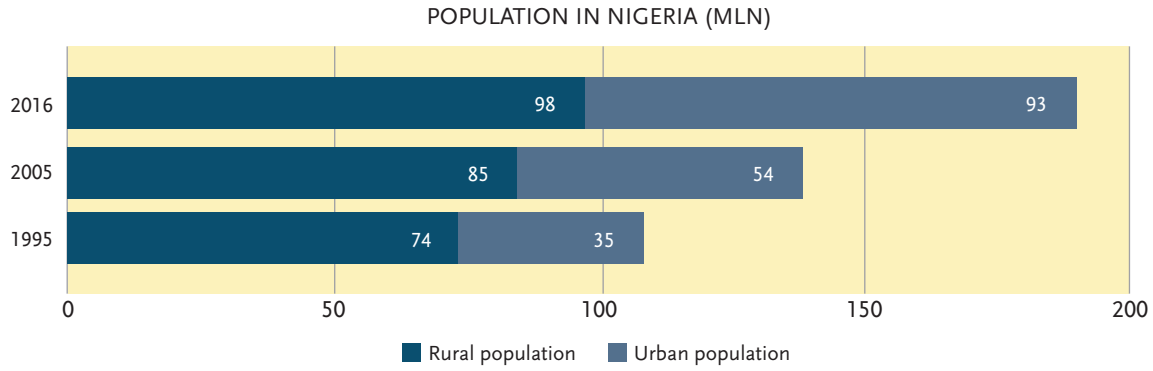
Although access to finance is difficult for some small value chain actors, there is private capital present in the agri-food system. In 2018, the Nigerian diaspora sent remittances at an estimated US$25 billion, translating into 6.1 per cent of total GDP (World Bank 2019). Part of the private capital is invested in commercial farms and/or agribusinesses, creating a dualism in agricultural production systems: high-tech commercial farms versus low-input smallholder farming. Some of the private investments fail due to a lack of technical and commercial skills or relevant knowledge. This private capital is rarely used to invest in value chains or agricultural services that would benefit small-scale producers and/or processors; the two production systems are disconnected.

Women and youth have poor access to financing, partly due to poor access to resources and assets, which impedes them from using hired labour or purchase inputs for agricultural activities. The access of rural women is further hampered by a low educational background, poor networks and restricted mobility. Financial services or programmes that are available are often designed and implemented with the male head of household as target group (ECOWAS/FAO 2018).

Employment (youth and women)

Agriculture provides employment for close to 70 per cent of the Nigerian population and accounts for almost one-third of the country's Gross Domestic Product. Meanwhile, the population of Nigeria is growing fast (Figure 4), which poses a challenge for the economy to absorb all its labour capacity. Youth make up the largest proportion of people in Nigeria; about 1.5 million youth are expected to enter the job market in Nigeria annually (Adesugba & Mavrotas 2016).

Figure 4. Population growth in Nigeria (1995, 2005, 2016) (FAOSTAT, 2019)



The low accessibility and quality of skills training, and limited access to information and extension, result in a low-skilled workforce in the agri-food sector. Among the youth who attended higher education (approx. 15%), about 4 per cent studied agriculture (Adesugba & Mavrotas 2016). This results in a mismatch between supply and demand regarding labour force: growing agribusinesses look for specific skills, whereas there is a large pool of low-skilled and unemployed youth. This pool of labour tends to seek low-paid employment within the informal economic sector.

In many rural parts of Nigeria, men can claim women's labour but this is not reciprocated. Women are closely involved in processing activities along the value chain, which can be cumbersome work. Labour-saving technologies and training can improve post-harvest management and reduce the drudgery (ECOWAS/FAO 2018).

Climate change adaptation

Climate change is a key environmental driver of the Nigerian food system. If left unchecked, climate change will continue to cause adverse effects on livelihoods in Nigeria; first signs of its impact are already witnessed (FMIC 2016; Nugent 2018). Temperatures are expected to increase, especially in the North. Rainfall variability will also continue to increase whereby the North is expected to face lower and more erratic rainfall and the South more intense rainfall, resulting in flooding (WUR/BZ 2018). These expected trends will have a significant impact on the functioning of the food system. Meanwhile, basic skills and knowledge on climate-smart agriculture is lacking, among farmers as well as among extension services.

Due to increasing population growth in Nigeria, there is an increasing pressure on land – particularly the expansion of agricultural land. The amount of land that is permanently cultivated has almost doubled over the past 60 years, from 3.5 million ha in 1960 to 6.5 million ha in 2015. In many cases, the expansion of agricultural cropland resulted in deforestation and loss of biodiversity. Despite the importance of forests to the rural population, between 1990 and 2005, Nigeria lost 35.7 per cent of its forest cover, or around 6,145,000 hectares. The forested area has by now been reduced to only 12 per cent of the country's surface (Babanyara & Saleh 2010). The increasing pressure on land and water (due to growing population, expansion of arable land and herd) further causes overexploitation of natural resources and conflicts between different community groups and pastoralists.

Women and children are more vulnerable to climate change and natural disasters than men, also related to their low social status and low education (ECOWAS/FAO 2018). Male migration, a social impact of climate change, negatively affects women and girls, as it increases their workload but also makes them vulnerable to abuse and early marriages.

Archetypes of system behaviour in the agri-food system

The analysis resulted in the identification of four archetypes of system behaviour that play out in different parts of the Nigerian food system. These archetypes are core types of system behaviour that are common patterns of system behaviour found in the systems thinking literature (Meadows, 1999; Maani & Cavana, 2007; Nguyen & Bosch, 2013) In the description of these archetypes, we zoom in on the trends and dynamics that are at play in different corners of the Nigerian food system (see annex for more detail).

Growth and underinvestment

The 'Growth and Underinvestment' archetype describes a system behaviour in which growth reaches a certain limit due to a lack of capacity investment. This dynamic is clearly visible in the Nigerian food system, where over the past decades less than 4 per cent of the GDP was invested in agriculture. This underinvestment affects all parts of the agri-food sector: institutions, science & technology, rural infrastructure (roads, processing facilities, storage), availability of data and information, agricultural services (including extension, inputs, agri-finance). As a consequence, productivity in the agricultural sector is generally low, and food production is not sufficient to meet the growing demand. Under pressure of the population growth and accompanying food consumption, this food deficit is only growing, with Nigeria becoming more reliant on food imports for feeding its population.

Though serious attempts are being made to transform the agricultural sector through policy, the underinvestment in many parts of the agri-food sector prevent it from making a transformative change. This includes private investments in export crops (e.g. cocoa, cashew, oil palm), resulting in a huge unused potential for export of agri-food crops and foreign exchange earnings. As such, the enabling environment is constraining agricultural productivity rather than enabling, characterised by poor rural infrastructure, poor access to information, services and quality inputs, low food safety standards, low processing capacity, and reportedly high post-harvest losses. As a result the production costs, and thus domestic food prices, are high while domestic food supply remains low.

Success to the successful

The 'Success to the Successful' archetype points to a type of system behaviour, where one group has more resources and connections than another group, and therefore attracts even more resources. This dynamic of investment attracting investment is clearly visible in the Nigerian food system. Large parts of the agricultural trade in Nigeria are also happening in the informal sector. Some parts of this informal agricultural economy are characterised by high turnovers and profits, and private accumulation of wealth and power, with little influence of regulation and taxation.

Large-scale traders and importers have vested trade interests in food imports. They also have private capital to strengthen their position, and are thought to use corruption to guarantee their power and interests. Many value chains for staple crops are characterised by concentrated power in cartels and vested interests. This opposes policies and, also due to limited capacity in terms of financial and human resources, attempts to strengthen the institutions and enabling environment for sustainable and inclusive growth of the agri-food sector. As private capital accumulates, successful private entrepreneurs gain more power (e.g. market queens), but smaller entrepreneurs and young adults struggle to set up business because of a lack of (access to) capital. This dynamic also has a major impact on employment and entrepreneurship: those with capital can easily set up a business in the agri-food sector, giving rise to the group of so-called 'telephone farmers'. However, those without starting capital or collateral (e.g. youth or women) struggle to start up a business due to a lack of resources. Lack of market information, fragmented value chains and corruption make it a difficult environment for an outsider to invest.

Tragedy of the commons

The 'Tragedy of the Commons' archetype describes a type of system behaviour, where individual beneficial behaviour results in a degradation of common resources including climate change. This archetype can be recognised in different forms in the Nigerian food system, and has a negative effect on the functioning of the system. A pressing example is the pastoral conflict in much of the North of Nigeria, where arable farmers and pastoralists compete between and among themselves for the same natural resources, such as water, fuelwood and fertile land. This results in a further decline of the ecological resilience of the system and increases tensions and violence, in turn decreasing the willingness to invest in the region.

Rapid economic and population growth have led to an over-commitment of available surface water resources, over-exploitation of groundwater resources in many areas and unreliable access to water – all combining to affect the livelihood of many, particularly rural and poor

people, especially in 'Sahelian' northern Nigeria. Moreover, the availability of water in both quantity and quality is being severely affected by the extreme weather events brought on by climate change. Forest cover in Nigeria has also been severely affected. CIA World Factbook (2005) records show that 70 to 80 per cent of Nigeria's original forest has disappeared. Between 1990 and 2005, Nigeria lost 35.7 per cent of its forest cover, or around 6,145,000 hectares.

Fixes that fail

In the 'Fixes that Fail' archetype, short-term fixes are exacerbating a long-term problem. This system behaviour can be recognised in the Nigerian food system, when we look at the issue of agricultural productivity and the dependency of the system on food imports.

While there is a huge and growing demand for affordable food, both among the rural as well as the fast-growing urban population, agricultural productivity is low in many parts of the country. As the gap in domestic food supply and demand becomes larger, Nigeria becomes more dependent on cheap food imports, which works as a quick fix to the food deficit, but does not address the low agricultural productivity that keeps the deficit in place. In addition, the foreign exchange obtained through crude oil exports is declining, which lowers the GDP, and in turn, also lowers public investments in the food system.

The lack of investments in agricultural education and training, rural infrastructure and facilities, and public or private agricultural services (e.g. extension, finance, inputs) result in low innovation capacity and low agricultural productivity. Although there is a high (urban) demand for food, the poor infrastructure and support systems hamper the increase in productivity, which prevents the domestic supply of food from meeting the fast-growing demand. Moreover, low productivity levels affect the livelihoods and FNS of rural households.

Opportunities in the agri-food system

There are several trends and opportunities that can be leveraged to change some of these system dynamics. There is a growing work force, partly high-skilled (with higher education levels) but mostly low-skilled, with an entrepreneurial spirit. The climate and agro-ecological conditions favour agricultural production. Nigeria also has an abundance of natural resources (gas, oil, iron, zinc, lead, tin, etc.) that contribute to the export revenues, even if some revenues are declining (e.g. oil). Private capital is available within Nigeria and can be leveraged to finance investments in the agri-food sector. There is a huge domestic demand for food products, so markets are readily available. The port in Lagos provides access to international (food) markets. Despite the many challenges it faces, Nigeria – being the largest African economy – has huge economic potential.

Based on the literature review and key informant interviews, opportunities and challenges were identified for different commodity value chains in Nigeria (Table 1).

Table 1. Weaknesses and strengths of sub-sectors

Commodity	Weaknesses/ Challenges	Strengths/ Opportunities	Areas for NL to contribute
Horticulture Vegetables	• Farmers have limited access to irrigation; • Low use of improved varieties and disease-resistant seeds; • Weak advisory services; • Poor logistics infrastructure, high post-harvest losses • Poor quality control measures. • No existing or low performing farmers organisations/cooperatives	• Three climatic zones; • Promising crops are: tomatoes (Kano, Kaduna, and Jos); onions (Kaduna, Kebi); plantain as inter-crop; yam (western Nigeria) • Increased demand (rising population and GDP per capita)	• Seed system improvement; • Commodity based advisory services; • Improved logistics and infrastructure; • Water management (small-scale irrigation).
Palm oil	• Production scattered due to land fragmentation; • Poor seed systems for quality seedlings; • Harvesting and processing technologies are inefficient.	• High demand from processing industries; • Multinational companies interested in production and processing.	• Research needed to improve traditional processing; • Capacity building to organize palm oil producers.
Cocoa	• Government not interested	• High international demand; • Private sector investments.	• Build on experience of South-South initiative • IDH project with CRIN
White yam	• Lack of data on production and export volumes; • Not a priority crop for the government; • Fragmented value chains; • Processing equipment is expensive; • Lack of finance; • Exported yam rejected due to quality issues; • High post-harvest losses.	• High market demand; • Monitoring certification requirements for export; • Multi-stakeholder platform (YIIFSWA).	• Research on efficient, low-cost processing equipment; • Setting up efficient regulatory mechanisms.
Cassava	• Lack of consistency in supply and quality; • High quality planting material for varieties with high starch content is expensive; • Insignificant nutrition value –high starch content, low in protein, vitamins; mostly consumed as a 'filler' in diets	• Grown as a food crop by smallholder farmers • Growing market potential for starch and animal feed • Cassava flour is economical substitute to flour in bakeries. • Small-scale cassava processing and marketing is women's domain	• Improvement of cassava processing efficiency; • Develop market potential for cassava flour for bakeries, and cassava chips for animal feed.
Sesame	• High value crop with low yield; • Government not interested in promoting sesame.	• Promoted by some state governments in the North; • Has potential as a cash crop for exports.	• Seed system development; • Improvement of processing; • Establishing linkages with European buyers.
Soyabean	• Insufficient supply, cannot compete with cheap imports from China; • Not a major food crop.	• Important source of protein for animal-poultry feed (also for humans)	

Commodity	Weaknesses/ Challenges	Strengths/ Opportunities	Areas for NL to contribute
Dairy (milk and milk products)	• Large but fragmented and inefficient value chains; • Low productivity; limited access to water, quality feed, animal healthcare services; • Reconstituted milk is cheaper; fresh milk value chains need high investments e.g. to set up cold chain • Poor infrastructure and inefficient processing; • Per capita consumption of milk is low; • Programs like NDDP- National Dairy Development Programme to boost production contribute only 0.2% of total demand – not viable. • Policies like ECOWAS Common External Tariff (2013) – encourages the importation of milk powder	• Government promoting milk production and marketing as a means to resolve Fulani- crop farmers conflicts • End market controlled by multi-nationals (FC WAMCO, Arla) who import milk powder and use it for (reconstituting) milk and milk products • Government imposes restrictions on milk powder imports • National Grazing Reserves Establishment Bill (2016) to govern grazing reserves • Agriculture Promotion Policy (2016-2020) includes dairy • Traditional dairy products such as Fura, Nono and yogurt are integral to diets in the north	• Capacity building and investments to make local dairy sourcing more competitive/ viable
Poultry	• Fast growing commercial poultry sector for increasing demand for chicken meat of urban population • Growing issues with waste disposal of commercial poultry plants	• Dutch expertise and technology could help further expand the commercial poultry sector • Dutch experience with manure handling can be used to tackle waste disposal in the sector	• Knowledge exchange (expertise and technology) between Dutch and Nigerian private sector and knowledge institutes • Possibility for export of Dutch commercial poultry technology
Aquaculture	• Nigeria is largest aquaculture producers in Sub-Saharan Africa • Growth from 21,700 tonnes in 1999 to 316,700 tonnes in 2014. • Catfish most farmed species, equals half of total aquaculture production	• Dutch knowledge on water, aquaculture and fisheries can be used to boost the sector • Dutch expertise can help to reduce environmental impact of the sector's expansion	• Knowledge exchange (expertise and technology) between Dutch and Nigerian private sector and knowledge institutes

3. Policy recommendations

The analysis emphasised the importance of negative feedback mechanisms in the Nigerian food system that are the result of a weak institutional and enabling environment of the agri-food sector. The Dutch government has neither the mandate nor the resources to address all the factors hindering the transformation of the agri-food sector in Nigeria, but there are important ways it *can* contribute: it can collaborate with Nigerian and Dutch stakeholders from public and private sectors as well as civil society to transform a sub-sector or value chain within a target region, applying knowledge and expertise on FNS, the technical and logistical aspects of agricultural production and value chain coordination, as well as experience in public-private partnerships. Collaboration is key here: efforts need to be mutual, and joint choices need to be made, given the limited resources. Nigeria offers a lot of potential, with the necessary resources being available, but not in all places at all times; the challenge is to bring different parties together at the right opportunity and in the right way.

One particular key challenge is the predominance of the informal economy that shapes many constraints and opportunities of smallholder producers. More debate is needed to determine whether formalisation of the economy is a development paradigm that will result in the desired transformations. If so, current power structures will need to be challenged, which may further destabilise both urban and rural societies. If formalisation of the economy is not considered feasible in the short run, then modes of dealing with informality must be thought about, as Dutch policy and private sector interventions are often geared towards formalised economies. Questions to consider are: How can current private capital be put to use to unlock the potential of rural areas? Are there modalities that allow a merging of interests between formal financial institutions and private investors?

The Dutch government can facilitate processes of learning from practice between trade and development stakeholders in Nigeria. The challenges and specificity of constraints are simply too complex to allow for applying blueprint solutions. As such, think tanks, civil society, knowledge institutes and data centres in Nigeria all merit Dutch development investments. This may well be one of the greater opportunities for generating impact with Dutch investments: strengthening intellectual capacity, independent institutions and space for civil action in Nigeria to leverage effects on a more resilient society. More voices of women and youth in the public domain has proven in many situations to deliver on development outcomes.

The EKN in Lagos can play a brokering role and provide matchmaking services for companies, organisations and individuals interested in these opportunities. Alliances must be created to improve market linkages; provide the skills training for youth; enhance access to quality inputs (in particular seed) and finance; support processing SMEs; and invest in storage, packaging and transport facilities. To benefit women and youth, it is recommended to focus on value chains with local markets and less concentrated power, for example horticulture. High-level interventions and policies, though important, are unlikely to benefit small-scale farmers and SMEs on the ground given the weak institutions and power imbalances. For export crops, it is recommended to invest in cash crops (e.g. cocoa, cashew, sesame, palm oil) that are not essential for the domestic food consumption; however, export promotion of such crops can be highly politicised.

Intervention points for the six policy themes are described below. Note that several policy themes have considerable overlap with the major issues and opportunities at play.

Food & Nutrition Security

Nigeria faces the double burden of malnutrition, with both undernutrition and obesity recognized as a major health issue for the country. There are also challenges related to post-harvest losses and food safety. Nigerian stakeholders with knowledge on nutrition and healthy diets (e.g. Nigerian universities) have little influence on consumer behaviour. Awareness raising on healthy diets is required at the consumer end. At national level, Nigeria faces a food deficit because of the low agricultural productivity and limited processing and storage capacity resulting in high prices for domestically produced food products.

FNS is at the heart of the Nigerian agricultural policy, with food security as one of four federal priorities. The Agricultural Promotion Policy identifies food as a human right, compelling the government to protect Nigerians from hunger and malnutrition. Nutrition sensitive agriculture is mentioned as one of the ways to address issues of stunting, wasting and underweight in the country (FMARD, 2016). Nigeria's National Strategic Plan for Action on Nutrition aims to promote the delivery of effective interventions that will ensure adequate nutrition for all Nigerians, especially vulnerable groups (Ministry of Health, 2014).

One identified leverage point is **awareness raising and knowledge improvement on healthy diets incorporating the private sector**. Knowledge on nutrition, food safety and healthy diets could be included in the technical and vocational training of youth and women in the processing industry.

Suggested activities under the trade and investment strategy include:

Trade and investment strategy recommendations	Types of Partnerships	Geographic areas
• Include healthy diets and knowledge on nutrition in technical and vocational training of youth and women, farmers and processors • Engage (small-scale) processors, vendors, supermarkets, farmer unions in awareness raising on nutrition and healthy diets (incl. food safety) • Work with universities (e.g. student challenges) to promote awareness and knowledge about food safety in Nigeria's urban open markets	• Apex research organisations Abuja • FMARD • WUR • HAS • Unilever • FrieslandCampina • Food for All International • Food Basket International Foundation • Aliko Dangote Foundation (CSR)	Target states (Kano, Kaduna, Plateau State, Edo, Lagos)
• Promote info/statistics on healthy food and (social) media campaign • Involve local and international civil society to improve awareness on health & nutrition among consumers	• Federal Office of Statistics • Nigeria Bureau of Statistics • Oxfam Novib • Albert Heijn • National Committee on Food and Nutrition (NCFN)	Federal level

At national level, an important leverage point is the (public and private) **investments in domestic agricultural production and processing capacities** to improve the production of food and cash crops and reduce food losses. Access to quality seeds can significantly improve productivity.

Suggested activities under the trade and investment strategy include:

Trade and investment strategy recommendations	Types of Partnerships	Geographic areas
Value chain development in horticulture sub-sector (also for nutritious food, affordability of nutritious food)	• East-West Seed • Koppert • NABC (Seeds for Change) • ISSD program (WUR/KIT) • Solidaridad	• Kano • Kaduna • Lagos
Promote vegetable production as food and nutrition sources for the people	• CGIAR • IAR&T • NIHORT	

Agricultural sector transformation

Two major dynamics need to be considered when designing a strategy for the agricultural sector transformation: i) the strong informal economy often driving most of the agricultural sector, and ii) decades of underinvestment resulting in a weak enabling environment, limited access to quality inputs and technical know-how, and insufficient facilities and infrastructure. However, current productivity levels are far below the agricultural potential, so returns on investment can be substantial if well-coordinated.

The proposed focus on the enabling environment, including policy implementation and infrastructure, links well to the objectives in Nigeria's Agricultural Promotion Policy, which has a strong focus on fixing the infrastructure deficit and encouraging implementation through institutional reform (FMARD 2016).

The main leverage point for impact includes **public investments in operational enabling environment, infrastructure, and implementation of policies**. This includes:

- Create coherent public policies at State level in support of sub-sectors (EKN to lobby for this at diplomatic level; import / export etc.).
- Policies should recognise the trade-offs between promoting agri-food businesses using staple commodities (e.g. breweries) and national or regional food & nutrition security. Promotion of export crops should focus on crops that are not essential for Nigeria's national food & nutrition security, e.g. cocoa, cashew, sesame or palm oil.
- Strengthen the political will and institutional capacity to fully implement Nigeria's policies on gender to encourage gender mainstreaming within FMARD.

Suggested activities under the trade & investment strategy include:

Trade and investment strategy recommendations	Types of Partnerships/partners	Geographic areas
Strengthen institutional capacity for policy implementation incl. gender mainstreaming Link with policy support program's such as IFPRI's Nigeria Strategy Support Program (NSSP)	• FMARD (implementation at State level, but in dialogue with Federal level) • EKN Lagos • Knowledge institutes (e.g. WUR, KIT)	Target states (Kano, Kaduna, Plateau State, Edo, Lagos) Keep Federal level engaged
Capacity strengthening for civil society, e.g. farmer unions	• Dutch partners: Agriterra, Rabobank, SNV, IDH, Farmers Union, FrieslandCampina, KIT, W-CDI, etc.	
Create centres of excellence where Nigerian and Dutch experts can engage in knowledge exchange, practical innovation and vocational training. Activities can include: exchange visits between NL-Nigeria; peer-to-peer learning (e.g. farmer to farmer, cooperative to cooperative)	• Dutch partners in farmers organisations and cooperatives (e.g. Agriterra, SNV, IDH, Farmers Union, FrieslandCampina, Rabobank) • Knowledge institutes: ASC, HAS, WUR, KIT, FBKP • Apex group in Abuja for research and extension services	
Facilitate Public-Private Partnerships (Dutch diamond approach) through sector support instruments (e.g. DGGF)	• EKN Lagos • RVO • MinBuZa • Agriprofocus	

Agribusiness, value chain development, agri-logistics

Value chain development is seriously hampered by the lack of investments in the agri-food sector in past decades (see also agricultural sector transformation), which has resulted in low agricultural productivity. Lack of basic knowledge on good agricultural practices and lack of quality inputs seriously constrains agricultural production. However, there is a huge (and unmet) food demand in many areas of Nigeria, particularly around urban centres. The largest demand is still for cheap food on local markets, but higher-end niche markets are growing in metropolitan centres. Any investment in processing agribusinesses should be accompanied with investments in agricultural productivity (predominantly through the combination of offering extension, tailored advice, quality seed and inputs) to increase production efficiency (creating more output per unit of input) and create sufficient surplus for the processing industry. Certain value chains are characterised by concentrated power in cartels and vested interests. Lack of market information, fragmented value chains and corruption make it difficult for an outsider to invest. Instead, it is recommended to strengthen short value chains (e.g. fruit and vegetables) that can serve local peri-urban markets. This could be done by making available Dutch training modules and materials on vegetable value chains and by strengthening a number of TVETs to improve their trainings on vegetable cultivation. Moreover, Dutch knowledge and provision of improved vegetable seeds could help develop these value chains. The proposed focus on strengthening specific value chains aligns well with the Nigerian Agricultural Promotion Policy (APP), in which supporting enterprise development in different commodity value chains is one of the key priorities (FMARD 2016).

The main leverage point for impact is **value chain strengthening and coordination for value chains with limited concentrated power**. This can be done through the following actions:

- Focus on a few crops for value chain development and coordination, where the Netherlands has added value in terms of knowledge and expertise.
- Provide training and extension to farmers and SME processors (men and women) on good agricultural practices and business skills, in combination with access to quality inputs and access to finance.
- Improve infrastructure and coordinated transportation, including cold chain facilities.
- Prioritise sub-sectors in which women are engaged in the production, processing and marketing of food crops (e.g. vegetables, cassava, yam) and small livestock (e.g. poultry, small ruminants) and include gender-transformative approaches in interventions.
- Engage the private sector (Dutch & Nigerian aggregators, processors, wholesale / retail) in providing incentives to farmers to invest in agriculture, and improving value chain optimisation and efficiency by
  - Supporting bottom-up partnerships between private sector, farmer organisations and civil society.
  - Encouraging production of scale and collective aggregation and marketing via (potentially) well-performing farmer groups, organisations and cooperatives.
  - Establishing product centres (agri-hubs), linking producers and processors through processing & storage facilities, and commodity-based extension and input systems.
  - Using existing private sector support instruments (e.g. DGGF).

Suggested activities under the trade & investment strategy include:

Trade and investment strategy recommendations	Types of Partnerships	Geographic areas
Develop understanding of the whole (informal) value chains of selected crops and the power relations between actors	Partnering with Ministries of Agriculture at Federal and State level	Onions • Kano • Nasarawa Tomatoes • Kaduna Potatoes • Plateau state Palm Oil • Edo • Ondo Cocoa • Edo • Ondo • Ogun
Create Agrihubs for commodity-based extension services, TVET, inputs supply and information (seed, fertilizer), processing and storage Assist in developing farmer investment incentives	• Organisations: Agriprofocus, Agriterra, 2SCALE, IDH, IFDC, GAIN, SNV, Solidaridad, Farmer Union • Private sector: Koppert, East West Seed, ENZA, Rijk Zwaan, Omnivent, UNILEVER, Friesland Campina, Nutreco • Knowledge institutes: KIT, WUR • Babban Gona • NIHORT	
Improve infrastructure and coordinated transportation (logistics) including cold chain facilities	• Omnivent • Platform Logistics • WUR on logistics expertise • FrieslandCampina	
Empowerment of small-scale women entrepreneurs and processors Empowerment of (female) farmers organisations and cooperatives / unions	• BoPInc • Oxfam Novib • KIT • SNV	

Another leverage point is the **provision of data and information and matchmaking services through a support unit at EKN Lagos for Dutch and Nigerian private sector and NGOs**, e.g. for export of cocoa, cashew, sesame, and/or palm oil.

Suggested activities under the trade and investment strategy include:

Trade and investment strategy recommendations	Types of Partnerships	Geographic areas
Promote viable data collection of Government offices Support/strengthen Nigerian collection of statistic information on a variety of value chains	• Federal Office of Statistics • Nigeria Bureau of Statistics • WUR-CDI • EKN Lagos	Federal level Target states (Kano, Kaduna, Plateau State, Edo, Lagos)
NL and Nigerian private sector collaboration for knowledge sharing Link with existing sector support instruments (e.g. DGGF)	• EKN Lagos • RVO • NABC • CBI • Agriprofocus	Federal level

Access to finance

The agri-food sector in Nigeria is attracting private investments from wealthy Nigerians as well as foreign private capital. Also within the major trade corridors, (working) capital is present to sustain the (seemingly fragmented) staple supply chains. Private funds are targeted to intermediaries in the supply chain who get paid by end-buyers, but there is little provision of credit to farmers to enhance productivity. Farmers predominantly access finance through traditional institutions, but small-scale producers and processors have limited access to finance from formal financial institutions, as interest rates are high. Initiatives such as NIRSAL (Nigerian Incentive-Based Risk Sharing System for Agricultural Lending) can contribute to the de-risking of micro-finance in the agricultural sector in Nigeria. Improvements can be made in matching the available private capital with investment opportunities and technical know-how that can benefit small-scale producers and processors.

The proposed focus on improving access to financial services links well to Nigeria's agricultural policies, in which innovation in financing ecosystems for agriculture is a key priority (FMARD 2016).

One leverage point for impact is a **matchmaking service of private capital with other partners with agricultural know-how and social / environmental / economic impact goals**. This includes capacity building of Nigerian banks on knowledge of the agricultural sector. The Dutch Good Growth Fund can continue to play a role in this. Increasing women entrepreneurs' and farmers' access to financial services that also challenge gender inequalities will work towards empowering women.

Suggested activities under the trade & investment strategy include:

Trade and investment strategy recommendations	Types of Partnerships	Geographic areas
Continue with existing support instruments for investments: e.g. DGGF/FIFAN. Linking with Nigerian banks	• EKN Lagos • RVO • FMO	Federal level
Capacity building of Nigerian (agricultural) banks on financial services and agri-food sector through knowledge exchange Promote initiatives for de-risking lending in the agricultural sector	• Rabobank • FMO • Babban Gona • NIRSAL	Target states (Kano, Kaduna, Plateau State, Edo, Lagos)
Develop and support innovative financial services and microfinance for the agri-food sector (e.g. introducing gender-transformative approaches)	• FMO • KIT • NIRSAL	

Another potential leverage point is to **create access to (micro-) finance for young / female entrepreneurs, in combination with business coaching / advice and matchmaking** (e.g. with Dutch investors). This can be achieved through

- Guaranteeing funds to lower interest rates
- Showcasing patient capital investments
- Technical and vocational training of youth and women, linked to value chains / processors, to develop business plan and to make them credit-worthy
- Projects like GAIN incubation and 2SCALE have systems to screen candidates to guide Dutch investors

Suggested activities under the trade & investment strategy include:

Trade and investment strategy recommendations	Types of Partnerships	Geographic areas
Collaboration between Nigerian banks and MFI with Dutch organisations for empowerment and access to finance for youth / women entrepreneurs	• FMO • Crosswise Works • KIT • RVO • Oxfam Novib	Target states (Kano, Kaduna, Plateau State, Edo, Lagos)
Technical and vocational training of youth and women: credit-worthy business plan development for different value chains Setting up of business incubators for young and female entrepreneurs	• RVO – Orange Corners • HAS • Nuffic • Oxfam Novib • Crosswise Works • 2SCALE • GAIN • KIT	

Employment

The agri-food sector in Nigeria is characterised by a mismatch between the demands on the labour market and the available labour force. The growing private sector seeks to hire employees with technical skills that are not available; the combination of a strong population growth and weak public education is resulting in large numbers of low-skilled unemployed youth in Nigeria. Young females in poor households have even less access to education. The focus on employment links well with Nigeria's top priorities for agriculture, in which job creation is one out of four key priority areas for its Agricultural Promotion Policy (FMARD, 2016).

An important leverage point is **the technical and vocational training of youth and women, linked to value chains / processors and access to finance**: the training must be matched with the skills demand, keeping in mind that different dynamics are at play in different locations. Technical / vocational trainings should be linked to other leverage points, such as the following:

- Employment creation that requires low capital investments. Youth can be trained for new emerging jobs in agri-services that require professional skills, low start-up capital, and involve application of ICT, for example: agri-logistics (local aggregation, storage and transport), advisory services and input supply, crop insurance and access to finance.
- Improvement of human capital in line with the demand in the agri-food sector, for example through matching Nigerian and Dutch TVETs, knowledge institutes, and private sector R&D departments.
- Access to (micro-) finance for young / female entrepreneurs (see access to finance above).
- Support local enablers in setting up incubation programs, using experiences such as Food Connection Challenge (Crosswise Works), incubation centres (GAIN), start-up centres (Rabobank), Orange Corners (RVO), Work in Progress (Oxfam Novib)

Suggested activities under the trade & investment strategy include:

Trade and investment strategy recommendations	Types of Partnerships	Geographic areas
Support TVETs for skills development in partnership with private sector (articulation of skill demand and access to job market) Work with women and youth groups giving them more influence on capacity building	• Nuffic • RVO – Orange Corners • Solidaridad • Crosswise Works • Oxfam Novib • HAS • ASC • FMARD • Apex research organisations in Abuja	Target states (Kano, Kaduna, Plateau State, Edo, Lagos)
Support local enablers for start-ups and business incubation to support young / women entrepreneurs	• Oxfam Novib • Hivos • SOS • Rabobank • GAIN • RVO – Orange Corners • Crosswise Works	

Another leverage point is the **promotion of responsible investments (of Dutch private and public sector) creating decent jobs**.

Suggested activities under the trade & investment strategy include:

Trade and investment strategy recommendations	Types of Partnerships	Geographic areas
Promote responsible investments that create decent jobs	• FMO/Access bank • EKN Lagos • NABC • HiiL • Oxfam Novib	Federal level Target states (Kano, Kaduna, Plateau State, Edo, Lagos)

Climate change adaptation

Climate change is expected to have large consequences for Nigeria's food system, and the first signs of its impact are already being witnessed (FMIC, 2016; Nugent, 2018). Temperatures are expected to increase and rainfall to become even more variable. Nigeria's northern region is expected to face lower and more erratic rainfall, whereas more intense rainfall resulting in flooding is expected in the southern region (WUR/BZ, 2018). Meanwhile, basic skills and knowledge on climate smart agriculture is lacking, among farmers as well as among extension services.

Very little Nigerian cropland is irrigated, meaning that most farmers can cultivate their fields only during the rainy season. This also leaves farmers and food-insecure populations vulnerable to the changing and unpredictable climate. The Nigerian government's Agricultural Transformation Agenda has already noted the benefits of irrigation for the country's agricultural productivity. The Netherlands can contribute to widespread adoption of (small-scale) irrigation and efficient use of water, as this has the potential to transform Nigerian agriculture. Existing interventions in other African countries, such as Smart Water for Agriculture in Kenya[3] or Rain for Africa[4], provide examples of successful small-scale irrigation elsewhere, and can potentially be adapted to Nigeria, taking into consideration the context differences.

The attention for climate change links well with current agricultural policies, in which environmental sustainability and climate are featuring more prominently than before. The Agricultural Promotion Policy aim of 'focusing policy instruments on the sustainability of the use of natural resources (...) with the future generation in mind' (FMARD 2016).

The identified leverage point is the **sharing of data and information (and know-how) on climate change impacts and adaptation strategies for value chain actors**, including regional scenarios for climate change impact. This should be combined with the following leverage points:

- Provision of quality inputs (e.g. drought-resistant varieties)

3 www.snv.org/project/smart-water-agriculture-swa
4 www.rain4africa.org

- Technical training on climate change adaptation in value chains (production, processing, storage)
- Strengthen land rights; integrated masterplan on use of contested natural resources agreed upon with stakeholders
- Promote low-cost small-scale irrigation and climate-smart agriculture in prioritised sub-sectors.

Suggested activities under the trade and investment strategy include:

Trade and investment strategy recommendations	Types of Partnerships	Geographic areas
Knowledge exchange on climate-smart agriculture, climate change adaptation, water management and micro irrigation Develop knowledge on climate impact for specific regions and commodities	• River Basin Authorities • FMARD • Oxfam Novib • SNV • WUR • HAS • NI-SCOPS • Solidaridad • IDH • Etc.	Kano Kaduna Plateau State Edo
Increase knowledge and capacity of farmer organizations on climate smart agriculture. Promote (small-scale) irrigation and efficient use of water		
Strengthen land governance for (investments in) sustainable land use	• Land@Scale • LANDac • KIT	Kano Kaduna
Obligation to address climate change adaptation and resilience across interventions in all sub-sectors, especially for trade and investment strategies Ensure efficient water access and use in investment strategies.	• RVO • EKN Lagos • IDH	Federal level

4. Conclusions

The Governments of Nigeria and the Netherlands are embarking on a bilateral relationship in order to promote trade and investments between the two countries and to strengthen the agri-food sector of Nigeria. Realistic goal setting is required, given the limited investments that can be made relative to the large economic and socio-political forces at play in the Nigerian agri-food sector.

It is therefore recommended to focus on a particular sub-sector or selected commodities where a collaboration between the two countries can make a difference and set an example for other sub-sectors. From a food systems perspective, the Dutch-Nigerian bilateral relationship should focus its energy on improving food system outcomes, targeting domestic crops that help to close the nutrient gap for Nigerians, such as vegetables, dairy, poultry or aquaculture, while also strengthening those export crops that can have high economic impact for Nigerian farmers, such as cocoa and palm oil. These are also sectors in which the Netherlands has added value in terms of knowledge and expertise (e.g. horticulture) and which provide promising business opportunities for Dutch companies in Nigeria.

To achieve transformative change, the root causes (incl. negative feedback mechanisms) that keep agricultural productivity low need to be addressed. This will be relatively easier in short commodity chains (e.g. vegetables) than long commodity chains (e.g. grains) that are characterised by concentrated power. Government interventions should focus on strengthening the enabling environment to attract private sector investments. The EKN in Lagos can play an important brokering role, matching supply and demand of knowledge, capacity building, finance and trade relationships.

Ideally, interventions and investments should be demand-driven, suited to the local context and needs, rather than merely supply-driven based on Dutch expertise. This requires Dutch and Nigerian partnerships between knowledge institutes, civil society, public and private sector to co-create innovative solutions to transform the selected commodity supply chains. An integral approach to value chain development will be required given the multiple constraints.

This includes not only coordination between value chain actors to lower transaction costs, but also the supporting services and enablers. Interventions and investments should include both institutional innovations (e.g. value chain coordination, access to finance, advisory services, user rights of natural resources, capacity building, and generation and sharing of information and knowledge) and technological innovations (e.g. variety development, quality seed production, climate-smart agricultural practices, ICT-based advisory services) to increase productivity and efficiency. This will result in economic growth, employment creation for youth, and food and nutrition security in Nigeria. This report has identified a spectrum of possible leverage points for the Dutch-Nigerian bilateral relationship to achieve these goals. These leverage points are formulated for each of the six prioritised policy themes of the Ministry of Foreign Affairs:

Agricultural sector transformation

- Public investments in operational enabling environment, infrastructure, and implementation of policies

Agribusiness, value chain development, agri-logistics

- Value chain strengthening and coordination for shorter value chains with less concentrated power.
- Provision of data and information and matchmaking services through a support unit at EKN Lagos for Dutch and Nigerian private sector and NGOs.

Access to finance

- Matchmaking service of private capital with other partners with agricultural know-how and social / environmental / economic impact goals.
- Create access to (micro-) finance for young / female entrepreneurs, in combination with business coaching / advice and matchmaking.

Employment

- Technical and vocational training of youth and women, linked to value chains / processors and access to finance. Match training with skills demand.
- Promotion of responsible investments (of Dutch private and public sector) creating decent jobs.

Food & nutrition security

- Awareness raising and knowledge improvement on healthy diets.
- Investments in domestic agricultural production and processing capacities.

Climate change adaptation

- Sharing of data and information (and know-how) on climate change impacts and adaptation strategies for value chain actors.

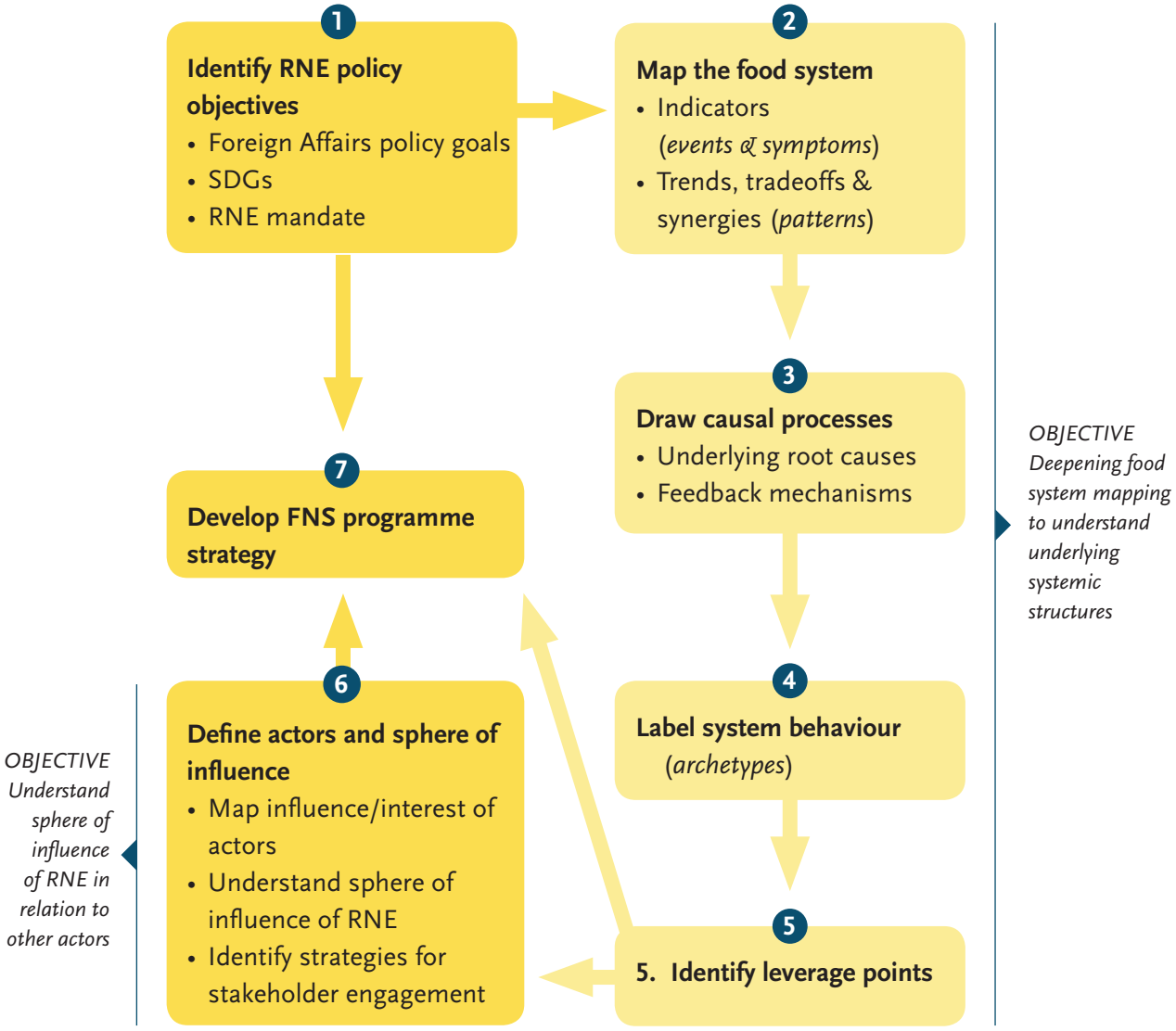
Recommendations for next steps

This report presents a general overview of the main issues related to the prioritised policy themes for the agri-food sector in Nigeria, using a food systems approach, in line with the Scope of Work issued by the Ministry of Foreign Affairs. We recommend the following next steps to further shape the trade and investment programming of the Dutch Government.

1. The food system analysis was predominantly based on secondary data and insights obtained from key informants within the Dutch public and private sector. Consequently, the findings and recommendations are biased towards the Dutch perspective on the opportunities and challenges in the Nigerian food system, and lack detailed insights within specific sub-sectors or regions. It is therefore recommended to follow up this desk-based study with more empirical research among selected sub-sectors within target regions, in order to develop more specific policy recommendations. Such an in-depth study could apply a similar food systems approach, but should engage Nigerian key stakeholders from the public and private sector and civil society.

2. Gender issues are hinted at in this report with a brevity that may not have emphasised sufficiently how gender inequality in Nigeria poses particular challenges to the agricultural transformation agenda, given the importance of women's involvement in the agri-food sector. Any programme or intervention will therefore require further gender analysis and gender mainstreaming strategies in order to contribute to the empowerment of women and youth.

Figure 5. Food Systems Decision Support Tool



ANNEX

Food System Decision Support tool application

The Food Systems Decision Support (FSDS) tool, jointly developed by KIT and Wageningen Economic Research, has been applied to provide a quick scan of the food system and identify leverage points to inform policy recommendations for the Dutch Government. The FSDS tool provides a series of analytical steps to understand the dynamics of an agri-food system and identify leverage points for interventions to achieve systemic change to arrive at desired policy objectives, such as economic growth and employment, food & nutrition security (FNS), and climate change adaptation.

The Food Systems Decision-Support Tool (Figure 1) consists of seven steps:

1. Defining the policy objectives
2. Mapping the agri-food system relevant to these policy objectives
3. Identifying the causal processes underlying the agri-food system
4. Determining archetypes in system behaviour of the agri-food system
5. Identifying actionable leverage points within the agri-food system
6. Defining relevant actors and their influence and interest to address leverage points
7. Based on leverage points, policy objectives and relevant actors, provide policy recommendations

The application of the FSDS tool on the Nigerian food system consisted of the following main activities:

Data collection and interviews
Recent literature and data was reviewed to map the current food system of Nigeria. Additionally, ten interviews were held with key informants (Table 2) in the Netherlands and Nigeria to discuss trends, challenges and opportunities in the Nigerian agri-food sector.

Internal workshop
During a one-day internal workshop, the collected information was presented and causal processes were discussed by the project team and thematic experts in order to identify leverage points.

Presentation and validation of first findings at multi-stakeholder meeting (March 5th, 2019)
A roundtable was organised by the Ministry of Foreign Affairs as a first step towards the establishment of a Netherlands-Nigeria working group on trade, cooperation and investment with special attention to agribusiness and food system governance. Dutch partner organisations involved in projects and programs focusing on agri-food sector development and trade in Nigeria attended the roundtable meeting. The roundtable was an important step towards defining the contours for implementation of the recently approved Multi-Annual Country Strategy (2018-2022). A total of 64 experts from 28 organisations (representing the Dutch Government, knowledge organisations, NGO and civil society, and private sector) attended the roundtable meeting. A preliminary food systems analysis was presented to kick off the discussions, and participants discussed challenges and opportunities for the different policy themes.

Table 2. Key informant interviews

Name	Organisation	Date
Rutger Groot	East-West Seed	13/02/2019
Bram Wits	Agricultural Attaché Nigeria	15/02/2019
Jacob Kroes	Friesland Campina	15/02/2019
Eva Rootmensen	Crosswise Works	18/02/2019
Edward Baars	IITA / N2Africa	18/02/2019
Niek van Dijk	BoP Inc	18/02/2019
Falaq Tijdani	Sahel Consulting	19/02/2019
Mackenzie	NABC	22/02/2019
Cyril Ugwu	IDH Nigeria	25/02/2019
Patrick Gouka	CBI	25/02/2019

Step 1: Define policy objectives

Nigeria is a new focus country for both the Ministry of Foreign Affairs (MinBuZa) and the Ministry of Agriculture, Nature and Food Quality (LNV). In 2018, an MoU was signed by the Minister for Foreign Affairs and his Nigerian counterpart. The Dutch government has committed to making substantive efforts to broaden the economic and political collaboration with Nigeria as part of its renewed interest in investing in West Africa. The bilateral relationship between the Netherlands and Nigeria will particularly serve mutual interests in political topics (incl. security and stability), economy, trade and investment (with special focus on agriculture and water), consular matters and migration.[5] The long-term objective is to support Nigeria in its diversification strategy from reliance on oil revenues to economic growth and job-creation based on a sustainable and inclusive agri-food sector.[6]

Despite its status as a (lower) middle income country, Nigeria is home to the largest number of people living in poverty in the world – surpassing, for example, India. Stronger economic relations are geared towards creating employment, especially for the youth, and increasing foreign (Dutch) and local private sector investments in Nigeria. The Nigerian government has prioritised agri-food sector transformation, a goal to which the Netherlands has much to offer in terms of knowledge, innovation and investment capacity.

Government policies concerning the agricultural sector and food and nutrition security are abundant in Nigeria. The Federal Government of Nigeria is actively pursuing an Agriculture Promotion Policy (APP) for the period 2016-2020. This policy, also known as 'The Green

5 Memorandum of Understanding between the Government of the Federal Republic of Nigeria and the Government of the Netherlands on the establishment of bilateral consultations. 2018

6 MLS 2018-2022

Alternative' is aimed at achieving food security goals, import substitution, job creation, and economic diversification. In 2014, the National Plan of Action on Food & Nutrition was adopted and in 2016 the multi-sectoral National Policy on Food & Nutrition (NPFN) was revised and relaunched. Moreover, there are several government fora where food and nutrition security is discussed, such as the multi-sectoral National Committee on Food & Nutrition (NCFN) and the Nutrition Partners Forum, including both government ministries and development partners (WUR/BZ, 2018).

A preliminary assessment conducted for the EKN Lagos and IGG identified the enabling environment for sustainable intensification of vegetable production, as well as inclusive and sustainable vegetable value chain development as priority investment opportunities for the embassy under its Multi-Annual Country Plan. It was also concluded that there is need to focus on rural infrastructure, support for agri-SME's and agro-logistics. In addition to commodity and sub-sector specific interventions, the need for agricultural sector transformation was highlighted by the Dutch and Nigerian governments. Dutch knowledge institutions and partners are expected to play a key role in engaging with Nigerian counterparts on specific aspects of sector transformation related to the priority sub-sectors and themes mentioned above. The horticultural (seed) sector has already been identified by stakeholders as a promising sub-sector where the Netherlands can have an added value in the food system transformation in Nigeria; but other sub-sectors are also being considered.
The Dutch Multi-annual Country Strategy (MLS) for Nigeria identifies the following main objective: to support Nigeria in its diversification strategy from reliance on oil revenues to economic growth and job-creation based on a sustainable and inclusive agri-food sector. The underlying vision is a sustainable transition of Nigeria's food system from a system based on food-imports and depletion of natural resources, to an integrated sustainable food system capable of both providing sufficient healthy food to a growing (urban) population and creating jobs and further opportunities. Six policy themes have been identified by the Ministry of Foreign Affairs: i) agricultural sector transformation; ii) agribusiness, value chain development, agri-logistics; iii) access to finance; iv) employment; v) climate change adaptation; and vi) food and nutrition security.

Based on conversations with staff of the Dutch Ministry of Foreign Affairs, we conclude that the Dutch trade and investment agenda for the Nigerian agri-food sector is expected to meet the following policy objectives:

- Trade and private sector (agribusiness) development
- Youth employment
- Inclusive economic growth (pro-poor market development)
- Food and nutrition security (healthy diets)
- Climate change adaptation and sustainable agriculture

Step 2: Food system mapping

Method: A literature review was done to map the Nigerian agri-food system using the framework of van Berkum et al. (2018). Key informants were interviewed to investigate major current trends and drivers in the Nigerian agri-food system.

For mapping the food system, the FSDS tool relies on the framework developed by van Berkum et al. (2018) in their report 'The food systems approach: sustainable solutions for a sufficient supply of healthy food', describing a way to map the relationships of the food systems to its drivers and outcomes (Figure 6).

Literature review

Food and Nutrition Security in Nigeria

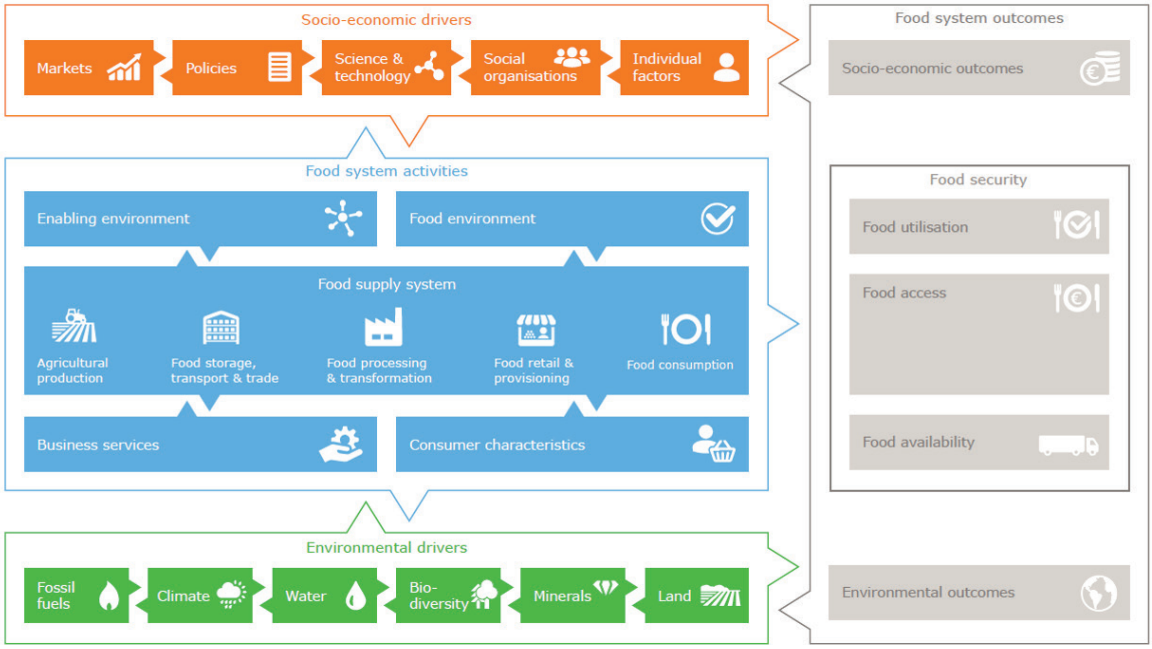
Nigeria is a key regional player in West Africa, with approximately 190 million inhabitants and an annual population growth rate of 3 per cent. Nigeria accounts for 47 per cent of West Africa's population, and has proportionally one of the largest population of youth in the world. Urbanisation is high, with an urban population growth rate of more than 4 per cent annually. Although it depends heavily on the oil industry for its budgetary revenues, Nigeria is in many ways still an agricultural society. Nigeria's agricultural sector employs 37 per cent of the labour force, but generates only 21 per cent of the country's GDP (World Bank, 2018).

Table 3. Key economic and food security indicators for Nigeria

	1990	2000	2010	2017
Population, total (millions)	95.3	122.4	158.5	190.9
Population growth (annual %)	2.6	2.5	2.7	2.6
Population density (people per sq. km of land area)	104.6	134.3	174.1	209.6
Poverty headcount ratio at national poverty lines (% of population)		48.4	46.0	
Prevalence of underweight, weight for age (% of children under 5)	35.1	27.2	24.4	31.5
Urban population growth (annual %)	5.4	4.1	4.7	4.3
GDP (current US$) (billions)	54.0	69.5	363.4	375.8
GDP growth (annual %)	11.8	5	8	0.8
Agriculture, forestry, and fishing, value added (% of GDP)	22	21	24	21
Industry (including construction), value added (% of GDP)	35	34	25	22
Exports of goods and services (% of GDP)	21	36	26	13
Imports of goods and services (% of GDP)	10	13	18	13

Source: World Bank 2018

Figure 6. Mapping the food system



Nigeria has made progress in socio-economic terms over the last 15 years. Between 2005 and 2015, Nigeria's HDI value increased by 13.1 per cent. However, the country continues to face massive developmental challenges, which include reducing the dependency on oil and diversifying the economy, addressing insufficient infrastructure, and building strong and effective institutions, as well as governance issues, public financial management systems, human development indicators, and the living conditions of the population.

Nigeria is the continent's leading consumer of rice: it is one of the largest producers of rice in Africa and yet also one of the largest rice importers. As well as an important food security crop, rice is an essential cash crop as well, generating more income for Nigerian farmers than any other cash crop in the country. Cassava is the main staple crop and predominantly grown by smallholders for home consumption and local scale. Approximately 66 per cent of total production occurs in the South, and about 30 per cent in the north-central region (FAO, 2017).

Fisheries contribute about 3 to 4 per cent to the country's annual GDP and is an important contributor to the population's nutritional requirements, constituting about 50 per cent of animal protein intake. Livestock is an important component of Nigeria agriculture with abundant social and economic potential. About 60 per cent of the ruminant livestock population is found in the country's semi-arid zone and is mostly managed by pastoralists. Domestic production of livestock products is far below the national demand, resulting in large imports of livestock and livestock products. Except for eggs, the domestic production of animal products is less than half the demand for beef mutton and goat meat, while for milk and pork products it is less than quarter the demand (FAO, 2017).

Food insecurity prevalence in the low-income urban and rural households stands at 79 per cent and 71 per cent respectively (Matemilola & Elegbede, 2017). NFCNS data on nutritional status showed that at national level 36 per cent of the children under five were stunted, 25 per cent were underweight, 18 per cent were wasted and 9 per centper cent of the children under five were overweight (SUN, 2011).

With its large and quickly expanding urban population rapidly accumulating wealth and undergoing changes in food habits, Nigeria will face new, multiple and different challenges regarding food security and food systems, health burdens and non-communicable diseases (Oyewole & Atinmo, 2015; Seto & Ramankutty, 2016). In urban areas in Nigeria an increase in the incidence of obesity and related NCDs is already being observed (Maiyaki & Garbati, 2014; Steyn & Mchiza, 2014).

Overview of FNS policies and interventions in Nigeria

Government policies and interventions
There is an abundant quantity of government policies concerning food and nutrition security in Nigeria. The 2001 multi-sectoral National Policy on Food and Nutrition (NPFN) was revised and relaunched in September 2016. The National Plan of Action on Food and Nutrition was adopted in 2014. The Federal Government of Nigeria is actively pursuing an Agriculture Promotion Policy (APP) for the period 2016-2020. This policy, also known as 'The Green Alternative' is aimed at achieving food security goals, import substitution, job creation, and economic diversification. Investments in agriculture are anchored on the Agriculture Sector Investment Plan. The APP is founded on some of the principles of the previous Agricultural Transformation Agenda (ATA) from 2011-2016.

Moreover, there are several government fora where food and nutrition security is being discussed. A multi-sectoral National Committee on Food and Nutrition (NCFN) is chaired/facilitated by the Ministry of Budget and National Planning. A Nutrition Partners Forum includes both government ministries and development partners. To effectively respond to food crises in West Africa, ECOWAS, with technical support from CILSS, has (?because ECOWAS is one entity?) encouraged the implementation of early warning systems in all of the countries in the region (WUR/BZ, 2018).

Development policies and interventions
In 2017, Nigeria received a total of 4.37 billion USD in development funds. The largest development donors in Nigeria are the World Bank (925m USD), the African Development Bank (843m USD) and the United Kingdom (407m USD). Together, these donors are responsible for half of the development funds Nigeria receives yearly. The largest sectors receiving development funds are government and civil society (849m USD), emergency response (782m USD) and basic health (571m USD) (WUR/BZ, 2018).

There is a range of major international development programmes in Nigeria on food and nutrition security. The North East Nigeria Transition to Development Programme (DFID) delivers an effective response to the basic needs of vulnerable people impacted by the crisis in the North East of Nigeria. The CGIAR Research Program on Agriculture for Nutrition

and Health, or A4NH, led by the International Food Policy Research Institute (IFPRI), helps realise the potential of agricultural development in Nigeria to deliver gender-equitable health and nutritional benefits to the poor. The World Bank's Agro-Processing, Productivity Enhancement and Livelihood Improvement Support Project enhances agricultural productivity of small and medium scale farmers and improves value addition along priority value chains in the Participating States (WUR/BZ, 2018).

Dutch FNS policies and interventions

Zooming in on Dutch development support, we see that the Dutch Ministry of Foreign Affairs has spent 20 million USD in Nigeria, the large majority of which was allocated to emergency response (17m USD), and a minority to government and civil society (3.1m USD) and population policies/reproductive health (0.15m USD). In 2017, the NL Enterprise Agency sent 339 thousand US dollars to Nigeria, with the majority of 284k spent on the fishery sector, 35k on trade policy and regulations and 20k on agriculture (WUR/BZ, 2018).

There is a range of development programmes directed at food and nutrition security. The 2SCALE program stimulates inclusive agribusiness and public private partnerships. RVO's Orange Corners is a platform for (young) entrepreneurs to learn, stimulate their creativity, grow their business and expand their professional network. KIT hosts a project on the improvement of potato value chain Jos Plateau (KIT). The Amsterdam Initiative against Malnutrition (AIM) aims to provide complete value chain solutions for nutritious foods, from affordable raw materials to available and accessible nutritious foods.

Both Heineken and Friesland Campina have developed the first steps to do more with respect to local procurement of their raw materials, supported by the 2SCALE program. For example, The FrieslandCampina WAMCO (FCWAMCO) Dairy Development Programme (DDP) focusses on supporting the Federal Government's initiative of improving dairy farming in Nigeria, with the main aim of sourcing at least 10% of the processed milk volume from local producers (WUR/BZ, 2018).

Bottlenecks in the Nigeria Food System

The Nigerian food system faces numerous challenges related to infrastructure, productivity, land degradation, to access to land, services and finance. Poor rural road infrastructure undermines farm profitability, increases waste, and impedes access to markets, inputs, equipment and new technology.

The lack of both human capital and investment in high-quality education are blocking the development of the agricultural sector. There is a lack of high-quality vocational institutions and extension services to support the professional development of farmers and food entrepreneurs.

Corruption, low accountability and low trust in institutions hamper the regulatory environment of the agricultural sector. In value chains, there is a lack of coordination between market parties. Moreover, many value chains lack good market information systems for different parties in the chain to make the right decisions.

Yield per hectare has been low, because of poor and limited farming inputs, such as seedlings, pesticides and fertilisers. Farming systems are mainly smallholder-based and agricultural landholdings are scattered. Simple, low-input technology is employed, resulting in low-output labour productivity.

Moving further down the value chain, processing and marketing activities have been plagued by poor infrastructure, low investment, and unfavourable government policies. There is often low to no access to finance for investments at farm level. Loans have high interest rates and farmers do not have enough collateral to apply for them. About 95 per cent of agricultural lands are not titled, effectively nullifying their capacity to be treated as collateral for financial transactions. Moreover, there is a lack of agricultural sector knowledge in the financial sector.

Finally, there is limited knowledge and expertise on good farming practices available among producers and extension workers. Land degradation and erosion arising from over-cultivation, deforestation and overgrazing are increasing, and drought has become common in the North (IFAD, 2019).

Food system activities

Food supply system
Nigeria has a largely rain-fed agricultural sector, which constitutes an important part of the national economy. Agriculture provides employment for close to 70 per cent of the Nigerian population and accounts for almost one-third of the country's Gross Domestic Product. Moreover, Nigeria is a food deficit country, importing food to supplement its own food supply. Since the 1970's boom in the oil sector, the development of the agricultural sector has stagnated in many ways.

The sector faces many challenges, notably an outdated land tenure system that constrains access to land (1.8 ha per farming household), a very low level of irrigation development (less than 1 per cent of cropped land under irrigation), limited adoption of research findings and technologies, high cost of farm inputs, poor access to credit, inefficient fertiliser procurement and distribution, inadequate storage facilities and poor access to markets have all combined to keep agricultural productivity low (average of 1.2 metric tonnes of cereals per ha), with high postharvest losses and waste (FAO, 2018).

As for many countries, accurate data on post-harvest losses in Nigeria's vegetable chains are scarce and are mostly based on estimations. Field data of registered losses of vegetables between harvest and market are meagre and, as a result, hamper the evaluation of costs and benefits from interventions that aim to decrease these losses. Studies performed on postharvest losses in vegetable chains in Nigeria reveal some of these 'guestimates', but generally maintain a wide range within the estimates of losses in the postharvest chain, from 30 to 50 per cent (or more for specific crops) (Bolarin & Bosa, 2015).

In Nigeria, agricultural input subsidy occupies a central role in the policy tools of the government (Umar et al., 2015). According to Takeshima and Liverpool-Tasie (2013), fertiliser subsidy alone constituted nearly 68 per cent of government agricultural expenditure in the recent

past. Agricultural inputs are a range of materials which may be used to make agricultural production possible, while input subsidies are grants given by the government to farmers in order to reduce their production cost and improve their profit margin. Over the years, the Nigerian government has been making considerable expenditure on the provision of subsidised farm inputs (especially fertiliser) in the country (Amurtiya, 2018).

Transforming Nigeria's agricultural value chains requires massive investments in Nigeria's agriculture sector to increase production and productivity and to create value addition across the most profitable segments of the value chain. Lack of government coordination (100%), inconsistencies in policy, regulatory, laws, taxes and administrative practices (94%), lack of security of raw material supplies to food processors (75%), and lack of human capital (50%) were identified as top constraints facing agribusiness investors in Nigeria from two recent surveys commissioned by FMARD in 2013. It is important to support farmers to increase their production so that marketable surplus is available year-round. This implies also improving processing and market linkages, complemented by sensitisation to make some foods and food combinations more attractive to the consumer (IFAD, 2018).

Enabling environment

The Nigerian food system has a challenging enabling environment, with bottlenecks around infrastructure, corruption and government bureaucracy. Nigeria scores 125 out of 140 countries on road quality, a relatively low score compared to other economic powerhouses in Africa, such as South Africa (34/140), Morocco (55/140) and Ethiopia (79/140). Its road quality score has slightly improved from 2.41 out of 7 in 2006 to 2.71 out of 7 in 2015 (WEF, 2019), but currently only 16 per cent of Nigeria's roads are paved, compared to an average of 50 per cent in the world's lower middle-income countries (ISS, 2017).

Nigeria ranks 144th out of 180 on the TNI Corruption Index, which is even worse than in 2010, when it ranked 134th out of 178 (TNI, 2019). Its ranking with regards to 'Ease of Doing business' is not very positive, either: Nigeria has a score of 52.9 out of 100, slightly better than the average of Sub-Saharan Africa (51.6) but scoring substantially lower than other economic powerhouses in the region, such as South Africa (66) or Kenya (70.3). The top five difficulties faced when doing business in Nigeria are registering property, trading across borders, getting electricity, paying taxes and dealing with constructions permits (World Bank, 2019).

Food environment

In rural areas, diets are composed of staple crops (rice, maize, cassava) and leafy vegetables. In cities and higher income groups, the share of (animal) proteins and fats is higher. Nigeria faces several barriers to increasing vegetable consumption in urban areas of Nigeria. Limited year-round availability, affordability, need for convenience, food safety issues and the attraction to the modern or Western lifestyles are constraints for healthy food choices by urban middle class consumers in Lagos (FAO 2015). Next, cultural beliefs and taboos as well as religious beliefs are also found to influence the food choices of consumers (Ijewere 2012). The vegetable availability is region- and season-dependent, and products are mostly eaten fresh, since storage possibilities are few and substantial losses occur due to inadequate preservation and transport.

Also at the national level, the availability of vegetables is insufficient to meet the recommended levels of intake. For lower Social Economic Classes, the affordability of vegetables is problematic due to low purchasing power of households, and the necessity to prioritise energy-dense foods, which are generally cheaper. Across all urban consumers, including the lower SEC, constraints in the time available for shopping and preparation of food appears to drive consumers towards increased consumption outside the home. Convenient foods are typically high in fat and carbohydrates, and low in vegetables and other nutrient-dense foods. Those seeking to shift to healthier, but convenient alternatives, such as fish, fresh fruits and vegetables, are faced with the increasingly expensive costs of nutritious foods relative to the fast-food alternatives (Raaijmaker 2018).

With most of the urban people engaged in activities outside the agricultural sector, the rapid industrialisation of most urban centres in Nigeria has diminished the main cities' capacity for food sufficiency. Lagos is particularly in danger of being engulfed in a food crisis. In the early 70s, Lagos used to boast of agricultural settlement such as Dairy farm, Agege and many others in Ikorodu, Epe and Badagry. They were established to provide healthy food and employment for people. Rapid industrialisation has, however, led to the disappearance of these settlements. The large distances in Nigeria between rural (production) and urban (consumption) areas, bad infrastructure, lack of good transportation means and lack of storage are all serious challenges for the food supply meeting the demand. The difficulties in supply of (especially perishable goods) to the metropoles in combination with different lifestyles leads to changes in urban consumption preferences.

Business services

Access to agricultural finance and other services, such as inputs, is limited in much of Nigeria. A share of 74 per cent of adults (64m) have never had a bank account, and only 15 per cent of women currently have bank accounts. While 71 per cent of salaried workers have a bank account, 86 per cent of rural adults do not. Only 5 per cent of SMEs have access to a loan, and 59 per cent report difficulties accessing financial services (CGAP, 2009).

Access to inputs remains a challenge for achieving optimal productivity of agricultural outcomes. In Nigeria, agricultural input subsidy occupies a central role in the policy tools of the government (Umar et al., 2015). Nigeria's past agricultural input subsidy policy (known as the Market Stabilisation Scheme) was widely considered to have been ineffective owing to some obvious problems like massive diversion of supply to benefit the middlemen, the issue of elite capture, the cumbersome acquisition process, late delivery of inputs and the low quality of some of the inputs (Dorward, 2009; Grow Africa, 2016; Ayoola and Ayoola, 2016). The Government has recently implemented an improved agricultural policy known as the Growth Enhancement Support Scheme (GESS) under the Agricultural Transformation Agenda (ATA). The primary objective of the scheme is to depoliticise the input sector by withdrawing the State from procurement of inputs and developing a private sector channel for input distribution (Grow Africa, 2016). Under the scheme, farm inputs like fertiliser, insecticides / herbicides, and improved seeds are disbursed to registered individual smallholder farmers through an electronic system (Tiri et al., 2015). According to Takeshima and Liverpool-Tasie (2013), the fertiliser subsidy alone constituted nearly 68 per cent of government agricultural expenditure in the recent past. Agricultural inputs are a range of materials which may be used to make agricultural production possible, while input subsidies are grants given by the

government to farmers in order to reduce their production cost and improve their profit margin (Amurtiya, 2018). But the huge financial burden through input subsidies raises concern about its sustainability considering the dwindling financial resources of the country. Moreover, the GESS attempts to address this issue have been characterised by late or non-delivery of inputs.

The Nigerian agricultural extension services have been dominated by Agricultural Development Programs (ADPs) funded through the World Bank loans, based in each of the 36 states and the Federal Capital Territory since the mid-1970s (Adebayo and Idowu, 2000). But due to the low quality of these ADPs, extension services have been provided by a variety of public, commercial, and voluntary agencies (mainly NGOs). Despite the differences in their goals and approaches, all these entities seek to achieve their objectives by sharing knowledge to influence the decisions and practices of rural farm households (Adebayo, 2004).

Consumer characteristics

Average food consumption has increased over the past decades, from 2310 kcal in 1990 to 2710 kcal daily intake in 2006. On average, the share of total income spent on food is 41 per cent. The data on food budget shares show that the average Nigerian consumer spends 73 per cent of his/her earnings on food products (IMAP, 2010). Table 4 shows the distribution of these expenditures over different food categories. Fruits and vegetables make up 15% of total expenditures, while cereals take up over one-third of total expenditures. The study of Ohen (2013) found that the frequency of the purchase of fruit and vegetables is strongly determined by the level of monthly income.

Table 4. Food expenditure, by category (%)

Beverages, tobacco	Breads, cereals	Meat	Fish	Dairy	Fat, oils	Fruits, vegetables	Other foods	Total food expenditures
			Percent of total food expenditures					*% of total expenditures*
2.73	34.08	12.88	15.22	5.61	5.15	15.44	8.89	72.97

Source: IMAP, 2010

Food system outcomes

Socio-economic outcomes

Nigeria is the largest economy of Africa, with the highest GDP. At the same time, 25 per cent of all Africans in extreme poverty live in Nigeria. Recently the Brookings Institute labelled Nigeria as the country with the largest number of people living below the poverty line. There are presently more poor people in Nigeria (87m) than in India (73m). Although it is classified as a lower middle income country, Nigeria ranks in the lowest quintile of the UN Human Development Index (152 out of 188 countries) (WUR/BZ, 2018). Moreover, economic growth in Nigeria has been stagnating lately. Annual GDP growth has been a stable 5 to 8 per cent in the period between 2000 and 2015, while it dropped to 0 to 2 per cent in more recent years.

Food availability

In 2001-2003, a National Nigeria Food Consumption and Nutrition Survey was conducted by the International Institute of Tropical Agriculture (IITA). One of the goals was to determine the level of food insecurity, nutritional status, and nutrient intakes of the rural and urban populations in Nigeria. Most households indicated that staple foods were available to them for 9-12 months (Maziya-Dixon et al., 2004). Interestingly, the percentage of households that could *afford* the foods available was usually lower than the percentage that indicated the *availability*. The most available staple foods providing energy were rice (14.8%), cassava (12.9%), maize (10.6%) and yam (10.1%). Major staples providing plant proteins are cowpea (10.7%), groundnut (8.1%) and soybean (2.1%). The most available non-staple foods were meat products (14%), non-leafy vegetables (13%), leafy vegetables (9.5%), and fats and oils (8.9%)

Food access

Nigeria ranks 31.1 in the Global Hunger Index (GHI) of IFPRI (2018), whereby the highest GHI represents the highest hunger level possible. Thus, according to the IFPRI report, Nigeria is ranked as a country with serious levels of hunger (Table 5). There has been a positive development over the years, i.e. Nigeria improved from a ranking of 40.9 on the GHI in 2000 to 31 in 2018.

Table 5. Global Hunger Index IFPRI (2018) over years

# (0-119)	Country/year	2000	2005	2010	2018
22	Mexico	10.8	9.1	7.7	6.5
77	Kenya	36.5	33.5	28.0	23.2
80	Benin	37.5	33.5	28.1	24.3
103	Nigeria	40.9	34.8	29.2	31.1
119	CAR	50.5	49.6	41.3	53.7

Nigeria ranks 96 out of 113 countries on the Economist's Global Food Security Index (GFSI 2018). This Index considers the core issues of affordability, availability, and quality across a set of 113 countries, with a score of 0-100, whereby 100 is the best. The situation in Nigeria improved slightly in 2018 compared to 2017. The index is only available at the national level, so regional figures cannot be extracted.

Table 6. Global Hunger Index IFPRI (2018): comparison between countries

Category	Score Nigeria 2018	Score Nigeria 2017	Average score all countries	Rank Nigeria	Rank Mexico	Rank Kenya	Rank Benin	Rank Burundi
Overall	38.0	36.9	58.4	96	43	87	90	113
Affordability food	26.5	26.4	56.3	101	44	83	90	111

Availability food	44.4	42.4	60.3	100	45	101	83	113
Quality and safety food	49.4	48.3	58.2	77	30	83	91	103

Between 2003 and 2016, the share of children under age five that are stunted remained stable, around 35 to 45 per cent. Obesity among adults (18+), however, has more than doubled from 3.4 per cent in 2000 to 7.8 per cent in 2016. There are huge regional differences in Nigeria. The stunting levels are dichotomous, with a stark difference between rates of stunting in the North and the South of the country. In the South, near the Atlantic coast and Nigeria's largest city, Lagos, stunting levels are consistently between 10 and 20 per cent, whereas in the North they rise to 50 per cent or higher (NBS and UNICEF 2017). Households in the north tend to be poorer on average and depend heavily on agricultural activities, which in some northern states have been disrupted by terrorist activity; these disruptions increase food insecurity and may contribute to child stunting (Akombi et al. 2017). In northern Nigeria, stunting starts at an earlier age than in the rest of the country, suggesting that the poor nutritional status of the mother during pregnancy is a greater problem there. Efforts to address child stunting in Nigeria must take into account these and other differences (Amare et al. 2018).

The 'depth of the food deficit' table indicates *how many calories would be needed to lift the undernourished* from their status, everything else being constant. The value for 'depth of the food deficit' (in kilocalories per person per day) in Nigeria was 42 in 2016. Over the past 24 years this indicator reached a maximum value of 140 in 1992 and a minimum value of 35 in 2009. A country comparison (Table 7) shows that Nigeria ranks quite high as regards food deficits, even higher than upper middle income countries (World Bank, 2018).

Table 7. Depth of the food deficit

Country	Low income	Middle income	Upper middle income	Nigeria	Chad	Kenya
1992	298.85	167.27	151.55	140	470	209
2006	192.66	79.40	57.32	42	261	135

Food utilisation

With its large and quickly expanding urban population with rapidly accumulating wealth and rapid changes in food habits, Nigeria will face new, multiple and different challenges regarding food and nutrition security, sustainable food systems, health burdens and non-communicable diseases (NCDs). While the nutrition transition is still in an early stage in Nigeria, an increase in the incidence of obesity and related NCDs is already being observed in urban and rural areas in Nigeria (Raaijmakers et al 2018).

We have already seen that the percentage of expenditures on food differs per region with the overall conclusion that in the rural areas, food expenditures are the highest of all total expenditures. Moreover, the composition of the diet varies considerably between the Nigerian states – leading to a more general conclusion that the main difference is between urban and

rural settings. Figure 9 shows the food expenditures in Kano State (70% food expenditure) where the majority of food expenditures is spent on cereals (26%), followed by vegetables (14%), beans and peas (10%), and rice (9%).

For Edo state (54% food expenditure) the majority of food expenditures is spent on tubers and plantains (33%), followed by vegetables (14%), rice (9%), and beans and peas (8%) (Figure 10). Note the difference with Kano on meat expenditures, bread, poultry and seafood. Despite its importance, the daily consumption of vegetables is insufficient in Nigeria. Reliable data on food intake in populations in developing countries (including Nigeria) are scarce and limited, meaning that the mentioned numbers may deviate from actual consumption. In the latest national survey 12.4 per cent of the households reported to consume leafy vegetables, and 16.3 per cent consumed non-leafy vegetables at least once or twice per week. In urban areas, 11.1 per cent of the households indicated that they consume at least once or twice a week leafy vegetables and 16.6 per cent indicated to consume non-leafy vegetables equally frequently (Raaijmakers et al 2018). A recent study by Raaijmakers et al. (2018) showed that on average, the total urban consumption of vegetables was 2.55 portions per day, whereas it is recommended to eat at least 4 portions daily (200 g). Vegetables were considered a standard element of meals, but a limited variety of vegetables was commonly consumed, both in terms of types of vegetables eaten, degree of processing (i.e., mostly fresh), and outlets (i.e., mostly traditional open markets). Consumers in higher economic classes consumed a greater variety of vegetables, especially the ones that are considered exotic (e.g., broccoli, cauliflower) and they also ate more raw vegetables. Regarding the drivers of vegetable consumption, the researchers found that a higher consumption of vegetables relates to higher knowledge of vegetables and belief in ones' own ability to prepare the vegetables. Health was considered by the respondents to be the most important driver.

Based on the 2008 Nigerian Demographic and Health Survey, Kandala & Emina (2016) reported that the prevalence of undernutrition (underweight) and over-nutrition (overweight) in women of reproductive age was 12 per cent and 21 per cent, respectively. Based on the same data, Kandala & Stranges (2014) observed that the prevalence of overweight and obesity varies across ethnic groups and the state of residence in Nigeria. These might be signalling a 'nutrition transition': the shift in dietary consumption and energy expenditure that coincides with economic, demographic, and epidemiological changes (Popkin, 1993). In fact, Adegboye et al. (2016) summarised evidence of the dietary changes from 'traditional' to more processed foods, which has also been observed in recent years in Nigeria. In general, the difference in the nutrition transition across states may be linked to differences in the food systems, including production, processing, distribution, trade, food environments and consumer behaviour (HLPE, 2017). This is because the food systems determine availability, affordability, convenience, and desirability of various foods.

We know that Nigeria is undergoing rapid urbanisation with a rapidly growing population (Aliyu and Amadu 2017). It follows that the food systems in urban and rural areas would grow more distinct, concurrently with nutritional problems. For example, the Nigerian high body mass index(BMI)-related deaths increased by 29 per cent among females and by 79 per cent among males between 1990 and 2015 (GBD 2015 Obesity Collaborators, 2017). Even though urbanisation can be seen as an engine of growth and development, it may also lead to urban health crises if not managed carefully. In fact, evidence from Nigeria suggests that

Figure 9. Food expenditures Kano (Nigeria data portal 2016).

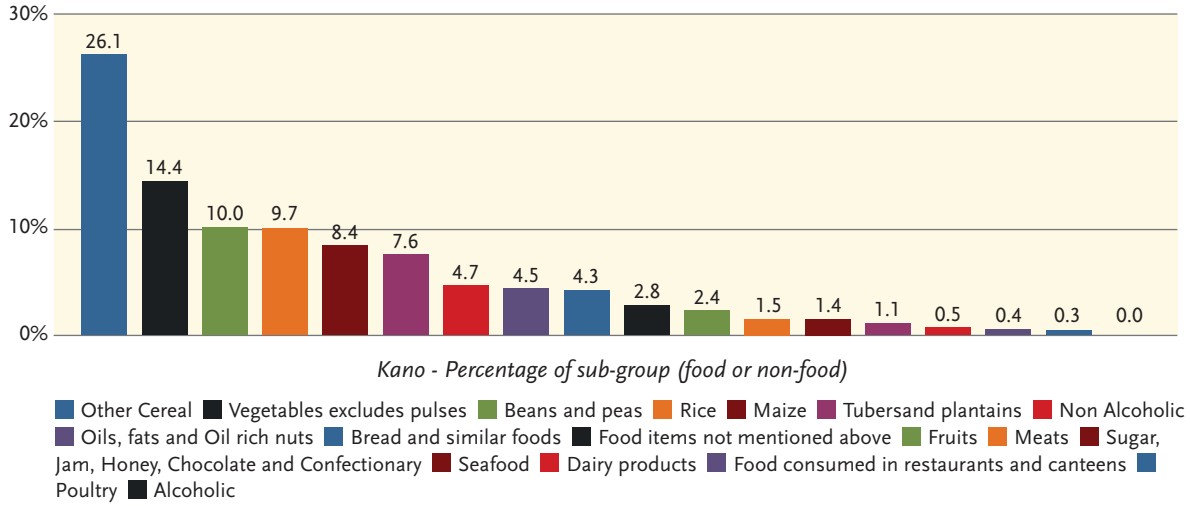


Figure 10. Food expenditures Edo (2016).

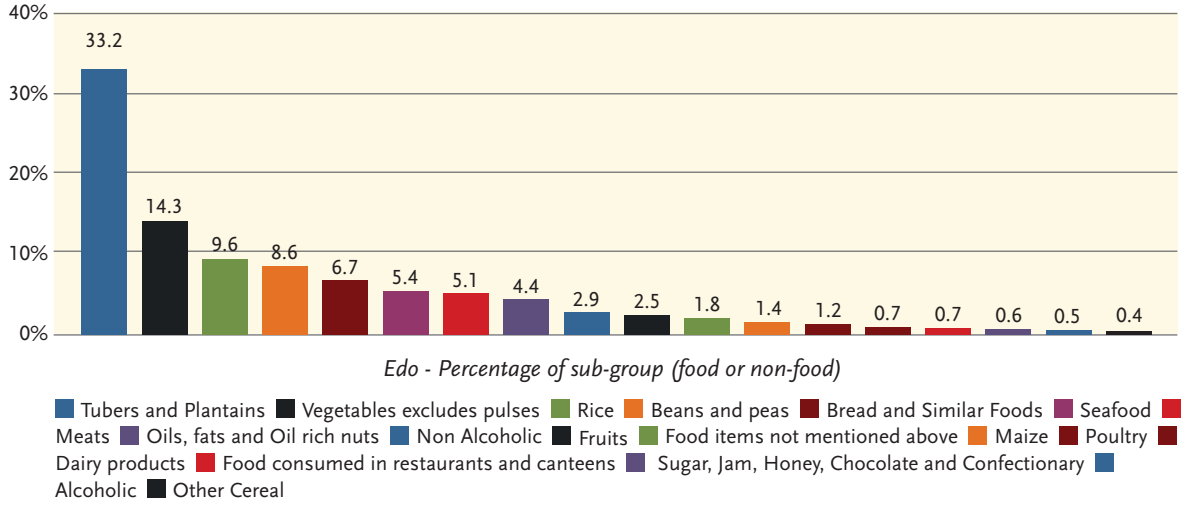
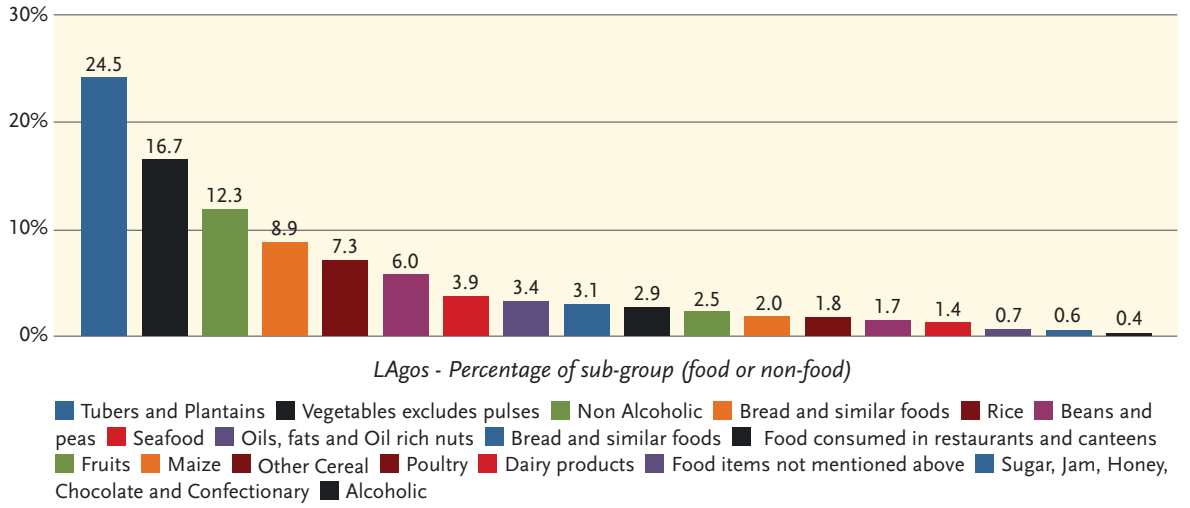


Figure 11. Food expenditures Lagos (2016).



urbanisation has created urban health crises of 'inadequate water safe supply, squalor and shanty settlements, sanitation, solid waste management, double burden of diseases and inefficient, congested, and risky transport system' (Aliyu and Amadu 2017, p.149). Hence, food safety is compromised in such circumstances.

Environmental outcomes

The pressure of the increasing population and its accompanying increase in food consumption and expansion in agriculture poses a serious threat to Nigerian's environmental resources. Nigeria suffers from increasing water scarcity, deforestation of its remaining tropical forest patches, land degradation in the dry North, decreasing biodiversity in many areas and water pollution related to oil exploitation.

There is also an impact of agriculture on the environmental health in Nigeria. Various studies provide evidence of environmental degradation as a result of agriculture practices that has a direct link with soil erosion, desert encroachment and unabated deforestation as well as poor soil conservation methods. Evidence reveals that the use of antibiotics in animal farming and insecticides accounts for high incidences of food poisoning and deaths of unsuspecting consumers, especially the non-literate farmers in rural areas. This is particularly common in aquaculture, where such chemicals have been used extensively to catch fish. The situation is further worsened by poor administrative and regulatory systems and weak enforcement protocols. Both the terrestrial and aquatic habitats have been endangered by crops in agriculture enterprises that degraded the environment via soil exhaustion and unregulated use of herbicides, pesticides, fertilisers and other chemicals, which is further complicated by the unregulated pattern of food processing (Kuta et al. 2002, Chianu et al. 2006).

The more and more modern commercial agricultural practices involving chemical inputs such as fertilisers, herbicides and pesticides have been associated with huge increases in food production and productivity. However, the high chemical usage of fertilisers and pesticides used to bring about these spectacular increases in food production are not without problems. A visible parallel correlation between higher productivity, high chemical input use and environmental degradation and human hazards effects is evident in Nigeria where commercial agriculture is gradually gaining ground (Alufohai 2013).

Environmental drivers

Climate

Climate vulnerability, as measured through the ND-GAIN index is 37.6 out of 100, which is comparable to the average score for the whole of West-Africa. However, Nigeria has a lower climate vulnerability than other large economies in West-Africa, such as Ghana (45.1), Cameroon (39.1) and Senegal (39.9). The climate vulnerability is composed of two parts, a climate vulnerability score, indicating the propensity of societies to be negatively impacted by climate hazards (0.489) and a climate readiness score, indicating the readiness to make effective use of investments for adaptation actions (0.241). The relatively low score on the climate readiness part is caused by low levels of education and innovation, and above-average levels of corruption, violence and political instability (Notre Dame Research, 2019).

Climate change and global warming, if left unchecked, will cause adverse effects on livelihoods in Nigeria, such as crop production, livestock production, fisheries, forestry and post-harvest activities, because the rainfall regimes and patterns will be altered, floods which devastate farmlands would occur, increase in temperature and humidity which increases pest and disease would occur and other natural disasters like floods, ocean and storm surges, which not only damage Nigerians' livelihood but also cause harm to life and property, would occur. Temperatures will continue to increase with more warming in the North. Rainfall variability will also continue to increase whereby the North is expected to face lower and more erratic rainfall and the South more intense rainfall, resulting in flooding (WUR/BZ, 2018).

Water

Access to water in Nigeria has significantly improved in most areas over the past decades. The share of Nigerians using at least basic drinking water services increased from 46 per cent in 2000 to 67 per cent in 2015. More worrisome is that the share using at least basic sanitation services declined slightly from 37 per cent in 2000 to 33 per cent in 2015 (FAO, 2019). That means an estimated 100m Nigerians still lack basic sanitation facilities and 63m do not have access to improved sources of drinking water. According to WHO (2018), open defecation is still practiced by about a third of the rural population. Some 12 per cent of the urban population also practices open defecation. While 75 per cent of the urban population is served by improved water supply, often people will collect water from vendors and carry water a good distance after collecting it in containers. In rural areas, only about 42 per cent of households have access to safe water. Thus, Nigeria is not likely to meet the MDG target of 75 per cent coverage for improved drinking-water and 63 per cent coverage for access to sanitation facilities by the year 2015.

Water scarcity combined with overexploitation of the available resources threatens Nigeria's sustainable development. Rapid economic and population growth have led to an overcommitment of available surface water resources, over-exploitation of groundwater resources in many areas and unreliable access to water – all combining to affect the livelihood of many, particularly rural and poor people, especially in 'sahelian' northern Nigeria. For years, water services in Nigeria used a top-down and supply-side approach, which has failed in the country due to many reasons, including poor community and other stakeholders' participation; poor management of the infrastructure and inadequate financial resources. The availability of water in both quantity and quality is being severely affected by the extreme weather events brought on by climate variability and climate change more. Demand is increasing as a result of population growth and other demographic changes (in particular urbanisation) and agricultural and industrial expansion following changes in consumption and production patterns (WUR/BZ, 2018). At present, Nigeria uses a system built around River Basin Authorities to allocate water in specified tracts of the country. Unfortunately, that system is yet to provide the right level of water supply across the country; it still has great potential if appropriate investments are made in irrigation systems, as has been the case recently in the Hadejia River Basin Authority (FMARD 2016)

Experts gathered in Nigeria's capital in February 2018 to discuss ways to stop Lake Chad from drying up, after years of environmental decline that has impacted citizens' livelihoods and security. The two-day conference, organised by the Nigerian government and the Lake Chad Basin Commission, aimed to 'save the lake from extinction', according to UNESCO.

A research and conservation programme will involve Cameroon, Chad, Niger and Nigeria, whose borders meet on the lake, as well as the Central African Republic. Lake Chad is the principal source of freshwater for 40m people but climate change and water mismanagement have contributed to a staggering 90 per cent decline of the lake's surface over the past 40 years. As it dries up and hunger rises, the region has become fragile and Boko Haram jihadists have targeted subsistence farmers and fishermen to fill their ranks (WUR/BZ, 2018).

Land, soils

In Nigeria, there is an increasing pressure on land, due to increasing population growth, and the expansion of agricultural land. The amount of land and under permanent crops has almost doubled over the past 60 years, from 3.5m ha in 1960 to 6.5m ha in 2015. Another reason for the increasing pressure on land and natural resources are the disputes between pastoralists and sedentary farmers and conflicts among family members over rights of inheritance. Nigeria scores 132nd out of 180 countries on the UNCCD Land Management Index, indicating its relatively low level of sustainable land governance compared to other countries (WUR/BZ, 2018).

The Nigerian Constitution gives all citizens the right to acquire and own immovable property. The constitution also incorporates the provisions included in the Land Use Act of 1978 related to the reduction of land speculation, equitable access to land and the creation of a system of occupancy certificates, while encouraging productive use though the nationalisation of land. However, the Land Use Act has rarely been implemented, mostly due to the fact that the majority of the population, especially rural people, are unaware of the act. Therefore, despite the Land Use Act, customary norms regulating land tenure prevail in Nigeria; the ownership and the use of land is generally assigned to communities and the administration of the land by village's leaders is intended for the benefit of the community. Particularly in the north of Nigeria, customary law and Sharia law regulating land tenure have been somehow merged to create a type of hybrid system.

These systems have not prevented land disputes and conflicts from arising. Among the reasons for the increasing pressure on land and natural resources include the oil industry, disputes between pastoralists and sedentary farmers and conflicts among family members over rights of inheritance. Both formal and customary courts are entitled to resolve land disputes, yet these processes may be complex and take a long time to resolve.

Soil fertility requires attention in view of the need to maintain adequate levels of macro and micro soil nutrients under intensive production systems that remove nutrients from agriculture areas. Soil erosion in south-eastern Nigeria and desertification in the North due to deforestation wash away topsoil with the nutrient layers and pose a threat to soil fertility. Climate change, with temperature increase, speeds up the breakdown of soil organic matter which is essential for water retention and root development (NFAP 2016).

Biodiversity

CIA World Factbook (2005) records show that 70 to 80 per cent of Nigeria's original forest has disappeared and the forested area has by now been reduced to 12 per cent. Between 2000 and 2005, the rate of forest change increased to 3.2 per cent per annum. In total, between 1990 and 2005, Nigeria lost 35.7 per cent of its forest cover, or around 6,145,000

hectares. Nigeria lost 1,230,000 hectares of its primary forest cover during that time. Deforestation rates of primary cover have decreased 79.1 per cent since the close of the 1990s. Measuring the total rate of habitat conversion (defined as change in forest area plus change in woodland area minus net plantation expansion) for the 1990-2005 interval, Nigeria lost 39.2 per cent of its forest and woodland habitat. (FAO 2005). Although the Nigerian government established several forest reserves for conservation of forest resources, these forest reserves have been seriously neglected and received little or no improvement in terms of investment and management (Pelemo et al. 2011).

Nigeria has some 1417 known species of amphibians, birds, mammals and reptiles according to figures from the World Conservation Monitoring Centre. Of these, 1.2 per cent are endemic, meaning they exist in no other country, and 3.5 per cent are threatened. Nigeria is home to at least 4715 species of vascular plants, of which 4.3 per cent are endemic. Only 3.6 per cent of Nigeria is protected under IUCN categories I-V, and the implication of the forest and woodland losses is that many plants and animals, including many potentially valuable species are on the fast track to extinction. The USAID Report on Biodiversity and Tropical Forestry Assessment (2002) recorded that there are many – too many – environmental threats in Nigeria affecting Biodiversity. A National Assessment (NCF2012) confirmed the reality of high rise and fast tracked increase in biodiversity loss in Nigeria. An analysis of the major underlying factors responsible for the continuous degradation of biodiversity in Nigeria concluded that high population growth, widespread poverty, low environmental law enforcement, poor land use planning and climate change are among the key factors affecting biodiversity in Nigeria.

Minerals

The commercial value of Nigeria's solid minerals has been estimated to run into hundreds of trillions of US dollars. It has also been estimated that Nigeria loses about USD$40b annually in unexploited gold alone. The domestic mining industry is underdeveloped, currently accounting for only 0.5 per cent of Nigeria's GDP, and leading to the importation of commodities that can be produced locally.

An audit report released by the Nigeria Extractive Industries Transparency Initiative on the solid minerals sector, showed that a single company, Dangote Group, generates more mineral resource revenue for the government than the rest of the nation put together. With the global decline in oil prices, Nigeria is seeking to diversify its economy by building a stronger revenue base that would require a stronger performance of the solid minerals sector. Nasarawa State in the North has been described as Nigeria's home of solid minerals, as it is endowed with a large number of solid mineral deposits (source: https://www.nipc.gov.ng/solid-minerals/).

Solid mineral deposits are scattered all over Nigeria. They include:

- *Talc*: an estimated reserve of over 100m tonnes of talc has been obtained in Niger, Osun, Kogi, Kwara, Ogun, Taraba and Kaduna States.
- *Iron ore*: there are over 3b tonnes of iron ore found in kogi, Enugu, Niger, Zamfara and Kaduna States. Iron is currently being mined at Itakpe (Kogi State).
- *Gold*: there are proven reserves of both alluvial and primary deposits of gold with proven reserves in the schist belt covering the western half of Nigeria.

- *Bitumen*: the occurrence of bitumen deposits in Nigeria is indicated at about 42 billion tonnes almost as twice the amount of existing reserves of crude petroleum. When fully developed, the industry could meet local requirements for road construction and also become a foreign exchange earner for the country.
- *Rock salt*: the national demand for table salt, caustic soda, chlorine, sodium bicarbonate, sodium hypo-chloric acid and hydrogen peroxide exceeds one million tonnes. A colossal amount of money is expended annually to import these chemicals by various companies including tanneries, food beverages, paper and pulp, bottling and other industries including the oil companies. There are salt springs at Awe (Plateau State), Abakaliki (Enugu State) and Uburu (Imo State), while rock salt is available in Benue State. A total reserve of 1.5 billion tonnes has been indicated, and further investigations are now being carried out by government to ascertain the quantum of reserves.
- *Gypsum*: is an important input for the production of cement. Current cement production is put at 8 million tonnes per annum while the national requirement is 9.6 million tonnes. About one billion tonnes of gypsum deposits are spread over many states in Nigeria.
- *Lead/zinc*: an estimated 10 million tonnes of lead/zinc veins are spread over eight States in Nigeria. Joint venture partners are encouraged to develop and exploit the various lead/zinc deposits all over the country.
- *Bentonite and baryte*: these are the main constituents of the mud used in the drilling of all types of oil wells. Over 7.5 million tonnes of baryte have been identified in Taraba and Bauchi States.
- *Coal*: Nigerian Coal is one the most bituminous in the world – owing to its low sulphur and ash content – and is therefore the most environment friendly. There are nearly 3 billion tonnes of indicated reserves in 17 identified coalfields and over 600 million tonnes of proven reserves.
- *Gemstones*: gemstone mining has boomed in various parts of Plateau, Kaduna and Bauchi States for years.
- *Kaolin*: an estimated reserve of 3 billion tonnes of good kaolinitic clays has been identified.
- *Tantalite*: large deposits of Tantalite are known to occur in Nasarawa, Gombe and Kogi states as well as the Federal Capital Territory. Private investors are invited to stake concessions for the development and exploitation of tantalite in these areas.

Socio-economic drivers

Demography / Migration

Population prospects now stand at a staggering 410 million in 2050. With these population figures one really wonders what is going to happen in the near future as the country already is close to or over its limits regarding food access, access to water and land. (WUR/BZ, 2018). According to the World Bank (2018) Nigeria was characterised by a population growth of 2.6 per cent in 2017 and the expectation is that this growth rate will increase the coming years. See Table 6 for a comparison among various countries.

Nigeria's urban population has increased rapidly over the past 50 years, as a result of both natural increase and rural-urban migration, and it will simply continue to grow (Ekpenyong, 2015). There are several data sources available on Nigeria's urban population (i.e. Census, United Nations (UN), AfricaPolis, City Population). The UN estimates that over 50 per cent

of the Nigeria population will live in urban areas, while Africapolis estimates that over 30 per cent will live in urban areas (Bloch et al., 2015). In any case, it is expected that urbanisation and urban growth will increase rapidly in Nigeria in the decades to come. According to the World Bank (2018), urban population was 15 per cent of the nation's total population in 1960 and 50 per cent already in 2017.

Table 8. Population growth rates 1960 and 2017

Country/ year	1960	2017
Nigeria	2	2.6
Ghana	3.2	2.2
Kenya	3.1	2.5
Benin	1.3	2.8
Cameroon	2	2.6

Nigeria is a destination country for regional migrants (Benin, Ghana, Mali, Togo and Niger); ECOWAS member state nationals reside in Lagos and Ogun and Oyo States. The majority of migrants are low-skilled labourers, but skilled workers (Benin, Ghana) are encountered in service sectors. The UK and US were long preferred destinations for Nigerian migrants (middle and high skilled legal migrants); now followed by Italy and Spain. The north-eastern part of Nigeria (Borno, Adamawa, and Yobe states) is prone to terrorist attacks (Boko Harm) that affect rural livelihoods and lead to the displacement of communities and families (WUR/BZ, 2018).

The most extensive urban spatial expansions have been concentrated around four (massive) urban fields: a northern conurbation centred around Kano, running from Zaria to Katsina and from Funtua to Hadejia; a central conurbation running from Abuja to Jos; a south-eastern conurbation stretching from Lagos to Ilorin; and finally, a south-western 'square' conurbation including Benin City, Port Harcourt, Calabar and Enugu. This heavy population concentration in specific areas has implications for the distribution of natural resources and infrastructural facilities (i.e. water and sanitation) (Barungi et al. 2015).

Markets

Nigeria increasingly depends on food imports to feed its population. Nigeria's food imports have more than quadrupled over the same period from a value of USD$964m in 1995 to USD$4,566m in 2016. Nigeria's cereal import dependency ratio has increased since the start of the millennium from 13.7 per cent in the 1999-2001 period to 19.2 per cent in the 2011-2013 period (FAO 2019).

In 2012, the Government launched the ATA to make Nigeria self-sufficient in rice and less reliant on food imports. One method of the agenda was to increase the production of the country's five key crops, including rice, sorghum and cassava. A number of import substitution measures were also adopted, such as the mandatory inclusion of 10 per cent cassava flour in bread. Input availability and access were supported in the framework of the ATA. Additionally, the Central Bank of Nigeria banned importers from accessing foreign exchange markets in 41

categories of items. While these items were not banned from importation, importers had to acquire the foreign currency to purchase these items from an autonomous market at a higher exchange rate (FAO 2017).

The ban was partially lifted in October 2015, allowing imports through land borders after payment of appropriate duties and charges. However, these measures amplified informal cross-border imports from neighbouring coastal countries, which resulted in the Nigerian Customs Service reintroducing the rice import restrictions as of March 2016. Nigeria applies additional duties to reduce the country's reliance on imports. However, there have been some inconsistencies between taxes on imported and produced goods. For example, excise duties are not levied on imports, only on domestically produced goods. Still, although it is the largest rice importer in Africa, Nigeria's rice imports are expected to decrease by 50 per cent by the end of 2017 (FAO 2017).

Trade from Nigeria is dominated by mining commodities (oil resources, iron, bauxite, manganese, gold) and agricultural products such as coffee, cocoa, cotton, rubber, fruits and vegetables and others (cereals, roots, tubers and livestock). Nigeria has a relatively weak integration into regional value chains (ECOWAS, 2019). Nigeria's export to the ECOWAS region, which averaged about 7 per cent of its total exports between 2001 and 2006, plummeted to 2.3 per cent in 2010. The vast majority of Nigeria's exports to the ECOWAS are mineral fuel and oils, which reached 97 per cent and 94 per cent, respectively, in 2009 and 2010. the share of manufacturing in Nigeria's total exports to the ECOWAS region climbed from 1 per cent in 2001 to 5.4 per cent in 2010, while the share of Nigeria's agricultural exports – which was 3 per cent in 2001 – plunged to nearly nothing in 2009 and 2010 (Chete, 2016).

Policies

Corruption is a pressing issue in Nigeria. The corruption index for Nigeria from the Transparency International organisation indicates that Nigeria is among the most highly corrupt countries of the world. President Muhammadu Buhari launched an anti-corruption drive after taking office in May 2015. Corruption affects public finances, business investment, public-private partnerships as well as the standard of living (WUR/BZ, 2018).

Starting in 2010-2011, the Government of Nigeria – The Federal Ministry of Agriculture and Rural Development (FMARD) – began to reform the agriculture sector after years of benign neglect. To refocus the sector, the Government implemented a new strategy, the Agricultural Transformation Agenda (ATA), which was followed by The Agriculture Promotion Policy (APP) (2016-2020) with a meagre budget just 2 per cent of the Federal Budget (by far not meeting the common agreed upon objective of 10 per cent investment in agriculture). The APP focuses on solving the core issues at the heart of limited food production and delivery of quality standards. Given the limited resources and the importance of delivering sustainable results, the FMARD in consultation with partners identified an initial pool of crops and related activities that will be Nigeria's path to tackling the aforementioned gaps:

1. Improving productivity into a number of domestically focused crops and activities: rice, wheat, maize, fish (aquaculture), dairy milk, soya beans, poultry, horticulture (fruits and vegetables), and sugar.
2. Prioritise for export markets of: cowpeas, cocoa, cashew, cassava (starch, chips and ethanol), ginger, sesame, oil palm, yams, horticulture (fruits and vegetables), beef and cotton.

3. Periodically publish metrics to track performance against the strategy e.g. tonnage of rice paddy produced, or yields/milking cow.

The ATA was an important first step towards rediscovering agriculture but it faced challenges and did not deliver on all the targets identified. Some reasons for the failure of the agricultural development policies in Nigeria:

1. The absence of involvement of all stakeholders: there is a lack of proper interaction between all stakeholders both at the time of planning and of implementing national agricultural programmes in the country.
2. Weak agriculture development policies: agricultural policies are not specific and spelt out for the masses. Policies lack a clear strategy, targets, goals, specific objectives and most importantly programmes or projects geared toward their accomplishment.
3. The short duration of agriculture development policies: there is hardly continuity and perpetual implementation of agriculture development policies for the impact of the policies to be felt in Nigeria economy.
4. The inconsistency of regional agriculture development policies with the national policies: new agriculture policies and programmes are not consistent, do not work in harmony and closely with state and national policies and programmes.
5. Inadequate monitoring and evaluation of programmes: evaluation is purposely done to determine achievements of rural/agriculture development programmes vis-à-vis the set policy objectives.

Science and Technology

Nigerian agricultural research has to contend with the need to become climate smart. That shift will require different research priorities, development of new varieties, and a more rapid co-creation cycle with industry and operators. Moreover, agricultural research is recognised as a critical enabler of economic growth. It is therefore prioritised in the nation's constitution and explicitly assigned as the primary responsibility of the Federal Government on the Concurrent Legislative List (FMARD 2016). Despite the existing institutional capacity, e.g. the International Agricultural Research Centre (IARC) and the International Institute of Tropical Agriculture (IITA), Nigeria has not been able to engineer a significant and sustainable agricultural growth that would ensure national and household food security, create wealth and employment and make Nigeria a competitor in the global food markets. Part of that is the result of *a weak mechanism for translating research into field usage*, weaknesses in the extension system as well as a failure to properly incentivise innovation at the inventor level.

Research areas for Nigeria to focus on are:

- the use of modern food marketing methods, including use of mobile phones;
- a growing research community (CGIAR/IFPRI/IITA - A4NH) around nutrition and sustainable food systems;
- climate smart agriculture, integrated pest management, soil science, quality management and irrigation technology and water management;
- high quality inputs and quality resistant seed varieties (there is a need for high-yielding hybrid seeds, but especially the development of seeds that are useful in the agro-ecological conditions of Nigeria; sufficient water, adequate training and good timing of planting are critical to the success of using improved seed varieties);
- technology of post-harvest technology, green houses (suitable in Nigerian context);

- logistics (especially horticulture, dairy) should be developed to the highest level. Cold store management, auction systems and port management need advanced technology inputs including information and data systems.

Social organisations

There are a great many farmers' organisations in Nigeria, but one cannot speak of a Nigerian 'farmers' movement'. Between the large umbrella organisations that are sometimes manipulated by the government authorities, and a multitude of local initiatives, Nigerian farmers are now beginning to look for a path to unity. Farmers' organisations (FOs) in Nigeria are not yet well structured, but several broad categories can be distinguished: FOs with a general scope and focus on advocacy; FOs set up as cooperatives specialising in one or more agricultural products; FOs that operate locally; and FOs made up of only women. The number and composition of FOs in Nigeria are hard to ascertain. Locally there are many small FOs, organised by age group or sex (elders, youths, women, etc.). At the national level, the large federations that are meant to take charge of advocacy and address politicians have been created only recently, or are very close to the Federal Government. It is still too early to speak of a genuine 'farmers' movement' in Nigeria, but some dynamic currents are becoming established (Agricord 2010).

Traditional market authorities such as 'merchant queens' are important in organising trade. Merchant queens head up specific commodity groups within a market place, and are instrumental in settling disputes, managing credit relations, and enforcing trade conventions. They act as trade brokers and accumulate both wealth and power within the commodity markets (Clark, 2018).

Regional differences in food and nutrition security

When looking at food and nutrition security, Nigeria can be divided into three areas: (1) the South-west: Lagos, Ogun and Oyo States; densely populated; presence of food processing facilities; (2) the South-east: Niger delta; oil extraction; humid forest; rudimentary agriculture; (3) the North-east and North-west: Sahel region; prone to effects of climate change (WUR/BZ 2018).

The Boko Haram insurgency in remote, north-eastern Nigeria has resulted in violent conflict, undermined the already fragile livelihoods affected by climate change, and left a population without access to enough food, water and health services. A child in the north of Nigeria, where stunting rates are as high as 55 per cent, is four times more likely to experience malnutrition than a child in the south (WUR/BZ 2018)

Specifics for Kaduna

Kaduna State is key to the success of implementation of the national Green Alternative policy. The State is located in Nigeria's North-Central Zone. While it has a political significance as the former administrative headquarters of the North, agriculture is the mainstay of Kaduna State's economy. About 80 per cent of the 6.3 million people of the State are actively engaged in farming. Cash and food crops cultivated include grains, legumes, cotton, and in the vegetable sector – tomatoes and pepper.

Kaduna State is by no small measure the vegetable basket of Nigeria. The bulk of tomatoes produced in Nigeria comes from Kaduna State with its over 3.6 million tonnes annual output

eclipsing other States in the same ecological zone favourable for tomato cultivation. Likewise for onions (the second most important vegetable in Nigeria), Kaduna State is the largest producer, with outputs destined for consumption in the Southern States where over 90 million people of Nigeria reside.

Onions, tomatoes and other vegetables are often produced in mixed systems, though time-tested and trusted, as testament to local knowledge that has survived generations of farmers. Yet, modern farming information and techniques will provide farmers and the vegetables sector with opportunities for greater yield and access to markets if the current agronomic systems employed are substantially overhauled. The implications of this for seeds development, value chain enhancement, all-year round productivity, job creation, minimisation of involuntary migration and many other advantages cannot be over-emphasised (BZ, 2018).

Recently, south Kaduna has become a hotspot for violence between farmers and pastoralists. Kaduna State has deployed two battalions in South Kaduna to restore order. Despite this, the State is a key junction in the over 1000 km supply corridor for neighbouring states that are sources of other agricultural produce being moved to consumers and industries in southern Nigeria. The State is also home to value chain development in the vegetable sector where key players such as the Dangote Tomato Paste Factory and other food processing plants are active (BZ, 2018).

Specifics for Kano

Kano State has been a commercial and agricultural State, which is known for the production of groundnuts as well as for its solid mineral deposits. The State has more than 18,684 square kilometres of cultivable land and is the most extensively irrigated state in the country (Federal Republic of Nigeria 2018). Kano is largely Muslim. The majority of Kano Muslims are Sunni, though a minority adheres to the Shia branch. Christians and followers of other non-Muslim religions form a small part of the population, and traditionally lived in the Sabon Gari, or the Foreign Quarter.

Subsistence and commercial agriculture is mostly practiced in the outlying districts of the state. Some of the food crops cultivated are millet, cowpeas, sorghum, maize and rice for local consumption while groundnuts and cotton are produced for export and industrial purposes. During the colonial period and several years after the country's independence, the groundnuts produced in the state constituted one of the major sources of revenue for the country. Kano State is a major producer of hides and skins, sesame, soybean, cotton, garlic, gum arabic and chili pepper. The bulk of tomatoes are produced in Kaduna State, with Kano being second. The production is estimated at 3,600,000 metric tonnes per year (Van der Waal, 2015). The centres of consumption being the large urban centres in the South. The production of onions, the second most important vegetable in Nigeria, is also concentrated in the North of the country. Kaduna State is the largest producer, followed by Kano. The total Nigerian production was almost 18,000,000 metric tonnes in 2011 (NASS 2012, National Bureau of Statistics 2012 #599).

Specifics for Edo

Edo State is predominantly agrarian with a landmass of about 19,187Km2, of which about

70% is cultivatable land for agricultural production. It is estimated that agriculture accounts for about 40% of the State's GDP. Edo State has one of the best soil conditions amongst the southern states (sandy loam) and one that supports large scale cultivation of a variety of crops and good climatic condition to boot. The state is one of the few that have, based on soil testing values, come up with crop and soil fertiliser recommendations.

The state has a tropical climate characterised by distinct wet and dry seasons and this effectively supports the production of a variety of cash crops and food crops. 73,000 ha Agenebode / Iiushi axis, the Osse / Ovia Rivers, the Orhionmwon River and several lakes and Ox-bow lakes. The state's main cash crops are oil palm, rubber, cocoa, pineapple, pawpaw, cassava and watermelon.

Oil palm is native to West Africa and is well adapted to the ecology of Nigeria – particularly that of Edo State. World demand for oil palm has soared globally in the last decades because of its use as edible oil and more recently as biofuel. Natural rubber has been an important part of the socio-economic life of Edo State and its cultivation provided bulk employment in the 60s and late 70s. Edo State is rich in the production of cocoa, with all areas of Esan, Owan, Orhionmwon, Akoko-Edo, Ovia and Uhunmwode deeply involved. Cassava is probably the most cultivated crop in Nigeria, with Edo state being the second highest producer of the crop, producing up to 200 million tonnes annually.

Specifics for Lagos
The State is located in the southwestern part of Nigeria, on the narrow plain of the Bight of Benin. Lagos is the largest market in Sub-Saharan Africa, and is home to the Nigerian Capital and Money Market and home to Nigeria's biggest ports Ports, Apapa and Tin Can Island, which handles70 per cent of the total national cargo freight.

The high rate of urbanisation and the consequent growing population in Lagos and other cities in Nigeria are reducing the available arable land. This puts pressure on the farmers to farm their land continuously, going against the traditional practice of leaving the land fallow for a relatively long time. This results in low farm productivity and advances land degradation (Lawal 2018).

The figures below show some comparisons on a few variables per state, Kaduna, Kano, Lagos and Edo (Nigeria Open Data). The four states differ considerably, with the main differences between Kaduna on the one hand and Kano, Lagos and Edo on the other hand, being the extreme poverty, severe stunting in the children, unemployment and occupation in crop farming.

Overview of trends in Nigeria's agricultural sectors

Horticulture (Vegetables)
The Dutch Diamond approach has triggered the interest of Nigerian partners in businesses, knowledge institutes, NGOs and government agencies to establish comparative advantage. Vegetables will be the anchor value chain for the Netherlands' intervention. The Netherlands can provide and promote knowledge sharing for this value chain, attract Dutch private sector and offer opportunities for public private partnerships. (WUR/BZ, 2018).

A host of extension services groups, are willing to cooperate, together with the Nigerian Federal and State government administrations and research institutions such as the Institute for Agriculture Research (IAR) of Ahmadu Bello University in Zaria, which is one of the best agricultural research institutes in the country. In addition, a vegetable value chain will enable greater quality of work on food and nutrition security and climate-smart agriculture as well as guarantee the inclusion of women and youth (WUR/BZ, 2018).

FMARD will prioritise improving productivity in a number of domestically focussed horticulture (fruits and vegetables) crops and activities. Nigeria believes that the gap can be closed by partnering closely with private investors across farmer groups and companies to develop end-to-end value chain solutions. These chains will receive facilitated government support as they make deep commitments to engage a new generation of farmers, improving supply of specialised fertilisers and protection chemicals as well as wider scale use of high yielding seeds. In addition, Nigeria expects to work with investors to sharply improve the distribution system for fresh foods so as to reduce time to table, reduce post-harvest losses, and overall improve nutritional outcomes e.g. lowering of diabetic risk, stunting risk, etc.

Farming systems need to be strengthened to support the vegetable value chain, promoting sustainability and inclusion, include other crops and animal husbandry. The objective is to move from subsistence farming to farming as a business, with farmers as entrepreneurs producing for the market. It is also very important to address access to finance as well as land ownership and access to land use, in particular for women and youth to be able to invest in the vegetable value chain (WUR/BZ, 2018).

There are many lessons to be learnt from similar programs in support of vegetable value chain development in Nigeria and other countries, like the 2SCALE and East-West Seeds programs. The purpose of Seeds of Expertise for the Vegetable Industry in Africa (SEVIA) in Tanzania is to safeguard the supply of fresh, safe and affordable vegetables and to pursue a sustainable and profitable vegetable farming sector. It has allowed the Dutch vegetable industry to further develop a prosperous business relation with Tanzania. In addition, through the SEVIA Institute of Vegetable Technology (IVT), farmers access practical knowledge, skills and information about vegetable production and marketing. SNV's horticulture projects are also specifically focused on professionalising horticulture value chains in developing countries by cooperating with the (Dutch) private sector and utilising their technologies, expertise, and knowledge (WUR/BZ, 2018).

Livestock sector (dairy, poultry)

Collaboration exists between Royal Friesland Campina and local partners in Nigeria, referred to as FrieslandCampina WAMCO Nigeria, supported by the Facility for Sustainable Entrepreneurship and Food Security and 2Scale. While Nigeria is a potential market for 1.3 million tonnes of milk valued at about N450 billion (approximately €1b) annually, despite the current national interest in this value chain, local production and local dairy value chains remain underdeveloped. Developing smallholder value chains capable of competing on price with imported reconstituted products will be a challenge beyond the means of a foreseen delegated programme (WUR/BZ, 2018).

There is, however, scope for integrating dairy production into activities aimed at promoting sustainable intensification of vegetable production. Important considerations would be the local risks associated with adjunct cattle-rearing communities and the potential benefits for farmers and other stakeholders. The primary focus would be sustainable use of farm waste and the use of manure as organic fertiliser. A secondary benefit of including dairy in the sustainable integration of agriculture is the opportunity to test models for sustainable ranching as a response to herder farmer conflicts (WUR/BZ, 2018).

According to the FMARD 2016 programme, Nigeria has made significant progress in the production of animal protein. It is estimated that Nigeria has 13 million cattle, 35 million goats, 22 million sheep and 80-120 million chickens. This has helped transform Nigeria's poultry industry into one of Africa's largest. Today, Nigeria has broad challenges with livestock:

1. The country lacks updated census data based on physical surveys and aerial overflights (systematic reconnaissance flights).
2. Within specific animal categories e.g. special challenges remain that are not being addressed. For example, the rapid growth in commercial poultry has created its own difficulties that do need to be addressed with respect to waste disposal.
3. The cattle value chain has become a security problem. Today, the cattle value chain relies on a network of nomadic herdsmen with cattle entering a brief fattening system before slaughter and processing.
4. That supply chain, however, is both inefficient and a high security risk as roaming cattle is increasingly becoming a source of friction between land owners and herdsmen. According to the Nigerian government, in order to protect all parties, a key shift is necessary i.e. retain cattle in *ranches*.

The main constraints in developing this sector are: i) limited knowledge of Nigeria's livestock assets by size and location, and limited knowledge of good practices, ii) low productive breeds, iii) feed and fodder insecurity, iv) low quality (low access to markets).

Export sector

In Table 9, the top 10 product groups are shown with the highest dollar value in Nigerian global shipments during 2017. Also shown is the percentage share each export category represents in terms of overall exports from Nigeria. From this figure, it becomes clear that agricultural exports are only a marginal part of the total exports of Nigeria, which are dominated by oil exports. Most important agricultural exports are cocoa, oil seeds (mainly palm oil), tobacco, fruits and nuts, leather and rubber.

Cocoa production in Nigeria is mainly concentrated in the South of the country. IDH has signed an agreement with OCP Africa, the International Institute for Tropical Agriculture (IITA) and the Cocoa Research Institute of Nigeria (CRIN) to provide cocoa specific fertiliser formulations for cocoa-producing ecological zones of Nigeria. Through proper fertiliser application, farmers are expected to benefit from increasing yields and thereby increased income and reduction of expansion into forest areas.

Oilseeds and products in Nigeria that contain palm oil/palm kernel, soybean oil, and other oils contribute 70 per cent, 25 per cent, and 5 per cent, respectively, to the total domestic vegetable oil supply. Production of oilseeds and associated products is trending upwards in

Nigeria but domestic supply still lags behind the growing demand. Demand is growing from both the poultry and the food processing industries (GAIN 2014).

Rubber is one of the agricultural products (cash crop) that Nigeria has been known for. The major rubber-producing states in Nigeria comes from the southern part of the country. Rubber, which used to be the fourth largest foreign exchange earner for Nigeria after crude oil has since been neglected by successive governments despite the fact that the rubber plantation is one of the resources that thrives in Nigeria. The country's sole dependence on crude oil has rendered the rubber industry unattractive. Experts say capacity in Nigeria's rubber industry has fallen from well above 130,000 metric tonnes annually to 60,000 and 55,000 respectively on account of the failure to replenish old plants and establish new ones. Despite rubber being one of the most used plant products in virtually every industry, the cash crop has gone extinct in Nigeria as a result of government neglect. This has also led to USD6b revenue loss annually in the international market (SOURCE?).

Table 9. Export product groups with highest dollar value in 2017

	Export product groups
1.	Mineral fuels including oil: USD$39.1b (96% of total exports)
2.	Ships, boats: $253.5m (0.6%)
3.	Cocoa: $238.1m (0.6%)
4.	Oil seeds: $180.9m (0.4%)
5.	Fertilisers: $149.8m (0.4%)
6.	Tobacco, manufactured substitutes: $102.4m (0.3%)
7.	Plastics, plastic articles: $78.1m (0.2%)
8.	Fruits, nuts: $76.1m (0.2%)
9.	Raw hides, skins (not furskins), leather: $67.9m (0.2%)
10.	Rubber, rubber articles: $55.4m (0.1%)

Aquaculture

In Nigeria, fish is an important part of the household diet. Fish makes up around 40% of the country's protein intake, with fish consumption at 13.3 kg/person/per year. Total fish production per year is close to 1 million metric tonnes (313,231 metric tonnes from aquaculture and 759,828 metric tonnes from fisheries). The majority of this fish is consumed domestically, while around 10% is exported. Around 94 million hectares is used for fish production, according to the FAO, employing a total of 1,477,651 people. (Source World Fish, retrieved 2019: https://www.worldfishcenter.org/country-pages/nigeria).

With an estimated annual per capita fish consumption of 13.3 kg in 2013, fish represents an important dietary element and one of the few sources of animal protein available to many Nigerians. In 2015, the total fisheries production was estimated at 1 027 000 tonnes, to which marine catches contributed 36 per cent, inland waters catches contributed 33 per cent

and aquaculture 31 per cent. The fishery sector contributed to 0.5 per cent of national GDP in 2015. (FAO 2017) With total fish imports amounting to about USD 1.2 billion and exports valued at USD 284 390 million in 2013, although Nigeria has built a large domestic fishery economy it still relies heavily on imported fish and specialised feed for its protein consumption. Data from Customs indicate that Nigeria imports between $400 and $600 million worth of fish and fish products each year, creating an opportunity for further gains by domestic market participants. But the sector faces various constraints: i) low productive fish breeds in aquaculture, ii) low production due to lack of inputs (e.g. fingerlings, feed), iii) poor water quality (e.g. pollution), iv) security constraints in fisheries areas, v) low yields due to overfishing. Without effective strategies to overcome these constraints, the sector would not be able to meet the increased national demand.

More than 80 per cent of Nigeria's total domestic production is generated by artisanal small-scale fishers from coastal, inshore, creeks of the Niger Delta, lagoons, inland rivers and lakes. In 2014, 713,036 were reported as engaged in inland fisheries with 21 per cent of this total being women. The small migratory bonga (Ethmalosa fimbriata) is the principal catch. Some initial progress has been made in developing an industrial fisheries sector, but the fleet and infrastructure are ageing. The main species from marine capture fisheries are sardinella.

The aquaculture sector is driven by the private sector, with feed and seed provided by private business. Owing to recent significant investments of private capital and a renewed political will to empower the private sector in the area of aquaculture development, Nigeria is the largest aquaculture producer in Sub-Saharan Africa and this importance is steadily increasing. From 21,700 tonnes in 1999, aquaculture production has grown steadily to 316,700 tonnes in 2015 according to the government report. Catfish, typically grown in ponds and tanks, is the most farmed species in Nigeria, constituting over half of the total aquaculture production by volume. In 2012, 13,627 people were reported as employed in aquaculture (of which only 2% were women) (FAO, 2018).

Key informant interviews

The key informants (associated with agriculture and food activities in Nigeria) identified a number of key drivers that shape the activities in the Nigerian food system:

Key drivers

- The most significant socio-economic driver of change in the Nigerian food system is the exponential growth in population. In order to feed a growing population, while reducing food imports, food production has to increase.
- Urbanization that is projected to grow at an accelerating pace, has led to competing uses for land and water resources in the southern part of the country. Typically urbanisation leads not only to rise in income, but also influences food choices, frequency and food expenditure, and consequently nutritional status of vulnerable populations. The growing urban middle class aspires to western consumption patterns, and not aligned to present-day diet patters with low meat consumption, organic etc.
- There are big market hubs in Lagos for all agricultural produce where 80-90 per cent of the trade takes place; these are informal and also traditional and not so easy for outsiders to understand. Markets in Northern Nigeria are less chaotic, but face higher risk for foreign investors and/or private sector than the South. Foreign private enterprises are reluctant to travel within the country, especially in the North.
- Past emphasis on promoting the oil sector has affected the food situation in two ways – first it led to lesser attention and investments in the agri-food sector resulting in low productivity and low domestic food supply, necessitating large-scale food imports. However, the collapse of oil prices in the recent past has created deficits in foreign exchange vis-à-vis import food, which has also resulted in food shortages.
- The Nigeria Government has renewed its focus on improving the productivity of staple crops, and investments in modernising agriculture through stimulating policy for increased use of fertilisers, mechanisation and establishing processing plants to turn agricultural produce into high value products. The Government of Nigeria released a policy document on Agriculture Promotion for Export with a particular focus is on improving productivity of staples (rice, wheat, maize), soya bean, fish, dairy, chicken, tomato, yam, oil palm, sorghum, cotton and cocoa.
- There is (private) financial capital present, 'but not in the right places'; Nigerian capital can be channelled to make investments and acquire technical expertise.

Food systems activities

- The main food production base is in the North as there are large tracts of arable land; however, due to insecurity in the socio-political-cultural situation, there are lots of uncertainties associated with production and trade. The major markets are in the South but due to the insecurity, traders and processors from the South are reluctant to transport produce from the North to the South.
- Nigerian small- and medium-scale processors struggle to provide a consistent supply of the right quality and quantity of materials for big international food companies such as Heineken, Nestle, and Unilever. Some processors have the required knowledge but do not have resources to apply the knowledge due to constraints in the enabling environment (e.g. access to finance, bureaucracy).
- There is a lack of programs or schemes for SME development - some local universities

have agri-business incubation programs with international funders.

- Most value chains are fragmented; therefore it is difficult for businesses to aggregate produce, do processing throughout the year, and make supply chain-related decisions; SMEs often lack resources to develop and implement efficient agro-logistics.
- Low agricultural productivity is a challenge and constraint. This is mainly due to poor access to agricultural inputs – quality seed, irrigation, fertilisers and services for disseminating technologies and input supply. Access to quality seed is a big problem in all sub-sectors: crops as well as livestock. There is a need to improve seed systems, especially by strengthening research on disease- and drought-resistant varieties for staple crops (maize, palm oil).
- Post-harvest losses, due to a lack of storage facilities, are an issue.
- The cost of producing food is high, especially for animal source protein as compared to plant protein (IFPRI study); present pricing system is not in favour of healthy food.
- There are more SMEs coming up who are involved in food processing and developing products like porridge-mixes for the local market; not for export. However, SMEs are passive towards consumers; they sell to wholesalers but are not focused on the end consumers.
- Access to finance: customarily farmers get loans against high interest rates with long processing time; they also have to wait three to six months between planting and harvest to obtain their income (based on selling their produce) after investing in agricultural inputs.

Table 10 summarises the current drivers of change in Nigeria's food system based on the key informant interviews. Table 11 summarises the key informants' views on the different commodity chains (or sub-sectors) in Nigeria.

Table 10. Key informants' views on drivers and trends

	Drivers	Importance / relevance[a]	Trend[b]	Remarks
		SOCIO-ECONOMIC DRIVERS		
Markets	Informal economy	++	+	Difficult to regulate; high turnover and profits; poor quality assurance; traditional markets difficult for outsiders to understand
	Big markets in urban centers (Lagos)	++	++	Small farmers cannot compete with large farmers on basis of cost, quality, volume
	Poor Infrastructure	++	- -	Affects transportation- leads to food losses; poor access to markets - affects opportunities for high-value agriculture for urban markets;
	Security and safety Corruption	++	- -	Poor business environment; Leads to underinvestment especially from overseas companies
Policies	Restriction on imports	++	?	Moving towards self-sufficiency; needs more investment to induce productivity increase
	Programs to support SMEs	++	+	Would help to attract entrepreneurs (youth?) into food related enterprises
Science and technology	Technology	+	+	Can enhance productivity and quality; In horticulture – can be used to attract youth to agri-business
Individual factors	Migration	++	++	Affects cost of agricultural labour- more expensive; labour mismatch
		ENVIRONMENTAL DRIVERS		
Water	Water scarcity	++	-	Limitation for irrigated agriculture/ horticulture if not addressed
Land	Land rights	+/++	-	Exploitation of land; land ownership and land tenure is unclear Leads to underinvestment especially foreign
	Land/ soil degradation	++	- -	Poor productivity; high-input requirement; vicious cycle
Climate	Climate change	++	-	Increasing variability in agriculture production

Table 10. Key informants' views on drivers and trends (continued)

	Drivers	Importance / relevance[a]	Trend[b]	Remarks
		FOOD SYSTEM ACTIVITIES		
Enabling Environment	Agricultural reforms	++	-/+	Attempts to agricultural reforms but there are vested interests that do not want the situation to change
	Institutions	++	-/+	Basic data is not available; farmer organisations are weak
Food environment	Urbanization	+	++	More disposable income -alters food choices towards more aspiration-driven food choices –packaged, (ultra) processed convenience food (aspirational), sugars; demand for fruits and vegetables increases
Food supply system	Staples or Cash crops	++	+	Government priority is to increase production of staples/ food crops; Good for low-income consumers; disincentive for small farmers
	Agricultural services	++	-	Affects supply and quality of food production
	Limited / no services (or subsidies) for small farmers	++	-/+	Small farmers lack access to information, credit; cannot afford inputs; productivity suffers
	Post-harvest losses	+	-/+	Less food availability Dutch traders unwilling to invest in post- harvest equipment (e.g. yam cleaning machines) or advisory services - find it too risky; also Ng are enterprising and do not want outsiders to take over
Agri-business services	Focus on Agribusiness	++	+	Investments mostly done in production, less on processing
	Fragmented value chains	+	-/+	Large farmers / traders benefit
	Private capital	++	++	Private capital available therefore low dependence on government; can be leveraged for investments in agri-businesses
Consumer characteristics	Food choices		++	Urban middle class upward mobility- more aspiration-driven food choices –packaged, (ultra) processed convenience food, high sugar content; also increases demand for fresh produce

a Very low (-); low-medium(+); high (++)

b Strongly declining (- -); Declining or negative (-); Stable (-/+); Increasing or positive (+); Strongly increasing (++)

Table 11. Key informants' views on sub-sectors

Commodity	Weaknesses/ Challenges	Strengths/ Opportunities	Areas for NL to contribute
Horticulture Vegetables	• Policies to promote the sub-sector are in place but implementation is weak; • Farmers have limited access to irrigation therefore they are unwilling to invest in quality inputs, resulting in low use of improved varieties and disease resistant seeds; • Weak extension-information and advisory services; • Poor logistics infrastructure, limitations in packaging leads to losses and waste; • Poor knowledge and enforcement of quality control measures and inspection systems affecting food safety	• Three climatic zones are relevant for agriculture – South (Guinean) has rainfall throughout the year, Central area (Savannah) has a marked wet and dry season, and North with seasonally irrigated Fadama lands. • Promising crops are • Tomatoes (Kano, Kaduna, and Jos) • Onions (Kaduna, Kebi) • Plantain as inter-crop with Cocoa, Cassava • Yam (western Nigeria), for short gestation income	• Seed system can be improved (production/ multiplication) to provide high-yielding, disease-resistant seed to boost production; promote youth-led businesses • Build capacity to deliver commodity based extension/ advisory services. • Improved logistic infrastructure • Water management
Palm oil	• Production scattered due to land fragmentation, therefore no incentives to invest in maintenance and upgrading; • Poor seed systems for quality seedlings; • Harvesting and processing technologies are inefficient leading to high post-harvest losses	• High demand from processing industries for soaps, candles, pharmaceuticals, agrochemicals, lubricants, paints and bio diesel can create job opportunities esp. for youth. • Multinational companies have been attracted to the potential in the production and processing of oil palm	• Research needed to improve traditional processing for different uses of palm oil in the food processing industry as well as for non-food products incl. bio diesel; • Build capacity, to organize palm oil farmers
Cocoa	• Government not interested	• High demand from overseas; • Non-state actors investing in the sub-sector.	• Build on experience of South-south initiative -IDH project with CRIN
White yam	• Data on how much is produced and exported not available; • Fragmented value chains, limited opportunities for farmers to link with processors; • Processing equipment is expensive –affordable finance schemes not available; • Exported yam rejected due to quality issues. • High post-harvest losses-almost 30% of the crop is wasted.	• High market demand -pounded yam is a popular item in Nigerian diets; • Not a priority crop for the government needs recognition by state governments to strengthen value chains. • There is potential for exports if certification requirements are monitored by efficient regulatory systems within the country. • Multi-stakeholder platform (Yam Improvement for Income and Food Security in West Africa (YIIFSWA)	• Research on efficient, low-cost processing equipment for small processing businesses. • Setting up efficient regulatory mechanisms within the country.

Table 11. Key informants' views on sub-sectors (continued)

Commodity	Weaknesses/ Challenges	Strengths/ Opportunities	Areas for NL to contribute
Cassava	• Lack of consistency in supply and quality • High quality planting material for better varieties with high starch content is supplied through private sector channels and is expensive • Fresh cassava has low shelf life • No policy support to develop the value chains • Insignificant nutrition value –high starch content, low in protein, vitamins; mostly consumed as a 'filler' in diets	• Grown as a food crop by smallholder farmers • High/ growing market potential (as cash crop) for starch and animal feed industry • Cassava flour is economical substitute to maize or wheat flour in bakeries • Small-scale cassava processing and marketing esp. for gari, is women's domain	• Scope to improve cassava processing efficiency (peeling, grating or making chips, drying) • Develop market potential for cassava flour for bakeries, and cassava chips for animal feed
Sesame	• High value crop with low yield • Government not interested in promoting sesame	• Promoted by some state governments in the North • Has potential as a cash crop for exports	• Seed systems need to be developed • Processing efficiency needs to be improved • Establishing linkages with big buyers in Europe
Soyabean	• Insufficient supply, cannot compete with cheap imports from China • Not a major food crop	• Important source of protein for animal-poultry feed (also for humans	
Dairy (milk and milk products)	• Large but fragmented, unproductive and inefficient; value chains • Low productivity -limited access to water, quality feed and fodder, animal healthcare services • Reconstituted milk is cheaper; Fresh milk value chains need high investments e.g. to set up cold chain • Poor infrastructure and inefficient processing, affects quality of milk/ milk products • Per capita consumption of milk is low @10 liters per person per year • Programs like NDDP- National Dairy Development Programme to boost production contribute only 0.2% of total demand – not viable • Policies like ECOWAS Common External Tariff (2013) – encourages the importation of milk powder, hampers demand and production of fresh milk	• Government promoting milk production and marketing via FC WAMCO (Oyo state); L&Z Integrated Farms in Kano; Arla (Kaduna) as a means to resolve Fulani- crop farmers conflicts • End market controlled by multi-nationals (FC WAMCO, Arla) who import milk powder and use it for (reconstituting) milk and milk products • Government has imposed restrictions on milk powder imports • National Grazing Reserves Establishment Bill (2016)-not yet approved but will help to govern grazing reserves (in favor of pastoralists) • Agriculture Promotion Policy (2016-2020) –includes dairy as a priority value chain • Traditional dairy products such as Fura, Nono and yogurt are integral to diets in the north	• Help to make local dairy sourcing more competitive/viable

Step 3: Causal processes in the Nigerian agri-food system

Method: Based on the key informant interviews and literature review, causal diagrams were drawn by the project team for the six main policy themes. The themes were also discussed in a large stakeholder meeting (roundtable Nigeria XL), and insights from these discussions were added to the causal diagrams.

Nigeria is facing big challenges with a high population growth, a high number of people living in extreme poverty, rapid urbanisation, and stagnating agricultural productivity due to years of low investments in agriculture. Public investments in the agricultural sector have been relatively low, resulting in underdeveloped (rural) infrastructure (e.g. roads, storage facilities and processing facilities) as well as a lack of agricultural services (advisory services, access to inputs and finance). As a result, the processing capacity within the agri-food sector is limited, and as there are no incentives for smallholders to invest in agriculture, supply remains low. Processors cannot find sufficient supply of raw materials with a consistent quality and quantity, whereas farmers cannot find buyers that pay a good price for their produce. This is a reinforcing feedback loop that hampers investments and increased productivity and value addition within the agri-food sector. Underlying institutional drivers include weak institutions (lack of data, lack of policy implementation, low transparency on markets and value chains, weak civil society and corruption), weak links between academia (science) and practice, lack of (technical) education, and non-transparent markets with high transaction costs and high investment risks despite high (urban) demand for food). The weak institutions and the informal economic power are reinforcing each other, as well as the fragmented value chains and informal economic power. Due to the underinvestments and consequently low productivity, Nigeria is a food-deficit country. The high urban demand is met through cheap food imports which further lowers the incentives for investments in Nigerian agriculture. As such, the supply and demand mismatches at many levels and in many dimensions seem to be reinforcing each other. Bringing in more evidence-based knowledge and information into feedback mechanisms, as well as match-making between supply and demand, can help break some of these cycles. The high domestic demand for food and the availability of a large workforce as well as private capital should provide opportunities for growth in the agri-food sector, but the constraints listed above result in a mismatch of supply and demand at all levels. Figure 12 depicts the main feedback mechanisms in the Nigerian agri-food system.

Agricultural sector transformation

The agricultural sector as a whole is largely driven by the informal economic sector. Although policies for agricultural sector transformation have been created (e.g. political agenda for import substitution), weak institutions, corruption, and conflicting political and economic interests prevent them from being properly implemented. These phenomena enforce each other, making it difficult to bring about change. The weak institutions, low tax revenue and lack of policy implementation result in low (public and private) investments in the agricultural sector. As such, the enabling environment is constraining agricultural productivity rather than enabling, and is characterised by poor rural infrastructure, poor access to information, services and quality inputs, low food safety standards, low processing capacity, and reportedly high post-harvest losses. As a result the production costs, and thus domestic food prices, are high while domestic food supply remains low. In order to feed its growing (urban) population, Nigeria therefore keeps importing food products, which is relatively cheap compared

Figure 12. Causal diagram NIgerian agri-food system

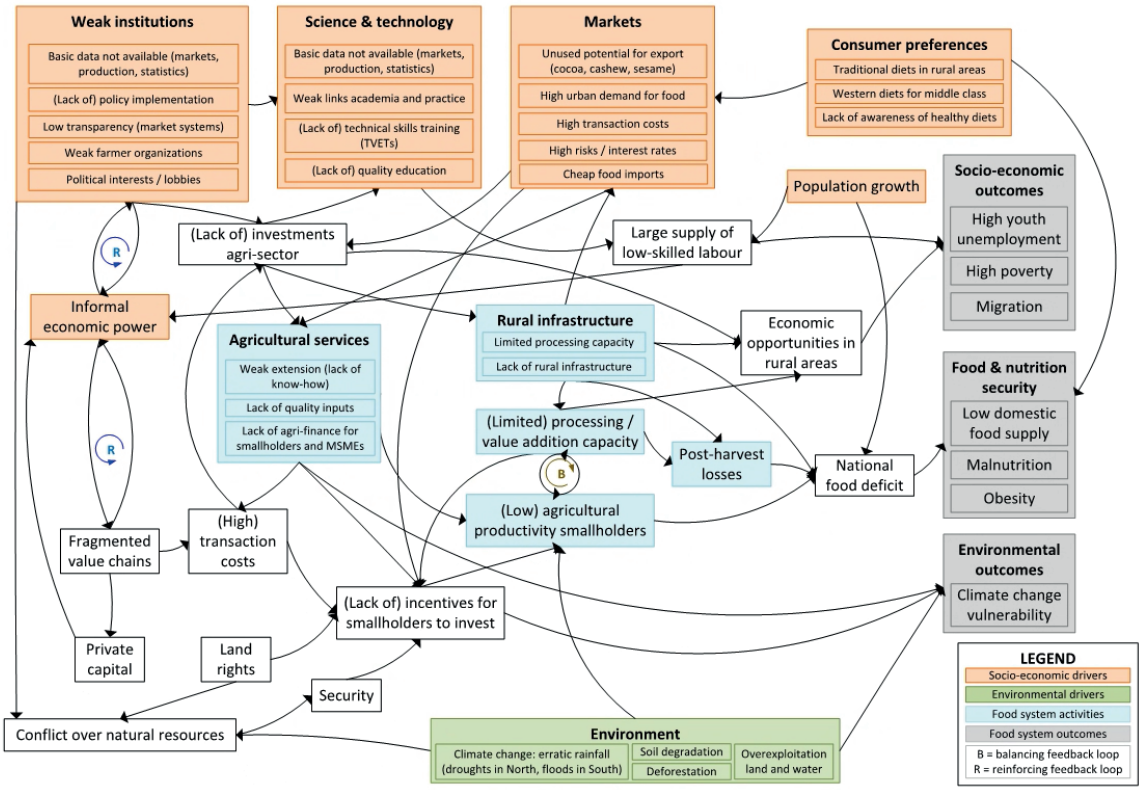


Figure 13. Causal diagram agricultural sector transformation

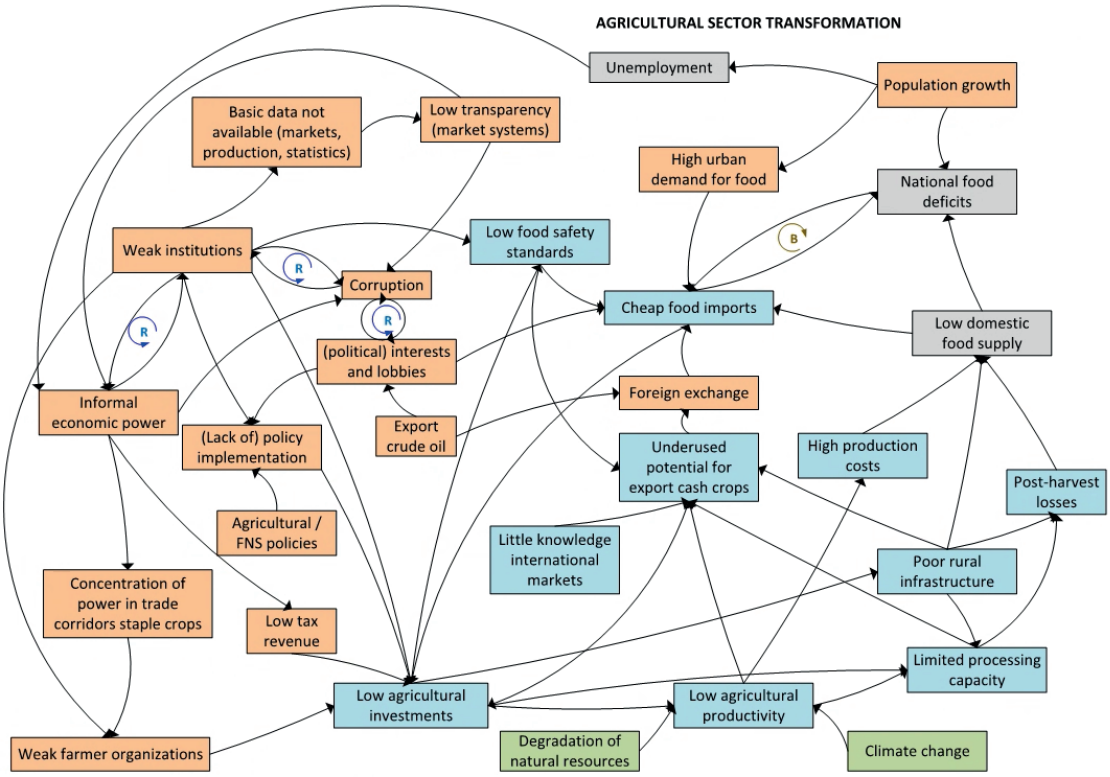


Figure 14. causal diagram agribusiness, value chain development, agrilogistics

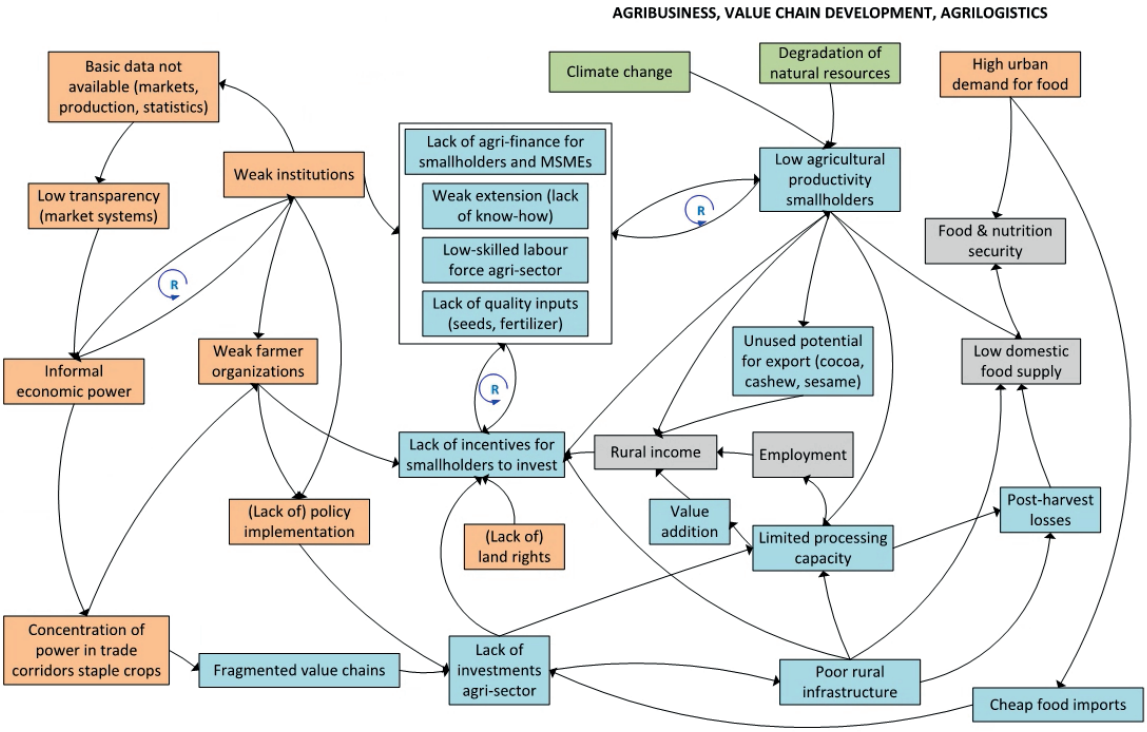


Figure 15. causal diagram access to finance

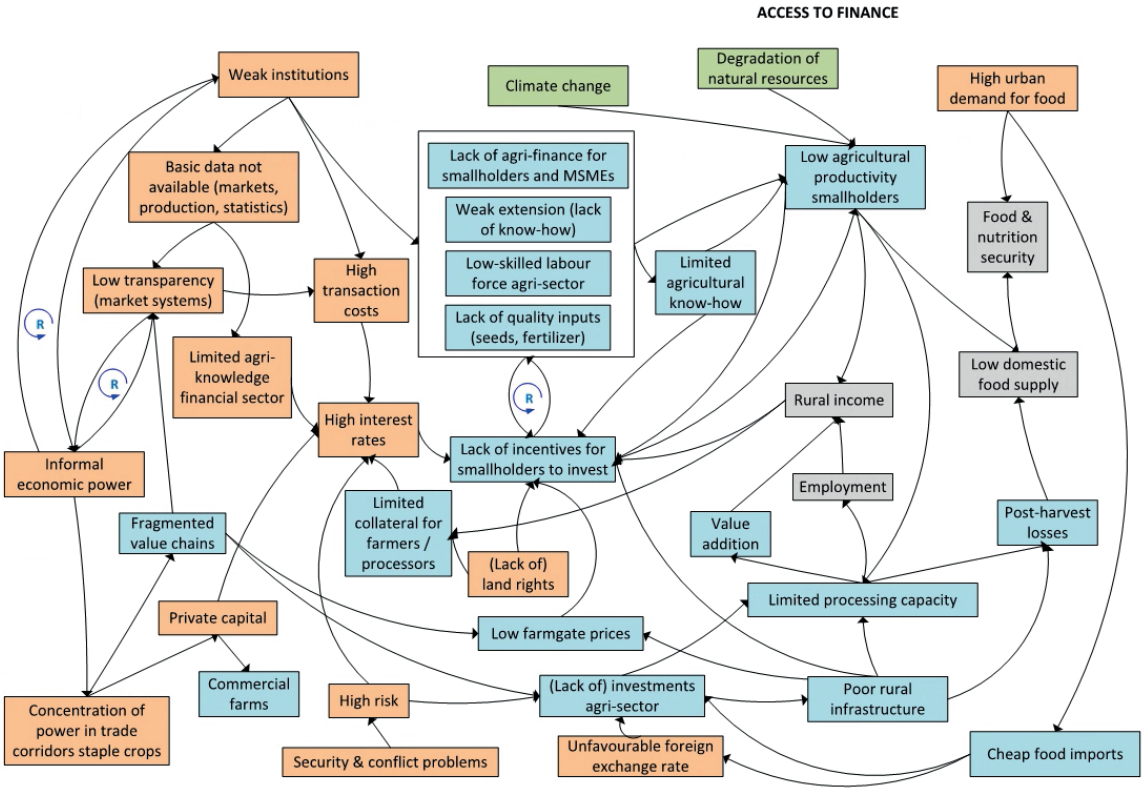


Figure 16. Causal diagram employment

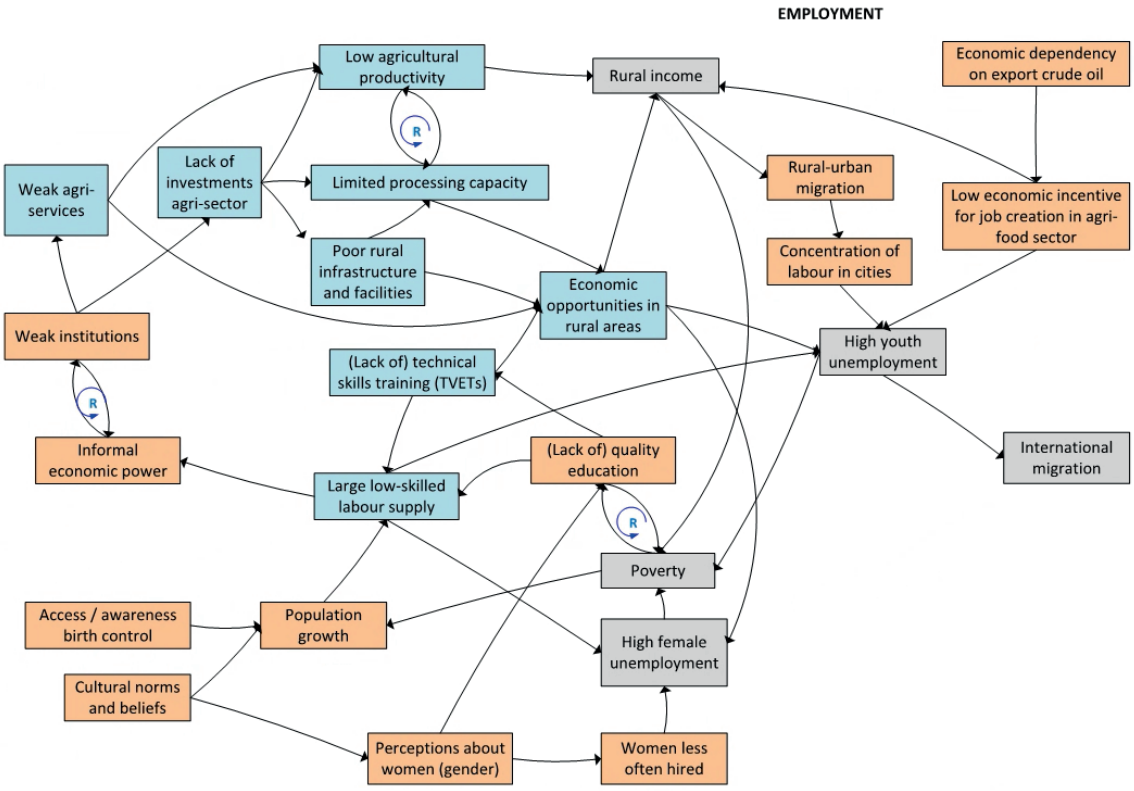


Figure 17. Causal diagram food and nutrition security

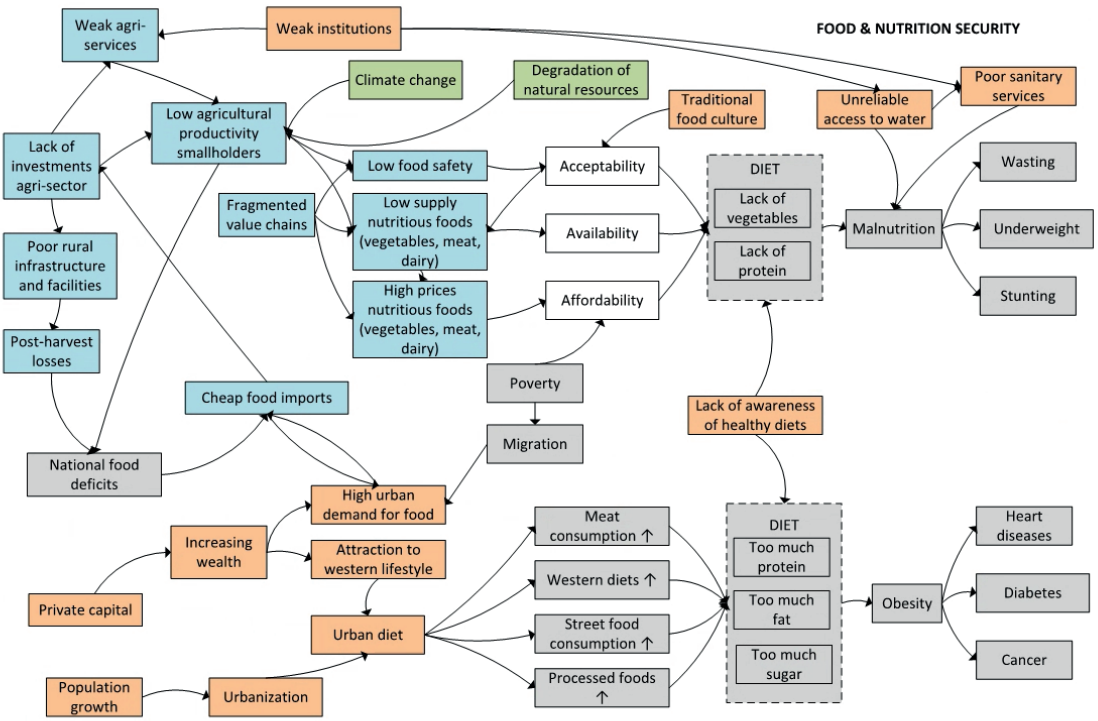
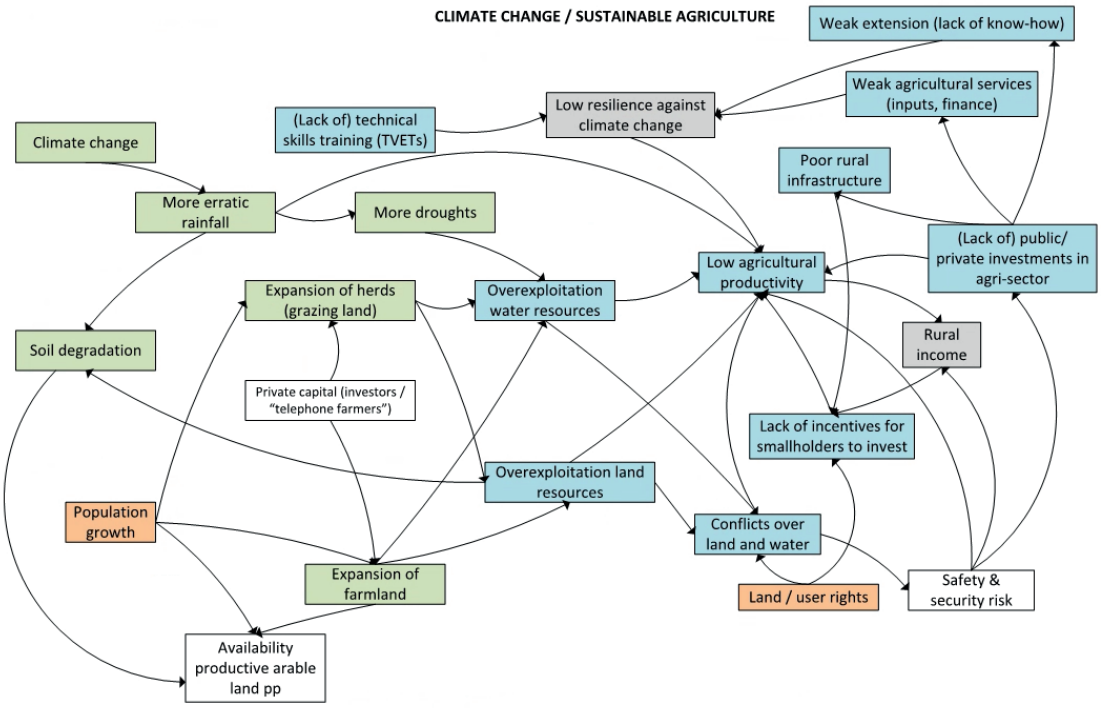


Figure 18. causal diagram climate change adaptation



to domestic food products. The unused potential of export crops such as cocoa, cashew and sesame are equally a result and a cause of these underinvestments. Huge investments are required to truly transform the agricultural sector of Nigeria.

Agribusiness, value chain development, agrilogistics

The causal diagram for the theme of agribusiness, value chain development and agrilogistics is very similar to the overarching agricultural sector transformation theme; similar causal processes and constraints are at play, though at the level of specific value chains. The low level of services (finance, extension, quality inputs) is an issue in most – if not all – value chains. The same is true for rural infrastructure and facilities for processing and storage, whether this is for cold chains (e.g. dairy), perishables (e.g. vegetables, cassava) or staple (e.g. cereals) food products. The low agricultural productivity and limited value addition within these value chains also hamper opportunities to generate more rural incomes within the agri-food sector, adding another disincentive for investments (by producers and processors). Lack of economic prospects within rural areas enforces the rural-urban migration flow that is taking place in many parts of Nigeria.

Access to finance

The current situation of low investments, limited access to agricultural services, low productivity and low rural incomes are both causes and effects of a lack of access to finance. Small-scale producers and processors lack collateral and face high interest rates when trying to access loans. Investments in the agri-food sector are considered high risk, due to lack of transparency and high transaction costs in the fragmented value chains, lack of infrastructure and facilities and high susceptibility to external – and sometimes erratic – environmental,

economic and political factors. Moreover, the predominantly informal economy hampers formal investments as juridical and fiscal regulations are not met. Yet, the informal economy is financed by informal capital, with its own rules and regulations, often based on features including kin, gender and religion. Although access to finance is difficult for some small-scale actors, there is private capital present in the agri-food system. The Nigerian diaspora sent remittances back to Nigeria at an estimated US$25b in 2018 (6.1% of total GDP[7]). Part of the private capital is often invested in commercial farms and/or agribusinesses, creating a dualism in agricultural production systems: high-tech commercial farms versus low-input smallholder farming. Some of the private investments fail due to a lack of technical and commercial skills or relevant knowledge. This private capital is rarely used to invest in value chains or agricultural services that would benefit small-scale producers and/or processors; the two production systems are disconnected.

Employment (youth and women)

The low accessibility and quality of skills training, and limited access to information and extension, result in a low-skilled workforce in the agri-food sector. This results in a mismatch between supply and demand regarding labour force, where growing agribusinesses look for specific skills, whereas there is a large pool of low-skilled and unemployed youth. This pool of labour tends to seek employment within the informal economic sector keeping living standards very low due to low salaries and high insecurity.

Food and nutrition security

Nigeria is experiencing an increase in the so-called double burden of malnutrition. The country has the largest population of any country living in extreme poverty, suffering malnutrition. Equally, there is a growing middle and higher class in urban areas that increasingly consumes an unhealthy 'western' diet, resulting in obesity. Malnourishment is due to the low supply of affordable, nutritious and safe food for the lower income levels. This is the result of insufficient investments in the agri-food sector at all levels. Agricultural productivity is far below its potential, but post-harvest losses are also thought to be high – though the actual volumes are contested. It is also thought that lack of knowledge on healthy diets is contributing to malnutrition.

Climate change adaptation

Climate change is also affecting the various agro-ecological zones in Nigeria with more variable rainfall and higher temperatures. The Nigerian agri-food sector is not well prepared for the effects of climate change. Basic skills and knowledge on climate-smart agriculture is lacking, among farmers as well as extension services. The increasing pressure on land and water (due to growing population, expansion of arable and pasture land) further causes overexploitation of natural resources and conflicts between different community groups and pastoralists. This makes the agricultural sector even more vulnerable to climate change.

7 www.worldbank.org/en/topic/migrationremittancesdiasporaissues/brief/migration-remittances-data

Step 4: Label system behaviour

Literature on system dynamics distinguishes core types of system behaviour that are common patterns across any system, also called 'archetypes'. To change the food system outcomes (e.g. improved FNS), one needs to break the systemic pattern of feedback loops that results in undesirable outcomes. The archetypes are a useful tool to identify patterns in the food system that sustain a systemic problem. Several behavioural patterns can be identified within the Nigerian agri-food system that affect the policy objectives. The identified archetypes are:

'Growth and underinvestment'

Growth reaches a limit due to lack of capacity investment

Increasing (urban) demand for food puts pressure on the agri-food sector while structural investments (from private and public sector) are insufficient to increase productivity at the required level and speed. The lack of investments affects all parts of the agri-food sector: institutions, science and technology, rural infrastructure (roads, processing facilities, storage), availability of data and information, agricultural services (including extension, inputs, agri-finance). This has implications for the different policy themes.

- **Agricultural sector transformation**
  The Nigerian government expresses an explicit ambition to transform the agri-food sector so productivity and domestic supply of healthy and affordable food will improve, yet both public and private investments remain too low to make a systemic change. Foreign exchange is spent on food imports, while weak institutions and corruption sustain the informal economy (lowering tax revenues). Though serious attempts are being made to transform the agricultural sector through policy, the weak implementation and underinvestments in parts of the agri-food sector prevent it from making a transformative change and instead, give rise to a dichotomy of production systems depending on whether private capital is available or not, resulting in the exclusion of smallholder farmers. This also applies to the sub-sector for export crops (e.g. cocoa, cashew, oil palm), resulting in a huge unused potential for export of agri-food crops and foreign exchange earnings.
- **Agribusiness, value chain development, agri-logistics**
  Lack of investments in education and training, rural infrastructure and facilities, and public or private agricultural services (e.g. extension, finance, inputs) result in low innovation capacity and low agricultural productivity. Although there is a high (urban) demand for food, the poor infrastructure and support systems hamper productivity increase.
- **Access to finance**
  The lack of information and transparency in the fragmented value chains, the lack of overall investment, and the high risk associated with agriculture result in high interest rates for loans for working capital and investments for (small-scale) producers and processors. This is a vicious circle hampering productivity increase and economic growth in the agri-food sector.
- **Employment**
  Employment generation for youth is a policy goal, but investments across the agri-food sector are required to increase the productivity, value addition and agricultural services sector to generate more jobs and opportunities for entrepreneurs in the agri-food sector. In addition, current investments in education and training (incl. TVET) are insufficient to

train youth with the necessary skills to make a living within the agri-food sector.

- **Climate change adaptation**
  The Nigerian agri-food sector needs to adapt itself to climate change to strengthen its resilience and be food secure. However, lack of investments in advisory services, research and development, education and training, quality inputs and rural infrastructure and facilities prevent a shift to climate-smart agriculture and value chains. Instead, natural resources (land, water, forest) have been exploited and degraded, making the agri-food sector even more vulnerable to climate change as the ecological resilience is declining.
- **Food and nutrition security**
  The lack of investments in the agri-food sector hamper Nigeria's ambition to become self-sufficient in food production. This also affects the poorer households who are food and nutrition insecure.

'Success to the successful'

One group has more resources and is therefore more likely to succeed than another group; investment attracts investment

Nigeria's informal economy accounts for 65% of GDP; there are high turnovers and profits, but regulation and taxation are low.

- **Agricultural sector transformation**
  Large-scale traders and importers have vested trade interests in food imports. They also have private capital to strengthen their position, and are thought to use corruption to guarantee their power and interests. This opposes policies and attempts (also due to limited capacity in terms of financial and human resources) to strengthen the institutions and enabling environment for sustainable and inclusive growth of the agri-food sector.
  Agribusiness, value chain development and agri-logistics
  As private capital accumulates, successful private entrepreneurs gain more power, but smaller entrepreneurs and young adults struggle to set up business because of a lack of (access to) capital.
- **Access to finance**
  As private capital accumulates, successful private entrepreneurs gain more power, but smaller entrepreneurs and young adults struggle to set up business because of a lack of (access to) capital.
- **Employment**
  Those with capital can easily set up a business in the agri-food sector, giving rise to the group of so-called 'telephone farmers'. However, those without a starting capital or collateral (e.g. youth, women), struggle to start up a business due to a lack of resources.

'Fixes that fail'

Short-term fixes that exacerbate a long-term problem

There is a huge urban demand for (cheap) food. Agricultural productivity is low (see 'growth and underinvestment'), resulting in a national food deficit. Importing food from neighbouring countries and international markets is cheaper than investing in domestic agricultural production.

- **Agricultural sector transformation / Food and nutrition security**
  As the gap in domestic food supply becomes larger, Nigeria becomes more dependent on cheap food imports. In addition, the foreign exchange obtained through crude oil exports is declining. This lowers the GDP and thus public investments in the agri-food sector,

which are required to increase the domestic food supply in the long term. The political tension between the urban consumers' demand for cheap food and inefficient smallholder production is real; it requires long-term investments and commitment to substitute food imports by domestic production – a quick fix is not realistic.

'Drifting goals'

Gaps between goal and reality, resulting in a lowering of the goal

Although the Nigerian government develops agri-food policies, the implementation and enforcement is weak, and reality is far from the goals.

- **Agricultural sector transformation**
  Small successes are being booked and celebrated, but the agri-food sector as a whole does not show transformative change. Each government wants to achieve its own 'success' but overall policy on transformation is disjointed. This can lead to failure when shortcuts are made to meet unrealistic goals without strengthening the entire agri-food sector ('white elephant projects').

'Tragedy of the commons'

Individual beneficial behaviour results in a degradation of the common resources.

Population growth (private investments?) result in increasing pressure and overexploitation of land and water resources for individual benefit (food production), resulting in land degradation and conflict between users.

- **Climate change adaptation**
  As arable farmers and pastoralists compete between and among themselves for the same natural resources, the ecological resilience and productivity are declining, making the Nigerian agriculture more vulnerable to climate change.
- **The increasing pressure on limited natural resources gives rise to human conflict.**

Step 5: Identify leverage points

Method: Based on the food system analysis, key informant interviews and the contributions of the stakeholders at the roundtable Nigeria XL meeting, leverage points were identified for the six policy themes.

Given the complexity of the Nigerian agri-food system, there is not a single leverage point that can trigger the transformation of the agri-food sector and boost agricultural productivity. One of the major constraints, however, is the lack of investments in the enabling environment. Any intervention, therefore, should also strengthen the enabling conditions for the targeted (sub-) sector. This includes providing access to finance, promoting local investments, knowledge brokering and skills training. Table 12 provides a full overview of the identified leverage points for the six policy themes.

Table 12. Overview of identified leverage points

Theme	Main leverage point(s)	Other leverage points	Additional information
Agricultural sector transformation	• Public investments in operational enabling environment, implementation of policies, infrastructure.	• Create coherent public policies in support of sub-sectors (EKN to lobby for this at diplomatic level; import / export etc.) • Promote investments creating local employment • Improve human capital in line with demand of agri-food sector (e.g. through matching ng/nl knowledge institutes, R&D depts., TVETs) • Improve enabling environment	• Sectoral transformation = shift from subsistence to commercial farms. • Getting youth back into agriculture: creating new jobs: youth can play the role of extension workers, service providers or local aggregators. • Gaps in extension system: harvest and fertilizer losses. • Recognize trade-offs: e.g. sorghum is at the same time a cash crop (Heineken) and a staple crop; food security might be at risk • Pluralistic extension system: companies provide extension services, public extension system non-existent / inadequate
Agribusiness, value chain development, agri-logistics	• Value chain strengthening & coordination for shorter value chains with less concentrated power	• Product centres (agri-hubs) linking producers and processors through processing & storage facilities • Access to finance • Develop commodity-based extension and input systems • Support bottom-up partnerships • Empowerment of women entrepreneurs	• Those with export potential – palm oil (Edo state suggested by Solidaridad as intervention state to curb migration to NL- trafficking (social reason); but need to start from scratch • Planting material is a challenge; Ondo State is more suitable because they already have a thriving palm oil sector; have know-how and nurseries (economic reason), • Horticulture – tomato (Kaduna), onions (Kano as it is a bit drier, Nasarawa), most vegetables that need water are grown in the South – depends on the scale; more intensive in the south as there is lesser land; • Tomato blight did not affect supply chains as tomatoes came in from subsistence farmers in the south; Tuta absoluta is a problem in some regions • Potatoes (Jos) • Tomatoes – loss in transportation 'buka' – made from overripe tomatoes – from food vendors; 'wole wole' local
	• Provision of data and information (support unit EKN Lagos for Dutch private sector and NGOs, also matchmaking for Nigerian private investors looking to export to EU – cocoa, cashew, sesame, palm oil)		• Heineken has developed a data acquisition model for sorghum value chain • Government offices do not have reliable data – companies can contribute through their CSR for data acquisition for value chains of interest esp.

Theme	Main leverage point(s)	Other leverage points	Additional information
Access to finance	• Matchmaking of private capital with other partners with agricultural know-how and social / environmental / economic impact goals	• Capacity building of banks (on sector knowledge of agricultural sector)	• Banks lend on own terms • Community rural banks- that cater to small farmers, who mostly borrow from local money lender; • Central banks have schemes like NIRSAL that cater to bigger farmers, as interest rates are high 22-26% • Private funds not targeted to farmers but intermediaries in the supply chain who get paid by end-buyers, no credit to farmers to enhance productivity, also not for staples. • Youth not in primary production, don't have collateral • To guide Dutch investors. projects like GAIN incubation, 2SCALE have systems to screen candidates • Fadama programme has provision to engage youth; create opportunities for retraining and apprenticeship for youth.
	• Access to (micro-) finance for young / female entrepreneurs, in combination with business coaching / advice and matchmaking (e.g. with Dutch investors)	• Guarantee funds to lower interest rates • Showcasing patient capital investments • Technical and vocational training of youth and women, linked to value chains / processors, to develop business plan and to make them credit-worthy	
Employment	• Technical and vocational training of youth and women, linked to value chains / processors: match training with skills demand (different dynamics in different locations)	• Job creation that require low capital investments • Access to (micro-) finance for young / female entrepreneurs	• Support local enablers; e.g. incubation (GAIN) or start-up centres (rabobank)
	• Promote responsible investments (of Dutch private and public sector), creating decent jobs etc.		• FMO and Access bank are promoting responsible investments • Work with Bank of Agriculture in agriculture value chains (downstream) and NRM to reach youth • Dutch private sector is not homogenous – individuals have been active in agriculture – buying land and lease it to farmers – supply to companies – converting farmers to labourers (food security challenges); regulations on land use can be enforced only if investments are linked to financial institutions.

Table 12. Overview of identified leverage points (continued)

Theme	Main leverage point(s)	Other leverage points	Additional information
Food and nutrition security	• Awareness raising on knowledge improvement on healthy diets	• include healthy diets in technical and vocational training of youth and women, linked to value chains / processors • improving knowledge on nutrition	• Health inspectors who check quality of food vendors (exist only on paper) • DHS data on stunting available but might not be reliable
	• Nigeria needs to invest in domestic production and processing capacities to improve the production of food and cash crops and reduce food losses	• Affordability of nutritious food • Improvement of GAP adoption • Sustainable intensification	• Domestic production and processing is a complex process because there is no consistent supply • Aggregators prefer to send commodities to Lagos markets as prices are better. • Varieties matter – sorghum only 2 useful for breweries; palm oil –for pharma and cosmetic industry vs food; cassava – yellow (Vit.A fortified) vs white
Climate change adaptation	• Share data & information (and know-how) on climate change impacts and adaptation strategies for producers, processors, traders • Include regional scenarios of cc impact	• Provision of quality inputs (e.g. drought-resistant varieties) • Technical training on climate change adaptation • Integrated masterplan on use of natural resources agreed upon with stakeholders • Strengthen land rights	• Sharing of Dutch knowledge on CSA • Strengthen farmer-led businesses • Develop knowledge on climate impact for specific regions and commodities • Security of tenure by local chiefs, land tenure law of 1999 but not enforced

Step 6: Stakeholder analysis

Method: For each policy theme, the main stakeholders were identified using an influence-interest matrix.

A list of Dutch and Nigerian stakeholders was compiled to provide an overview of who would need to be engaged in which policy theme.

For each policy theme, the stakeholder were mapped on an influence / importance matrix, taking into account

- the importance for a stakeholder to address the issue;
- the extent to which the stakeholder can influence the issue (decision making, policy implementation, funding).

Variables affecting stakeholders' relative importance and influence within and between formal organisations include

- Legal hierarchy (command and control, budget holders);
- Authority of leadership (formal, informal, charisma, political, familial or cadre connections);
- Control of strategic resources;
- Possession of specialist knowledge and skills;
- Negotiating position (strength in relation to other stakeholders).

For informal interest groups and primary stakeholders

- Social, economic and political status - degree of organisation, consensus and leadership in the group;
- Degree of control of strategic resources;
- Informal influence through links with other stakeholders;
- Degree of dependence on other stakeholders.

Using the matrix, stakeholders can be classified into four groups:

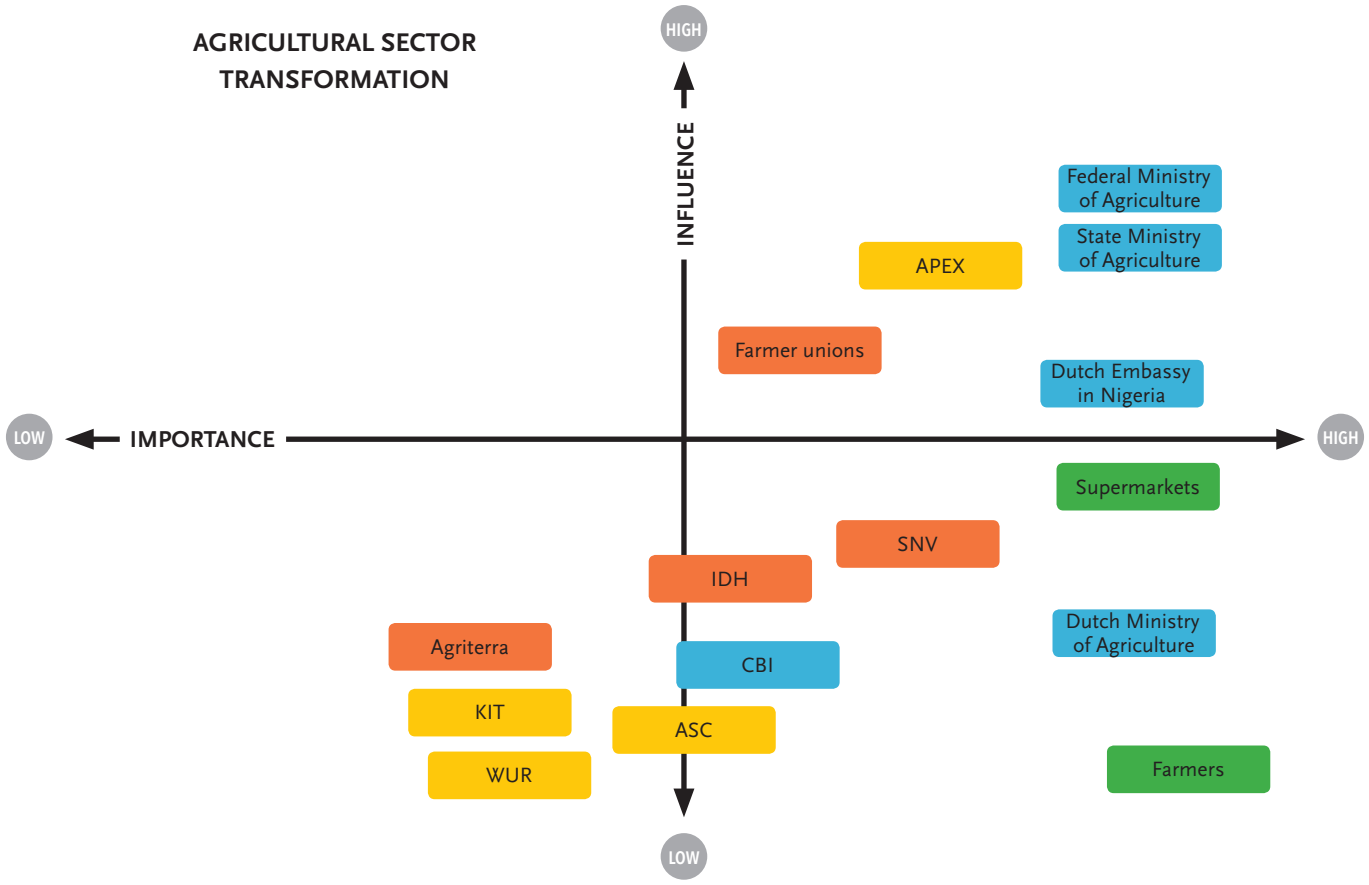
- High influence – high importance: the ones that can make the difference
- High influence – low importance: the ones that hold power but may not cooperate if it is not in their interest
- Low influence – low importance: the bystanders
- Low influence – high importance: the ones that are affected but have no power

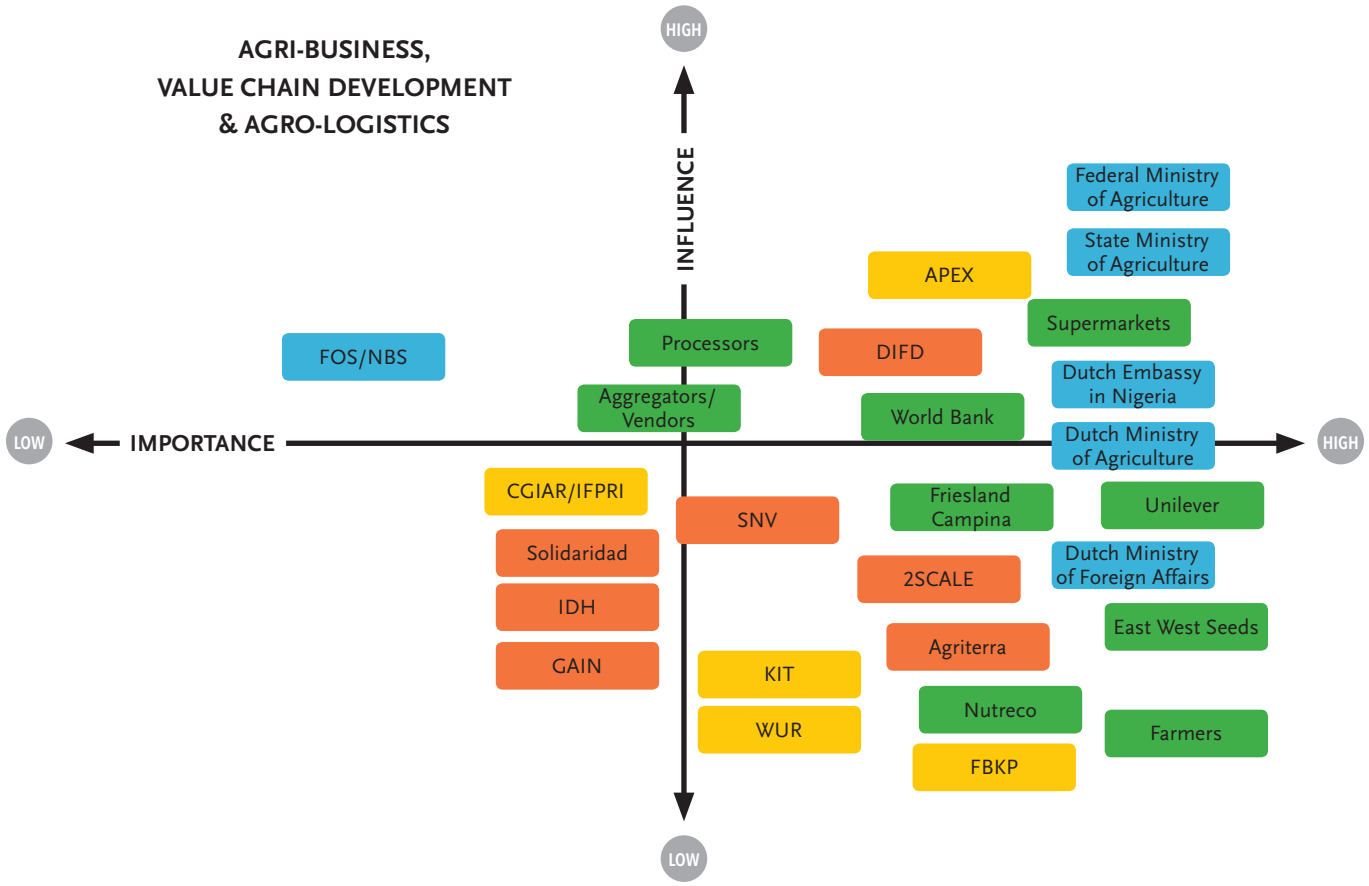
Partnerships are key to a trade and investment agenda for the agri-food sector in Nigeria. Table 14 gives an initial overview of key Dutch and Nigerian stakeholders, but the list is not exhaustive.

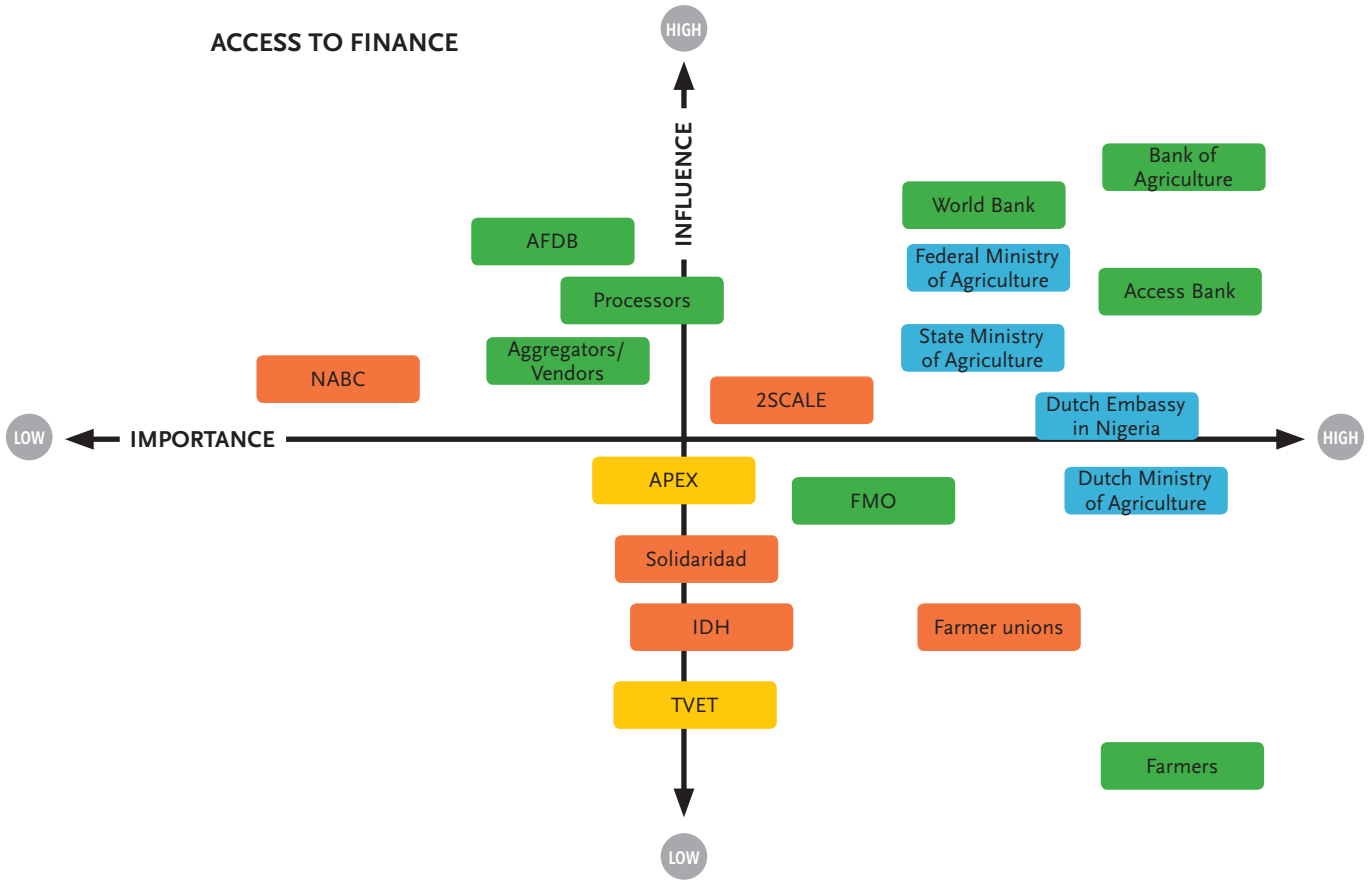
Table 13. Stakeholder overview per policy theme

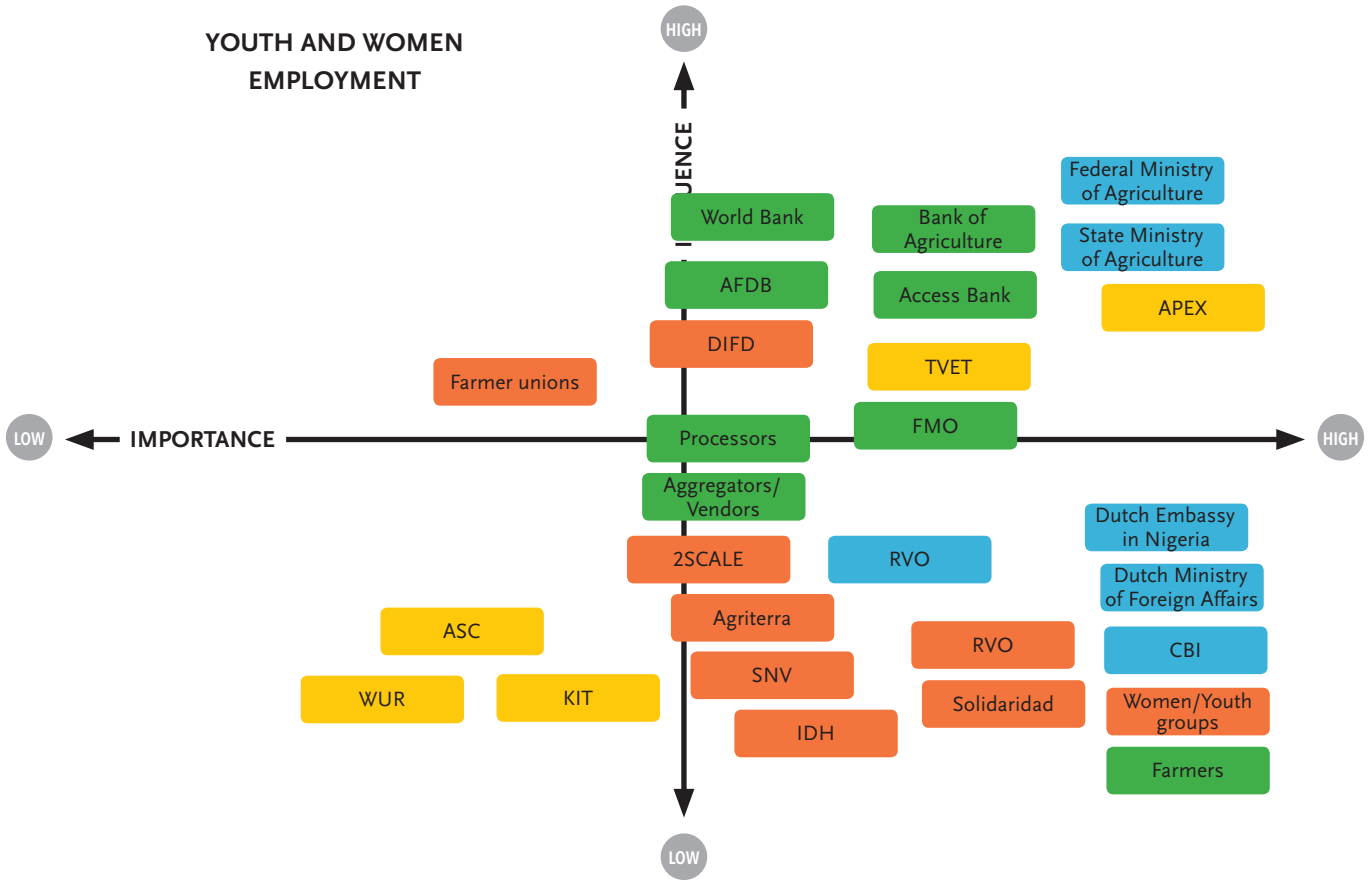
Stakeholder overview	Food & nutrition security	Agri-business, VC development & agro-logistics	Access to finance	Agricultural sector transformation	Youth & women employment	Climate-smart/ sustainable food systems
GOVERNMENT						
Nigeria – Federal level						
Ministry of Agriculture	x	x	x	x	x	
Ministry of Environment						x
FOS/NBS		x				
River Basin Authorities						x
Central Bank of Nigeria					x	
Nigeria – State level						
Ministry of Agriculture	x	x	x	x	x	
Ministry of Environment						x
FOS/NBS		x				
Netherlands Government						
Ministry of Foreign Affairs	x				x	x
Ministry of Agriculture		x	x	x		
RVO		x			x	
FMO			x		x	
CBI				x	x	
PRIVATE SECTOR						
NABC		x	x			
East West Seeds		x				
Unilever	x	x				
Nutreco		x				
Heineken		x				
Friesland Campina	x	x				
World Bank	x	x	x	x	x	
African Development Bank	x	x	x	x	x	
Bank of Agriculture			x		x	
AXIS Bank			x			
Aggregators/Vendors	x	x	x		x	

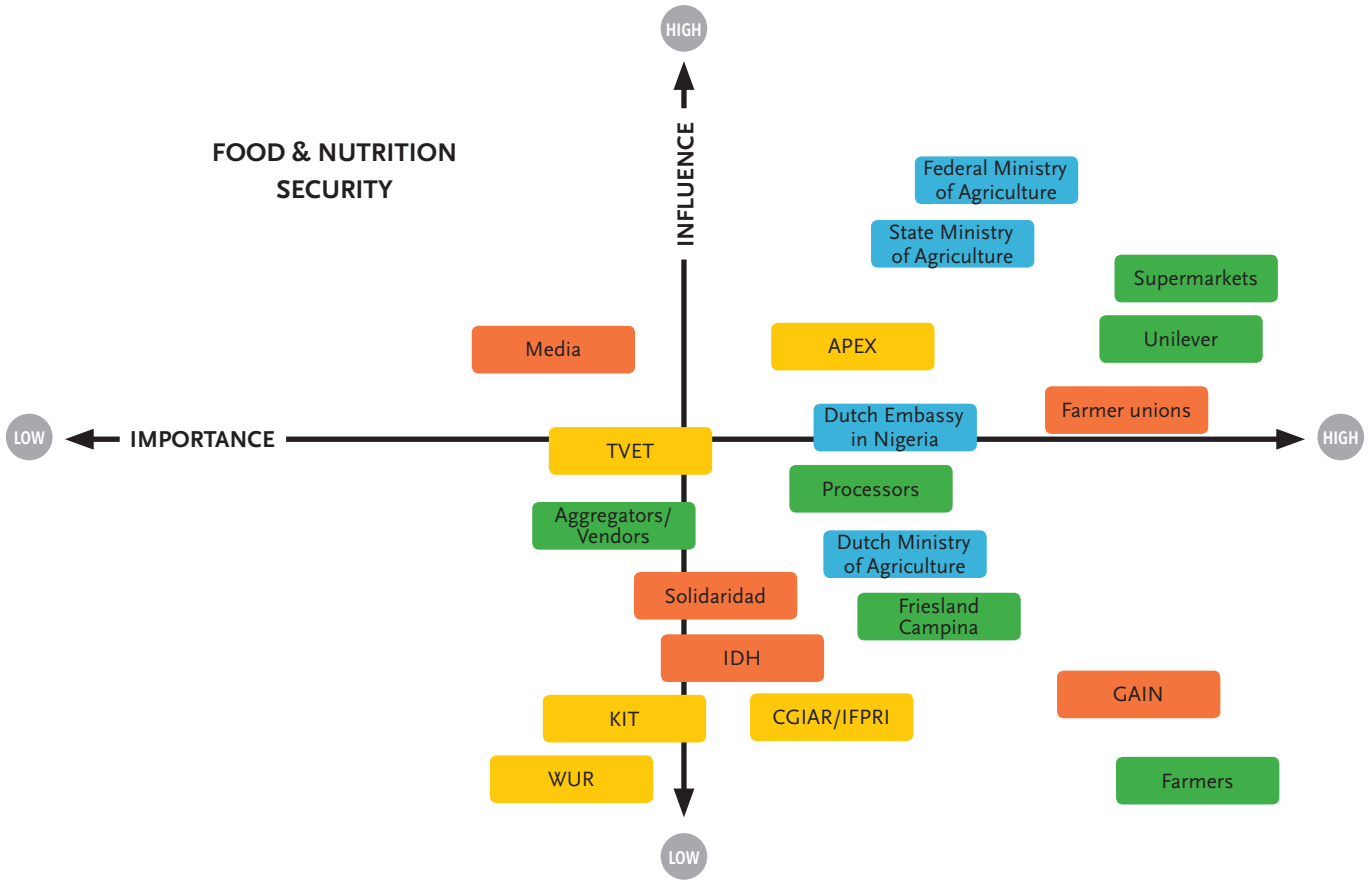
Stakeholder overview	Food & nutrition security	Agri-business, VC development & agro-logistics	Access to finance	Agricultural sector transformation	Youth & women employment	Climate-smart/ sustainable food systems
Processors	x	x	x		x	
Supermarkets	x	x	x	x		
NGO / CIVIL SOCIETY						
2SCALE		x	x		x	
SNV		x		x	x	
IDH	x	x	x	x	x	x
GAIN	x	x				
Agriterra		x		x	x	
Solidaridad	x	x	x		x	x
DFID	x	x	x	x	x	x
OXFAM		x				x
Farmer Unions	x	x	x	x	x	x
Farmers	x	x	x	x	x	x
Women and Youth Groups					x	
KNOWLEDGE ORGANIZATIONS						
KIT Royal Tropical Institute	x			x	x	x
Wageningen University & Research	x	x		x	x	x
Food & business knowledge platform		x				x
NUFFIC					x	
CGIAR/IFPRI	x	x				
ASC Leiden				x	x	
Schools	x					
TVET	x	x	x		x	X
Apex research organisations Abuja	x	x	x	x	x	X


AGRICULTURAL SECTOR TRANSFORMATION
HIGH
INFLUENCE
LOW
IMPORTANCE
LOW
HIGH
Federal Ministry of Agriculture
State Ministry of Agriculture
APEX
Farmer unions
Dutch Embassy in Nigeria
Supermarkets
SNV
IDH
Dutch Ministry of Agriculture
Agriterra
CBI
KIT
ASC
WUR
Farmers
HIGH
LOW


AGRI-BUSINESS, VALUE CHAIN DEVELOPMENT & AGRO-LOGISTICS
HIGH
INFLUENCE
LOW
IMPORTANCE
LOW
HIGH
Federal Ministry of Agriculture
State Ministry of Agriculture
APEX
Supermarkets
FOS/NBS
Processors
DIFD
Dutch Embassy in Nigeria
Aggregators/ Vendors
World Bank
Dutch Ministry of Agriculture
CGIAR/IFPRI
SNV
Friesland Campina
Unilever
Solidaridad
2SCALE
Dutch Ministry of Foreign Affairs
IDH
East West Seeds
Agriterra
GAIN
KIT
Nutreco
Farmers
WUR
FBKP
HIGH
LOW


ACCESS TO FINANCE
HIGH
INFLUENCE
LOW
IMPORTANCE
LOW
HIGH
Bank of Agriculture
World Bank
AFDB
Federal Ministry of Agriculture
Access Bank
Processors
State Ministry of Agriculture
Aggregators/ Vendors
NABC
2SCALE
Dutch Embassy in Nigeria
APEX
FMO
Dutch Ministry of Agriculture
Solidaridad
IDH
Farmer unions
TVET
Farmers
LOW


YOUTH AND WOMEN EMPLOYMENT
HIGH
UENCE
LOW
IMPORTANCE
LOW
HIGH
Federal Ministry of Agriculture
World Bank
Bank of Agriculture
State Ministry of Agriculture
AFDB
Access Bank
APEX
DIFD
TVET
Farmer unions
FMO
Processors
Aggregators/ Vendors
Dutch Embassy in Nigeria
2SCALE
RVO
Dutch Ministry of Foreign Affairs
Agriterra
ASC
RVO
CBI
SNV
WUR
KIT
Solidaridad
Women/Youth groups
IDH
Farmers
LOW


FOOD & NUTRITION SECURITY
HIGH
INFLUENCE
LOW
IMPORTANCE
LOW
HIGH
Federal Ministry of Agriculture
State Ministry of Agriculture
Supermarkets
Unilever
Media
APEX
Farmer unions
Dutch Embassy in Nigeria
TVET
Processors
Aggregators/ Vendors
Dutch Ministry of Agriculture
Solidaridad
Friesland Campina
IDH
GAIN
KIT
CGIAR/IFPRI
WUR
Farmers
LOW

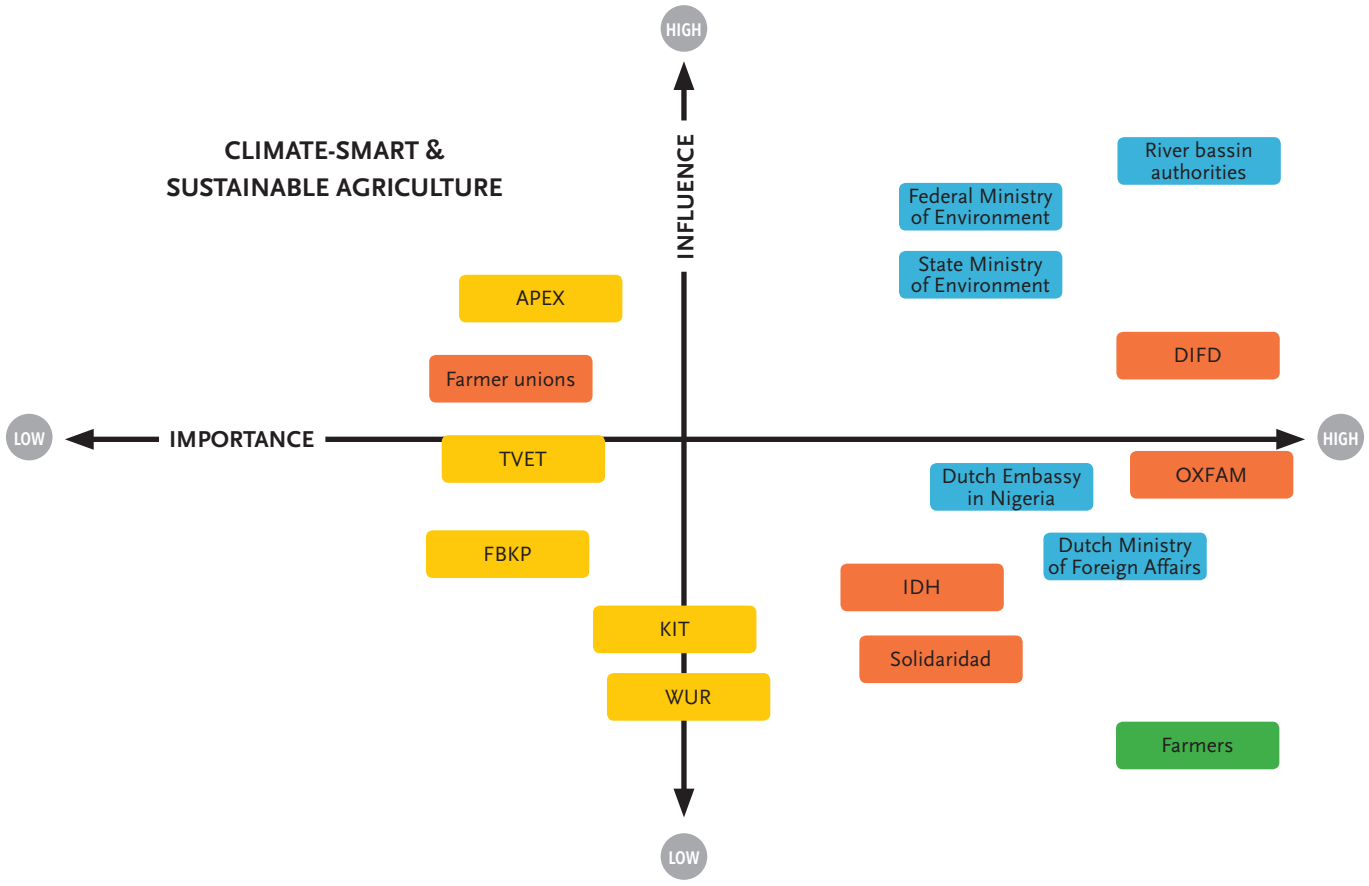

CLIMATE-SMART & SUSTAINABLE AGRICULTURE
HIGH
INFLUENCE
LOW
IMPORTANCE
LOW
HIGH
River bassin authorities
Federal Ministry of Environment
State Ministry of Environment
APEX
DIFD
Farmer unions
TVET
Dutch Embassy in Nigeria
OXFAM
FBKP
Dutch Ministry of Foreign Affairs
IDH
KIT
Solidaridad
WUR
Farmers
LOW

Table 14. Stakeholders linked to the policy themes

Themes	Main leverage points	Stakeholders in NL and Nigeria
Agricultural sector transformation	Public investments in operational enabling environment, implementation of policies, infrastructure	• Public extension system non-existent / weak / inadequate; At policy level models for better extension services can be developed with the help of apex group in Abuja where all research organisations are affiliated • For policy level start with federal ministry of agriculture and rural development and then go to state governments for specific crops. • Federal Office of Statistics (FOS) or Nigeria Bureau of Statistics (NBS) potentially play a good role if capacity is strengthened to set up reliable information systems and databases • Building the capacity of farmer unions can help strengthening civil society and empower farmers
Agribusiness, value chain development, agri-logistics	Value chain strengthening & coordination for shorter value chains with less concentrated power	• Federal and state ministries of Agriculture are important partners • Importance of supermarkets for agribusiness etc. still limited • Aggregator and processors can organize farmers and provide access to inputs and markets • Value chain projects (e.g. 2SCALE, IDH, Solidaridad, SNV) have very localized influence, but can be used to leverage impact through coordinated effort in targeted sub-sectors in specific geographical areas. At present, efforts are disjointed. • KIT is conducting an assignment for RVO entitled 'Improvement of the Potato Value Chain in Jos Plateau'. The aim is to contribute to the development of the potato value chain through the knowledge and expertise of the Dutch potato sector • NAO plays a role as match maker and is also responsible for pre competitive preconditions such as adequate fyto sanitary arrangements and the relevant aspects of the regulatory framework (Breeders Rights). • For export crops: RVO/CBI • Babban Gona is a social enterprise that provides cost-effective end-to-end services to a network of franchise farmer groups. Services include training in sustainable farming, soil analysis, crop insurance, access to storage facilities, including a warehouse receipt program, marketing and distribution of products and access to credit, fertilizer and seeds
	Provision of data and information (support unit EKN Lagos for Dutch private sector and NGOs, also matchmaking for Nigerian private investors looking to export to EU – cocoa, cashew, sesame, palm oil)	• Knowledge institutes (Nigerian and Dutch universities) can provide information. ASC Leiden has done work in area of entrepreneurship and value chain development particularly in agriculture in Nigeria • NGOs and private enterprises that engage in value chain development • State ministries of agriculture • AgriProFocus (network activities in agri-business)
Access to finance	Matchmaking of private capital with other partners with agricultural know-how and social/environmental/economic impact goals	• Bank of Agriculture • Access Bank • EKN Lagos • FMO / Babban Gona
	Access to (micro-) finance for young / female entrepreneurs, in combination with business coaching / advice and matchmaking (e.g. with Dutch investors)	• For micro-finance to young agri entrepreneurs: explore how the Bank of Agriculture works with youth – what are their challenges, successes. • Central Bank of Nigeria (CBN) also important (for small- & medium-scale farmers thus impacting on bigger number of farmers), perhaps more than Access Bank (that caters more for medium to large scale farmers • Oxfam: BMGF-funded programme to increase public finance for female small-scale producers – 'Female Food Heroes'

Table 14. Stakeholders linked to the policy themes (continued)

Themes	Main leverage points	Stakeholders in NL and Nigeria
Employment	Technical and vocational training of youth and women, linked to value chains / processors: match training with skills demand (different dynamics in different locations)	• Work with women and youth groups giving them more influence on capacity building • Dutch organisations (RVO, Agriterra, WUR, etc.) can collaborate with Nigerian educational institutes to strengthen TVETs • EKN Lagos: LEAD program (implemented by SOS and Oxfam) • NUFFIC/RVO: OKP program
	Support local enablers; e.g. incubation (GAIN) or start-up centres (Rabobank)	• Food Connection Challenge (Crosswise Works) is an incubator for existing agribusiness SMEs in Benin & Nigeria. The goal of the FCC is to reduce post-harvest food losses by incubating innovative business ideas by these SMEs • 2SCALE
	Promote responsible investments (of Dutch private and public sector), creating decent jobs etc.	• Partner with Bank of Agriculture, they work with youth • FMO / EKN Lagos promoting Dutch private sector investments • HiiL / Innovating Justice Hub West Africa in Lagos. This hub finds and supports justice innovations dealing a.o. with employment - such as workplace disputes, fair contracts, and labour standards • Oxfam: provide business support and access to finance to SMEs (mostly agribusinesses) to create youth employment – Work in Progress project
Food and nutrition security	Awareness raising on knowledge improvement on healthy diets	• Supermarkets cater for upper class only and are far less important than local markets in volumes of trade & pricing of agricultural produce. • Stakeholders with knowledge on FNS (e.g. Nigerian universities) have little influence on consumer behaviour. Dutch stakeholders even less so
	Nigeria needs to invest in domestic production and processing capacities to improve the production of food and cash crops and reduce food losses	• Aggregators/vendors are important drivers of 'prices' – they move agricultural produce out of, or into, Nigeria at will depending on prevailing prices. • CGIAR, IAR&T, NIHORT and the like contribute significantly to development and distribution of seed varieties to farmers & they have developed strong bonds particularly with subsistence farmers, leading to higher productivity of staple crops (cassava, maize, yam etc.) • NABC is the coordinator of S4C seeds for change a program focussed on increasing the use of hybrid vegetable seeds in Nigeria.
Climate change adaptation	Share data & information (and know-how) on climate change impacts and adaptation strategies for producers, processors, traders Include regional scenarios of climate change impact	• Two important groups: Ministries of agriculture and environment (UNCCD – to understand local practices) and River Basin Authorities • East West Seed trains farmers in Kaduna / Kano on vegetable farming; is trying to acquire land to set up nurseries - and sell seed in other parts of the country. • The Netherlands can introduce soil and water conservation measures, drought resistant varieties. • Land tenure insecurity influences climate change mitigation interventions – affects investments in agronomic practices. • Federal Ministry of Agriculture plays a greater role than State Ministries of Agriculture when it comes to environmental issues/climatic impact etc. • Nigeria Initiative for Sustainable and Climate-smart Oil Palm Smallholders (NI-SCOPS): Investing in the three dimensions of climate smart agriculture (productivity, adaptation, mitigation) in oil palm smallholder landscapes in several states in Nigeria.

Step 7: Policy recommendations

The Netherlands government does not have the mandate nor the resources to address all the root causes that restrain the transformation of the agri-food sector in Nigeria, yet it can collaborate with Nigerian stakeholders to transform a sub-sector or value chain within a target region. But efforts need to be joined, and choices need to be made, given the limited resources. Nigeria offers a lot of potential, with necessary resources being available, but not in all places at all times; the challenge is to bring different parties together on the right opportunity and in the right way. The EKN in Lagos can play a brokering role and provide matchmaking services for companies, organisations and individuals interested in such an opportunity. Alliances must be created to improve market linkages, provide skills training of youth, enhance access to quality inputs (in particular seed) and finance, support processing SMEs, and invest in storage, packaging and transport facilities. Furthermore, to achieve the desired impact, it is recommended to work with intermediary organisations who serve the target group directly. To benefit women and youth, it is recommended to focus on shorter value chains with local markets and with less concentrated power, for example horticulture. High-level interventions and policies, though important, are unlikely to benefit small-scale farmers and SMEs on the ground given the weak institutions and power imbalances. For export crops, it is recommended to invest in cash crops (e.g. cocoa, cashew, palm oil) that are not important for the national food and nutrition security; however, export promotion of such crops can be highly politicised.

One particular key challenge is the predominance of the informal economy that shapes many constraints and opportunities of smallholder producers. More debate is needed to determine whether formalisation of the economy is a development paradigm that will result in the desired transformations. If so, current power structures will need to be challenged, which may further destabilise both urban and rural societies. If formalisation of the economy is not considered feasible in the short run, then modes of dealing with informality must be thought. [How] can current private capital be put to use to unlock the potential of rural areas? Are there modalities that allow the merging of interests between formal financial institutions and private investors?

The Dutch government can also facilitate processes of learning from practice between trade and development stakeholders in Nigeria. The challenges and specificity of constraints are simply too complex to allow for applying blueprint solutions. As such, think tanks, knowledge institutes and data centres in Nigeria all merit Dutch development investments. This may well be one of the greater opportunities for generating impact with Dutch investments: strengthening intellectual capacity, independent institutions and space for civil action in Nigeria to leverage effects on a more resilient society. More voices of women and youth in the public domain has proven in many situations to deliver on development outcomes.

Table 15. Policy recommendations

Theme	Main leverage points	Trade and investment strategy	Types of Partnerships	Geographic areas
Agricultural sector transformation	Public investments in operational enabling environment, implementation of policies, infrastructure	• Exchange visits. Exchange of knowledge NL-Nigeria • Policy implementation training • Link (economic) political dialogue to partner interventions and constraints encountered • Create centres of excellence where Nigerian and Dutch experts can engage in knowledge exchange, practical innovation and vocational training.	• Nigerian policy level: Federal and State level institutions (Ministries, Apex research organisations Abuja • Farmer Unions • LNV, EKN Lagos • Dutch knowledge institutes	National level and for NL Intervention areas (Kano, Kaduna, Edo, Plateau State)
Agribusiness, value chain development, agri-logistics	Value chain strengthening & coordination for shorter value chains with less concentrated power	• Focus on a few crops for value chain development and coordination • Need to focus on sub-sectors/ value chains where the Netherlands has added value • Create Agrihubs for extension services, TVET, inputs supply and information (seed, fertilizer..) , processing and storage • Develop understanding of the whole value chain and the power relations between actors • Develop specific commodity-based extension and input systems • Empowerment of women entrepreneurs (other than so-called market queens)	• Ministries of Agriculture at Federal and State level • Knowledge institutes in Nigeria (Apex research organisations Abuja) and fom the Netherlands • Processors, vendors and supermarkets • DFID and World Bank • Solidaridad (Palm oil) • East West Seed (Horticulture Kaduna and Kano) • GiZ (potatoes) • SEED.nl •	• Palm oil: Edo state (most migration to NL, Ondo state (thriving palm oil sector; have know-how and nurseries) • Onions: Kano state, Nasarawa state • Tomatoes: Kaduna state • Potatoes: Plateau state
	Provision of data and information (support unit EKN Lagos for Dutch private sector and NGOs, also matchmaking for Nigerian private investors looking to export to EU – cocoa, cashew, sesame, palm oil	• Promote viable data collection of Government offices • Support/strengthen Nigerian collection of statistic information on a variety of value chains	• FOS/NBS • NL and Nigerian private sector • Value chain analysis (Netherlands Knowledge Institutes)	• NL Intervention areas (Kano, Kaduna, Edo, Plateau State)

Theme	Main leverage points	Trade and investment strategy	Types of Partnerships	Geographic areas
Access to finance	Matchmaking of private capital with other partners with agricultural know-how and social / environmental / economic impact goals	Capacity building of banks (on sector knowledge of agricultural sector)	• Nigerian agricultural banks • Rabobank • FMO / Babban Gona	
	Access to (micro-) finance for young / female entrepreneurs, in combination with business coaching / advice and matchmaking (e.g. with Dutch investors)	Empowerment of youth / women entrepreneurs Technical and vocational training of youth and women: credit worthy business plan development for different value chains	• Nigerian banks and MFI • TVET organisations (NL and Nigeria) • 2SCALE	NL Intervention areas (Kano, Kaduna, Edo, Plateau State)
Employment	Technical and vocational training of youth and women, linked to value chains / processors: match training with skills demand (different dynamics in different locations)	• TVET (skills development) • Job creation • Access to micro finance • Empowerment of young people/women entrepreneurs	• Ministries of Agriculture at Federal and State level • Knowledge institutes in Nigeria (Apex research organisations Abuja) and the Netherlands • Nigerian banks: Central Bank of Nigeria, Bank of Agriculture, Access bank • Processors • TVET organisations in Nigeria and in the Netherlands • FMO • DFID/WorldBank/ADB	National and NL Intervention areas (Kano, Kaduna, Edo, Plateau State)
	Support local enablers; e.g. incubation or start-up centres		• GAIN • Rabobank	National and NL Intervention areas (Kano, Kaduna, Edo, Plateau State)
	Promote responsible investments (of Dutch private and public sector), creating decent jobs etc.		• FMO/Access bank • EKN Lagos • NABC	National and NL Intervention areas (Kano, Kaduna, Edo, Plateau State)

Table 15. Policy recommendations (continued)

Theme	Main leverage points	Trade and investment strategy	Types of Partnerships	Geographic areas
FNS	Awareness raising on knowledge improvement on healthy diets	• Include healthy diets and knowledge on nutrition in technical and vocational training of youth and women, and processors	• Ministries of Agriculture at Federal and State level • Knowledge institutes in Nigeria (Apex research organisations Abuja) and the Netherlands • Processors, vendors and supermarkets • Farmer Unions • Unilever • WUR	National and NL Intervention areas (Kano, Kaduna, Edo, Plateau State)
	Nigeria needs to invest in domestic production and processing capacities to improve the production of food and cash crops and reduce food losses	• Promote info/statistics on healthy food (value chain development and media campaign) • Value chain development (also for nutritious food, affordability of nutritious food) • Promote Vegetable production as food and nutrition sources for the people	• FOS/NBS • WUR • East-West Seed	Horticulture value chains in Kano, Kaduna
Climate change adaptation	Share data & information (and know-how) on climate change impacts and adaptation strategies for producers, processors, traders Include regional scenarios of cc impact	• Sharing of Dutch knowledge on CSA, sustainable intensification, • Develop knowledge on climate impact for specific regions and commodities • Strengthen land governance for (investments in) sustainable land use	• River Basin Authorities • Ministries at Federal and State level • DFID	National and NL Intervention areas (Kano, Kaduna, Edo, Plateau State)

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